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Laws and Powers in Leibniz

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Laws and powers vie for theoretical primacy in Leibniz's philosophy. The concept of law is integral to Leibniz's understanding of the order of nature and of God's providential direction of creation. At the same time, Leibniz holds that natural laws themselves must be explained in terms of natural powers: intrinsic sources of activity from which instances of change arise. This is true both for prototypical physical laws (laws of motion, laws of optics) and for the law of the series that is the ground of the identity of an individual substance. In brief, nothing happens in Leibniz's world except through the activity of powers intrinsic to substances. This is a fundamental point, on which he distinguishes his philosophy from those of Descartes, Malebranche and Spinoza.

The activity of powers is a relatively underexplored topic in the Leibniz literature. It is clear that Leibniz believes that powers constitute a causal ground floor, and thus are to be appealed to in explaining why change occurs at all in nature. But how exactly do powers act for Leibniz? One possibility is that powers act via laws. One reason why this explanation is tempting is because for Leibniz there is no room for the *activation* of powers. Powers are not, as they are for Aristotle, potentials for action. They are fully complete and actual sources of activity, in Leibniz's term, *entelechies*. Furthermore, a substantial power can be influenced by nothing outside of itself. So, to the extent that particular actions and instances of change follow from it, this can only occur through a principle internal to the power. Yet what could this principle be but a law that is no less intrinsic to the substance than the power itself?

If this is correct, then laws presuppose powers, but powers equally presuppose laws. On Leibniz's account the one cannot be present without the other, and they are equally basic from an explanatory point of view. The first two sections of my paper summarize some central themes of Leibniz's account of the laws of nature, and his thesis that laws must be grounded in powers. The third section considers the mode of activity of powers and the sense in which this activity presupposes the idea of law. I conclude with a speculative hypothesis about the character of the laws that play a fundamental explanatory role in Leibniz's account of substantial change. Surprisingly, I suggest, these turn out to include the very physical laws that give rise to his claim for a metaphysical grounding of laws in substantial powers.

1. Laws of Nature

Considerations concerning the content and significance of the laws of nature loom large in Leibniz's philosophy. As a working scientist, Leibniz is intent on determining the correct form of the laws of nature and supplying adequate theoretical foundations for them. This is especially true for the laws of optics (reflection and refraction) and the laws of motion, including the fundamental principle of the conservation of force. Leibniz is also preoccupied, though, with the

metaphysical and theological significance of the laws of nature. What exactly is the ontological status of these laws? Do they represent explanatory bedrock in our understanding of nature? How are they to be understood in relation to God's providential designs and causal contribution to creation? In what follows, I will be concerned more with these general philosophical issues and less with Leibniz's theorizing about particular natural laws, though some of the results of the latter will be presupposed in what I say.

Leibniz takes for granted that nature is orderly, or lawful, and that it owes its order to God. In the *Discourse on Metaphysics*, he asserts that "in whatever manner God might have created the world, it would always have been regular and in accordance with a certain general order," because "God does nothing which is not orderly" (DM 6; AG 39). There is, most fundamentally, a law that governs creation as a whole, and this "most general of God's laws, the one that rules the whole course of the universe, is without exception" (DM 7; AG 40). The existence of a single "world law" comprehending all events in the created world is notable in itself and highlights Leibniz's conception of God as a perfect intelligence, who encompasses in thought a complete *rational* representation of the actual world and of every other possible world.

Under this most general law fall both God's ordinary and extraordinary volitions (DM 6). God's ordinary volitions are coextensive with the order of nature. "Natural operations," Leibniz writes, "are called natural because they are in conformity with certain subordinate maxims that we call the nature of things" (DM 6; AG 40). Events that are exceptions to these subordinate maxims are by definition miracles, ascribed to extraordinary (or particular) divine volitions (cf. DM 16-17).

In the *Discourse*, Leibniz offers as an example of a subordinate maxim, or law of nature, his principle, argued for against the Cartesians, "that God always conserves the same force but not the same quantity of motion" (DM 17; AG 49). Supposing Leibniz is correct in taking this to be a genuine law of nature, which is owed to God's general volition always to preserve the same force in interactions among bodies, how are we to understand the basis in God's will for this law? There are three possibilities: 1) the law may follow necessarily from God's nature (though this seems to cut against the idea that the law depends upon a free divine volition); 2) the law may be an arbitrary creation of God's will; 3) the law may be the product of a volition which is directed toward a particular end; God wills a given law and not another for a reason, which is to achieve a certain optimal outcome. As is well known, Leibniz argues strongly in favor of the third option. Rehearsing his discovery of the "true laws of motion" in the *Theodicy*, writes:

These considerations make it plain that the laws of Nature regulating movements are neither entirely necessary nor entirely arbitrary. The middle course to be taken is that they are a choice of the most perfect wisdom. And this great example of the laws of motion shows with the utmost clarity how much difference there is between these three cases, to wit, firstly *an absolute necessity*, metaphysical or geometrical, which may be called blind, and which does not depend upon any but efficient causes; in the second place, *a moral necessity*, which comes from the free choice of wisdom in relation to final causes; and finally in the third place, *something absolutely arbitrary*, depending upon an indifference of equipoise, which is imagined, but which cannot exist, where there is no sufficient reason

either in the efficient or in the final cause. Consequently one must conclude how mistaken it is to confuse either that which is absolutely necessary with that which is determined by the reason of the best, or the freedom that is determined by reason with a vague indifference. (sec. 349; GP VI 321/H 334)

Leibniz identifies two essential properties of the laws of nature. First, they are not metaphysically or geometrically necessary, as he takes Spinoza to claim, but contingent. The laws of motion cannot be derived from the concept of spatial extension; other laws are equally conceivable and consistent with that concept. But, second, the laws of nature also are not “absolutely arbitrary.” The laws themselves evidence signs of “fitness,” or optimality. The order they dictate for the world suggests that they are “a choice of the most perfect wisdom.” While both of these features of the laws of nature, contingency and fitness, can be supported by arguments based on the form of the laws themselves, Leibniz’s deepest rationale for thinking of the laws of nature in this way is his conception of God as a perfectly “intelligent and free being,” who acts for the sake of the best. To think of the laws of nature as either necessary or arbitrary would be to challenge this fundamental assumption about the correct understanding of God’s nature. For Leibniz, the laws of nature “do not arise entirely from the principle of necessity, but rather from the principle of perfection and order,” *because* “they are an effect of the choice and the wisdom of God” (sec. 345; GP VI 319/H 332).¹

The presumptive “fitness” of the laws of nature, expressed in rules such as the equality of cause and effect and the “most determined path principle” in optics, supplies a heuristic for scientific discovery.² We are directed to search for rules with these sorts of formal characteristics, because they are most likely to represent fundamental laws of nature. More important than this, however, laws that can be explicated in terms of the “principle of perfection and order” support an conception of the world as one that has been created by God as the best of all possible worlds. Thus, Leibniz’s interpretation of the laws of nature forms an integral part of his theodicy project.

2. From Laws to Powers

Everything that has been said so far about the formal properties of the laws of nature is consistent with a broadly Malebranchean (or Humean) understanding of them. Malebranche, as much as Leibniz, believes that the laws of nature express “general volitions” of God, and that these volitions are directed toward a certain end or good. In the laws he wills, God is not constrained by necessity and he does not will arbitrarily. For both philosophers, God wills the laws he does, because they are the *best* (though Malebranche and Leibniz understand this criterion differently).

Leibniz, however, stresses a further characteristic of the laws of nature which differentiates his position from that of Malebranche. For Leibniz, God’s general volition, or his willing that the world unfold according to one order rather than another, is not sufficient for the determination of a law of nature. A law of nature exists only if that law is grounded in the natural powers of created beings. In Leibniz’s view, this further condition is necessary in order to distinguish the natural and the miraculous. If this distinction is left to depend, as it does for Malebranche, on a difference merely in the generality of God’s volitions, then we are left with no coherent notion of

an independent order of nature. This leads to Leibniz's famous complaint that Malebranche's occasionalism amounts to a system of perpetual miracles. Replying to Bayle, he writes:

[L]et us see whether the system of occasional causes does not in fact assume a perpetual miracle. Here it is said that it does not, because according to this system God would only act through general laws. I agree, but in my opinion this does not suffice to remove the miracles; even if God should do this continuously, they would not cease being miracles, taking this word, not in the popular sense of a rare and marvelous thing, but in the philosophical sense of what exceeds the powers of created things. It is not enough to say that God has made a general law; for besides this decree there must be a natural means of executing it; that is, it is necessary that what happens can be explained through the nature that God gives to things. (GP IV 520/L 494)³

Leibniz's desire to establish a sharp distinction between the ordinary course of nature, which can be understood through the natures of created beings, and genuine miracles is evident. Less clear is whether he has a non-question-begging argument against Malebranche's position. There is no doubt that Malebranche has a distinction between the natural and the miraculous, which is consistent with his own theory of occasional causation. The difficulty is that Leibniz does not accept that theory of causation, and so does not accept the account of the natural/miraculous distinction that Malebranche builds on it.

Our priority, though, is to understand Leibniz's own account of the order of nature. Here we find two complementary lines of argument. The first is premised on a claim about the *intelligibility* of the natural order. Leibniz's commitment to the principle of sufficient reason entails that for anything that happens, there is a sufficient reason why it happens thus and not otherwise. A further necessary condition for an effect to be part of the order of nature, however, is that there be not just *some* sufficient reason why it happens, but that there be what Leibniz calls a "natural reason": a reason that displays the effect in question as following in an intelligible manner from the nature or essence of some created being (GP III 519).⁴ As Leibniz comments in the Preface to the *New Essays*:

But to explain myself distinctly, it must be borne in mind above all that the modifications which can occur to a single subject naturally and without miracles must arise from limitations and variations of a real genus, i.e. of a constant and absolute inherent nature. For that is how philosophers distinguish the modes of an absolute being from that being itself; just as we know that size, shape and motion are obviously limitations and variations of corporeal nature.... Whenever we find some quality in a subject, we ought to believe that if we understood the nature of both the subject and the quality we would conceive how the quality could arise from it. So within the order of nature (miracles apart) it is not at God's arbitrary discretion to attach this or that quality haphazardly to substances. He will never give them any which are not natural to them, that is, which cannot arise from their nature as explicable modifications. (RB 66)

Leibniz relates this requirement of the intelligibility of the natural order to a strong claim about the agreement between natural occurrences and the human mind's capacity to understand those occurrences. In the same Preface, he writes:

I acknowledge that we must not deny what we do not understand, but I add that we are entitled to deny (within the natural order at least) whatever is absolutely unintelligible and inexplicable.... [A]lthough what creatures conceive is not the measure of God's powers, their 'conceptivity' or power of conceiving is the measure of nature's power: everything which is in accord with the natural order can be conceived or understood by some creature. (RB 65)

That nature must be such as to be conceivable by the human mind, and conceivable in just the way Leibniz lays out, might seem mere wishful thinking on his part. It is important, therefore, to recognize how this claim is integrated into the structure of his theodicy, according to which God is conceived as a perfect intelligence, who has chosen this world for existence in large part *because* it is intelligible to rational beings. The intelligibility of the natural order is thus partly constitutive of this being the best possible world, or the world of greatest perfection. For this reason, Leibniz insists that to reject the "distinction between what is natural and explicable and what is miraculous and inexplicable.... would be to renounce philosophy and reason, giving refuge to ignorance and laziness by means of an irrational system.... [T]his idle hypothesis would destroy not only our philosophy which seeks reasons but also the divine wisdom which provides them" (RB 66).

The principle of the intelligibility of nature is a powerful tool that Leibniz wields against Malebranche's occasionalism, Newton's theory of universal gravitation, Locke's doctrine of thinking matter, and any other hypothesis which involves an ad hoc grafting of "occult qualities" or powers onto material things in an attempt to explain particular phenomena or effects. This style of critical argument, however, highlights the need to understand better how Leibniz himself envisions accounting for natural phenomena, and the laws that govern such phenomena, in terms of the natures of created beings. Pursuing this question leads us beyond the initial idea of the intelligibility of nature to consider more closely the *causal* grounds of physical phenomena: by virtue of what in the nature of a body (or other subject of predication) does such-and-such an effect occur? Again, the presumption is that to account for effects, it is not enough simply to cite a law according to which they occur. We must also be able to point to some fact about the nature of the subject of the effect, which explains how and why that effect occurs as it does.

In addressing this question we must begin from Leibniz's axiom that *substance* is the ground of all force or power in the created world. By definition, substance is an intrinsic principle of action or change. "Substances (material or immaterial) cannot be conceived in their bare essence, devoid of activity," Leibniz writes. "Activity is of the essence of substance in general" (RB 65). For this reason, he believes that all explanations of natural change must terminate in an account of how those changes occur through the exercise of powers intrinsic to substances. That is the ultimate reason why anything happens in the way it does in nature. Granting this, we then confront two further questions: (1) For Leibniz, what are the members of the class of genuine substances, the fundamental sources of activity in the world? (2) How is the exercise of the powers of those substances linked explanatorily to the occurrence of physical phenomena?

A dominant theme of Leibniz's philosophy from the late 1670s onward is that the latter explanatory work cannot be accomplished if we limit ourselves to the understanding of nature presupposed by the mechanical philosophy—an understanding according to which the properties of bodies are restricted to extension and its passive modifications (including solidity or impenetrability). There is much to say on this topic. For my purposes we need accept only two points: first, as conceived by the mechanical philosophy, bodies fail to meet the conditions Leibniz imposes on a substantial existence (e.g. they lack a true unity and an intrinsic principle of action); second, the natures of bodies, so conceived, are inadequate to account for the effects observed in them. In particular, Leibniz stresses effects associated with the motion and collision of bodies. His major claim here is that the fundamental law of the conservation of force cannot be accounted for if the nature of body is limited to extension and its passive modifications.

A characteristic statement of his reasoning appears in the *Specimen dynamicum* of 1695. After reflecting on the inadequacy of his original conception of body, Leibniz writes,

I found a proof that something more than magnitude and impenetrability must be assumed in body, from which an interpretation of forces may arise. By adding the metaphysical laws of this factor to the laws of extension, there arise those rules of motion which I would call systematic—namely that all change occurs gradually, that every action involves a reaction, that no new force is produced without diminishing the earlier force...., and that there is neither more nor less power in the effect than in the cause. **Since this law is not derived from the concept of mass, it must follow from something else which is in bodies**, namely, from the force itself, which always preserves the same quantity, even though it is used by different bodies. I concluded, therefore, that besides purely mathematical principles subject to the imagination, there must be admitted certain metaphysical principles perceptible only to the mind and that a certain higher and so to speak, formal principle must be added to that of material mass.... Whether we call this principle form, entelechy, or force does not matter provided that we remember that it is explained intelligibly only through the concept of forces. (GM VI 241-2/L 440-1*)

Leibniz's argument draws both on the general principle of the intelligibility of nature and the specific claim that certain physical effects demand a ground in a principle of force or power. The true laws of motion, particularly the conservation of force, cannot be explained in terms of the concepts of extension and impenetrability alone. Hence something more must be present in the nature of body, a "formal" or "metaphysical" principle, which is "perceptible only to the mind." The link to intelligibility is made explicit in the opening of the *Specimen dynamicum*:

We have suggested elsewhere that there is something besides extension in corporeal things; indeed, that there is something prior to extension, a force of nature implanted [*inditam*] everywhere by the Author of nature.... But if we cannot ascribe it to God by some miracle, it is certainly necessary that this force be produced by him within bodies themselves. Indeed, it must constitute the inmost [*intimam*] nature of the bodies, since it is the character of substance to act,

and extension means only the continuation or diffusion of an already presupposed acting and resisting substance. (GM VI 235/L 435)

The claim that there be a “force of nature implanted everywhere” in bodies leads directly to the conclusion that this force constitutes the “inmost nature” of bodies. Connecting these two ideas is the axiom that substance, the most basic form of reality, is itself a principle of action. If bodies are real, their existence must be explicated in terms of the existence of substance. From this it is a short step for Leibniz to conclude that if force belongs to the nature of body, then that force is just the force of whatever substances ground the body’s existence.

The relationship between the physical force of bodies and the principle of force constitutive of substance is fundamental to Leibniz’s philosophy. One of the hurdles to comprehending this relationship is Leibniz’s assertion that substantial force or power is to be interpreted in broadly Aristotelian terms as soul or substantial form. A characteristic statement of his position appears in the *Specimen dynamicum*:

Active force (which may not inappropriately be called *power* [*virtus*], as some do) is twofold, that is, either *primitive*, which is in all corporeal substance as such..., or *derivative*, which is exercised variously, as it were by a limitation of primitive force, resulting from the collision of bodies with one another. Indeed, primitive force (which is nothing but the *first entelechy*) corresponds to *soul or substantial form*. But, for that reason, **it pertains only to general causes, which are insufficient to explain the phenomena**. And so we agree with those who deny that we should appeal to forms when treating the individual and specific causes of sensible things. This is worth pointing out, so that when we restore forms, as if by birthright, in order to uncover the ultimate causes of things, at the same time we don’t seem to want to revive the empty wordplay of the common schools. Nevertheless, a conception of forms is necessary for philosophizing properly (GM VI 236/AG 119*)

Leibniz conceives of substantial power, or primitive force, as essential to the nature of material being, and as grounding the forces exerted by bodies in motion and collision. Yet he denies that this force, as soul or substantial form, can be appealed to in providing explanations of particular physical phenomena. Distancing himself from scholastic Aristotelians, and from those who “bring forth attractive, retentive, repulsive, directive, expansive, and contractive faculties” as the proximate causes of phenomena (AG 313), Leibniz allies himself with the research program of the mechanical philosophy, while also marking out what he takes to be its explanatory limits. As he succinctly puts it, we must suppose “that everything happens mechanically in nature, but that the principles of mechanism are metaphysical” (AG 319).

The distinction Leibniz draws here allows us to contrast the implications he sees as following from the principle of intelligibility and from the requirement that any instance of force have a ground in some substantial power. Leibniz takes the demand for intelligibility to rule against any putative explanation of physical change that is not given in terms of forces exercised through body-body contact. In his view, it is unintelligible how one extended body can affect another except through physical contact with it. To this extent, the program of mechanistic physics is

upheld: “That physics which explains everything in the nature of body through number, measure, weight, or size, shape and motion, which teaches that nothing is moved naturally except through contact and motion, and so teaches that, in physics, everything happens mechanically, that is, intelligibly, this physics seems excessively clear and easy” (AG 312). At the time, mechanistic physics is judged to be incomplete as an account of the physical forces exercised by one body on another. These forces, and the laws governing them, cannot be explained in terms of “size, shape and motion,” but presuppose something additional in matter, a substantial form, primitive force or entelechy, which is the ground of the forces exerted in motion and collision.

Unfortunately, to say all of this is merely to set the stage for the deepest problems that confront the interpretation of Leibniz’s position. Bodies (appear to) gain and lose derivative force through motion and through contact with other bodies. Those forces, however, claim a ground in reality as modifications of the active powers of souls or substantial forms. The unification of this set of doctrines posed an extraordinary challenge for Leibniz, to which he responded in at least two ways. Structurally, the two accounts are closely related, though most commentators have seen them as inconsistent from an ontological point of view. The first account responds to the incompleteness of the mechanistic theory of matter by replacing it with a conception of matter as consisting of infinitely enveloped living bodies or corporeal substances. On this understanding of matter, the forces exercised by bodies in motion are explained as modifications of primitive active forces, which themselves are identified with the forms of the constitutive corporeal substances. A second approach goes beyond this, conceiving of the substances that constitute matter (if there are such substances) as unextended, soul-like monads. Monads, like corporeal substances, are endowed with primitive active and primitive passive powers, i.e. substantial form and primary matter. Hence, we should expect Leibniz to pursue exactly the same pattern of explanation in this case: the derivative forces of moving bodies are accounted for as modifications of the primitive active powers of the substances constitutive of those bodies.

On the face of it, it might seem that the first account is more promising simply because it is more firmly rooted in *terra firma*: the substances that ground the reality of corporeal forces are themselves corporeal. I remain unconvinced by this for two reasons. First, both accounts face the same basic challenge of rendering intelligible how derivative active forces like *vis viva* arise as modifications of a *soul*-like substantial form. Although this soul or form is conceived as metaphysically united with a body in one case and not in the other, this difference does not make it any easier to understand how derivative forces arise as modifications of its primitive active force. Second, I believe that Leibniz actually has more interesting things to say about this issue in the case of monads, and that the account he gives allows us to see the explanatory strength of the monadological metaphysics as against that of corporeal substances. I shall return to the details of this account in the last section of my paper. First, however, I want to lay out the general strategy he develops for explaining the modification of active force, and why this sends us from powers back to laws.

3. From Powers to Laws

Whether physical forces are conceived as modifications of the active power of a corporeal substance or as modifications of the active power of an immaterial substance, Leibniz faces the same basic question: under what circumstances, and through what causes, is a substantial power

activated, or actualized, as this-or-that moment of force? The metaphysical issues here are subtle, and they nowhere receive the careful extended treatment they deserve from Leibniz. Leibniz defines change (*transitio*) as “nothing but a complex of two states which are immediate and opposite to each other, together with a force or [*seu*] reason for the change, which reason itself is a quality” (C 9/MP 134). The definition involves several elements. First, change itself is not a state of a thing, but a complex, or aggregate, of a pair of contradictory states.⁵ Second, a point that remains implicit in the definition, these states are ordered as prior and posterior, and there is a reason why the one succeeds the other.⁶ Third, this reason is a force, which itself is a quality of the thing (and, more specifically, of the prior state).

For Leibniz, this account of change is meant to be completely general. It is applicable to the changes that bodies undergo, but equally it should apply to changes in the states of substances, including monads. This is important, because if Leibniz’s explanatory program is to succeed, changes in the physical states of bodies, which are accounted for through the forces acting on and in them, must ultimately be explained in terms of the transient modifications of substantial forms, or primitive active powers. So the account has to apply to substances as well, and Leibniz clearly believes this is true for monads. At any moment, a monad is defined by a perceptual state, the representation of the manifold in a unity; such perceptual states succeed one another in change; and the succession of states is explained by the force associated with the prior perceptual state.

What remains less than perspicuous is how the force associated with the momentary changing states of a substance is grounded in the primitive active power that defines the nature of a substance. On this point, it is helpful to consider Leibniz’s theory from the perspective of Aristotle’s account of change. For Aristotle, any substance has a given power or potential to be modified by certain qualities or accidents (e.g. to be white or large). Under appropriate conditions, that power may be activated or actualized with the result that the substance is modified by some quality or accident (white or large is actual in it). Crucially, any change of this sort requires a cause, which elicits the actualization of the form: where before it was not F, now it is F. And this cause, in general, will be the activity of a substance distinct from the substance that undergoes a change in its qualities or accidents.

There are two respects in which Leibniz distinguishes his account of change from Aristotle’s. The first is that he denies that there is any real causal interaction among substances. Consequently, if change requires the activation of a substantial power, it cannot occur through the action of something external on that substance. Any change in a substance’s states has to be elicited from within. Accordingly, Leibniz emphasizes that any substance is *spontaneous* in all its actions:

[W]hen it is a question of explaining oneself precisely, I maintain that our spontaneity suffers no exception and that external things have no physical influence on us, speaking with philosophical rigor. In order to better understand this point, we must realize that a genuine spontaneity is common to us and all simple substances (*Theodicy*, secs. 290-1; GP VI 289)⁷

But to say that the soul does not produce its thoughts, its sensations, its feelings of pain and of pleasure, that is something for which I see no reason. In my system every simple substance (that is, every true substance) must be the true immediate cause of all its internal actions and passions; and, speaking with metaphysical rigor, it has none other than those which it produces. (*Theodicy*, sec. 400; GP VI 354)

Leibniz's emphasis on what can be said in "metaphysical rigor" makes it clear that the spontaneity of substance is a non-negotiable commitment for him. He draws this conclusion on the basis of a set of considerations related to the definition of substance and the principle of sufficient reason, and he never shows any sign of wavering from it.

The second point on which Leibniz distinguishes his account from Aristotle's is his denial that the notion of substantial power involves any notion of *potential*, or an unrealized capacity for change:

The concept of *forces* or *powers*, which the Germans call *Kraft* and the French *la force*, and for whose explanation I have set up the distinct science of *dynamics*, brings the strongest light to bear upon our understanding of the true concept of *substance*. Active force differs from the mere power familiar to the Schools, for the active power or faculty of the Scholastics is nothing but a proximate [*propinqua*] possibility of acting, which needs an external excitation or a stimulus, as it were to be transferred into action. Active force, in contrast, contains a certain act or entelechy and is thus midway between the faculty of acting and the act itself and involves a conatus. It is thus carried into action by itself and needs no help but only the removal of an impediment. (GP IV 439/L 433)

Leibniz's elaboration of the claim that, to act, a substance needs "no help but only the removal of an impediment" relies on physical examples (e.g. a compressed spring), and so does little to assist our understanding of the dynamics of substantial change. One point he is intent on making is that, because there can be no external excitation of a substance, a substance must be brought to action from within. Given this, he believes that it is inappropriate to think of a substance as containing merely the possibility or potentiality of acting; rather, a substance is already fully actual, or what Aristotle calls an *entelechy*:

One can call all simple substances or created monads entelechies, for they have in themselves a certain perfection (*echousi to enteles*); that have a sufficiency (*autarkeia*) that makes them the sources of their internal actions, and, so to speak, incorporeal automata. (Mon. 18; AG 215)

At one level, the picture Leibniz paints of substance is clear enough. Every substance is, by nature, a source of activity. Its activity is expressed in changing states (in the case of monads, perceptual states).⁸ A question that dogs his account, however, is how to conceptualize a substance's transition from one state to another. Leibniz believes that this change is explained by the power intrinsic to the substance; that the modification of that power (derivative force) as

expressed in any state of the substance is a *sufficient reason* for its determination in a subsequent state. The problem with this account is that, thus stated, it seems no less ad hoc than the appeal to “occult powers” that Leibniz criticizes. He rejects the idea that to explain phenomena of repulsion and attraction it suffices to posit a magnetic power. How are we any better off in positing a “substantial power” which expresses itself in a succession of distinct states of the substance? The concern is that there is nothing in the concept of an “active power,” even one that is more *entelecheia* than *dunamis*, that would allow us to understand why that power should give rise to one set of effects, mediated by a series of changing determinations, rather than another. Arguably, we have here exactly the same sort of violation of the principle of intelligibility that Leibniz elsewhere inveighs against.

It would be going too far to say that Leibniz himself sees the problem in exactly this way, but he frames his account of substance in a way that allows an answer to it. The answer comes in the essay *De ipsa natura*, in the course of responding to occasionalist accounts of divine action. Against such accounts, Leibniz stresses that, in giving order or law to the universe, God must be understood as doing more than issuing a command, which is a mere “extrinsic denomination” of creatures. Rather, there must follow an “enduring impression in the thing itself,” in the form of “an inherent law [*legem insitam*]... from which both actions and passions follow” (GP IV 506-7/AG 158). Leibniz’s reasoning invokes the same considerations of intelligibility as we saw at work his critique of other philosophers. **If all change is to be accounted for through the activity of substance, and substances act spontaneously, then there must be something about the nature of substance that accounts for its particular series of states.** As Leibniz sees it, this can only be a law that is inherent in the nature of substance itself:

[I]t is not sufficient to say that God, creating things from the beginning, willed that they follow a certain definite law in their change [*progressus*] if we imagine this will to have been so ineffective that things are not affected by it and no lasting effect was produced in them.... But if, indeed, the law God laid down left some trace of itself impressed on things, if by his command things were formed in such a way that they were rendered appropriate for fulfilling the will of the command, then already we must admit that a certain efficacy has been placed in things, a form or a force, something like what we usually call by the name ‘nature,’ something from which the series of phenomena follow in accordance with the prescript of the first command (GP IV 507/AG 158-59)

Again we find Leibniz insisting against occasionalist accounts of divine action that the effects of substance (its changing states) must be accounted for in terms of some fact about its own nature. Anything less than this would render such change a perpetual miracle. However, the assumed spontaneity of substance places unique demands upon that nature. If a substance is the spontaneous cause of all its own states, there must be something about its nature which determines that just those states and no others follow from it. According to Leibniz, this implies that a substance’s nature must incorporate a *law*, whereby “the series of phenomena follow in accordance with the prescript of the first command.” Thus, just as the demand for intelligibility leads Leibniz from laws to powers, in the case of substance it leads him from powers to laws.

4. The Laws of Substantial Change

There might still seem to be an important asymmetry between the grounding of physical laws in bodily powers and the explanation of a substance's primitive power in terms of an individual "law of the series." In the first case, Leibniz is concerned with the general laws of nature that hold of certain kinds of things; in the second case, he is concerned less with a law of nature than with what might be described as a program: a complete and fully articulated specification of a substance's states. This, clearly, is the notion of law that he associates most closely with the nature of an individual substance. In the *Theodicy*, he asserts that "by nature every simple substance has perception, and that its individuality consists in the perpetual law which brings about the series of perceptions that are assigned to it and that arise naturally one from another" (sec. 291; GP VI 289).

Yet this is not the only notion of law that Leibniz invokes in accounting for the changes that occur in the perceptual states of a monad. One of his most common ways of characterizing the doctrine of preestablished harmony is to contrast the laws that govern changes in souls with those that govern changes in bodies:

Souls act according to the laws of final causes, through appetitions, ends and means. Bodies act according to the laws of efficient causes or of motions. And these two kingdoms, that of efficient causes and that of final causes, are in harmony with each other. (*Monadology*, sec. 79; AG 223)

The "laws of final causes" dictate the order of perceptual change in a monad: "the perceptions in the monad arise from one another by the laws of appetites, or by the laws of the *final causes of good and evil*, which consist in notable [*remarquables*] perceptions, ordered and disordered" (GP VI 599/AG 207).

Increasingly in his late writings, Leibniz takes on the project of explaining change in the monad by appeal to a distinct class of laws ("laws of appetites"; "laws of final causes") that govern the operation of a distinct type of force: appetite. As he writes in the *Monadology*, "the monad's natural changes come from an *internal principle*, since no external cause can influence it internally.... The action of the internal principle which brings about the change or passage from one perception to another can be called *appetition*" (secs. 12, 15; AG 214-5).

This characterization of Leibniz's project raises two significant questions. First, adverting to his broader program of accounting for the reality of physical forces as modifications of a substance's primitive active power, it is reasonable to wonder whether there is not a kind of explanatory gap here. As they figure in physical explanations, derivative forces are not obviously appetitive forces. Admittedly, Leibniz employs the psychologistic terminology of his day ("conatus," "striving," "solicitation") to characterize the basic elements of force (i.e. *vis mortua*). But it is worth asking whether the entelechy, or primitive active power, to which he appeals in accounting for physical forces is plausibly construed as an appetitive force that strives for a perceived good. Second, it is not clear that this is the kind of force that Leibniz requires to account for change in the monad itself. Recall his definition of change as a complex of two opposing states, "together

with a force or reason for the change.” Whatever the force that accounts for change in a monad, it must be a force that provides a *sufficient* reason for the transition from one perceptual state to another; in other words, the existence of that force, in conjunction with the laws governing its operation, must *determine* the state that follows from the prior state.

Whether appetitive forces, together with the laws of appetite, can be understood to satisfy this condition depends, I think, on how we interpret those forces. If we interpret them as forces determined, in their direction and magnitude, by a certain (possibly confused) representation of the good, then I am skeptical that they can be. The difficulty can be put succinctly via a passage I have already cited from *Monadology*, sec. 15:

The action of the internal principle which brings about the change or passage from one perception to another can be called *appetition*; it is true that the appetite cannot always completely reach the whole perception toward which it tends, but it always obtains something of it, and reaches new perceptions.

As Leibniz acknowledges, appetites directed toward a representation of the good as good often fail to be satisfied. As a result of its endeavor, a monad reaches *some* new state, but it is not a state reliably (i.e. deterministically) associated with the occurrence of the appetite. As things go, the occurrence of the same appetite, together with the laws of appetite, can be associated with different, incompatible outcomes. Hence, such an account fails to satisfy the requirement, implicit in Leibniz’s definition of change, that there be a sufficient reason for the change in a monad’s perceptual change.

Now, this may immediately be met by the objection that I have misdescribed the case. While what I say may be true for, as it were, gross appetites—namely, that the striving for an object *sub ratione boni* is not reliably correlated with the attainment of a state in which the agent enjoys that object—this will not be true if we sum over the infinity of *petites apperceptions* that collectively define the conatus of a monad at a given moment. According to Leibniz, the sum of all these “strivings for the good,” together with the “laws of appetites,” must determine the monad’s subsequent state. With this general statement I am not in disagreement. My qualification comes in how we characterize the *petites apperceptions* that together provide the monad’s motive force. If each of these is conceived on analogy with a gross appetite, that is, as a force that operates *sub ratione boni*, then each is liable to miss its mark in the same way as a gross appetite can. And if each is liable to fail in this way, then there can be no coherent explanation of how the occurrence of the *aggregate* of those appetitive forces is deterministically correlated with the production of a certain consequent state.

More obviously needs to be said about this, but time is running short. So, let me conclude by asserting how I think Leibniz’s position should be reconstructed.

First, Leibniz requires, and has, a distinction between two senses in which a monad’s appetitions are directed toward the good. In an earlier essay, I characterized this as the distinction between desire teleology and natural teleology.⁹ Gross appetites, or desires, operate according to the law of desire teleology: they are directed tendencies toward an object or end represented as good from the perspective of the agent. The law of desire teleology dictates that, other things being

equal, an agent will tend toward the object represented as its greatest good; however, there is no certainty that it will attain it. Other causal factors may intervene. *Petites apperceptions*, by contrast, should be seen as directed toward the good in a different sense. They are directed toward physical microstates, which collectively determine the next best state of the physical world in which the agent represents itself as existing. To this extent, *petites apperceptions* are no less directed toward the good, but it is not the good *qua* good as represented by the agent; it is the natural good of the world, as understood by God.

Second, the distinction between desire and natural teleology correlates closely for Leibniz with the distinction between distinct and confused perception, and the distinction between the modifications of form and primary matter. For Leibniz, the pursuit of the good *qua* good can only occur on the basis of clear and/or distinct perceptions, as a consequence of the inherent activity of a monad. To the extent that a monad fails to achieve its desired state, or achieves a perceptual state that is independent of anything desired by it, the change in its state will be explained not by its desire for the good, but **by the way the world is** as represented by that monad. This will reflect the way in which that monad, through its perceptions, is passively responsive to the effects of external things on it. As Leibniz comments in a 1707 letter to Pierre Coste, “I have shown elsewhere that when we take things in a certain metaphysical sense, we are always in a state of perfect spontaneity, and that what we attribute to the impressions of external things arises only from confused perceptions in us corresponding to them, perceptions that cannot fail to be given to us from the start by virtue of pre-established harmony, which relates each substance to all the others” (GP III 403/AG 195).

Third, if we take seriously the idea that a monad is spontaneous in the production of all its perceptual states, including those which are confused or matter-bound, then we can appreciate the role that Leibniz reserves for *physical* laws in the explanation of monadic change. Take any case of intentional action, where the perceptual state of the soul of an organism includes the desire for *x*. Suppose the desire for *x* outweighs all other desires the organism has and hence is sufficient to determine a volition for *x*. Now, will the next perceptual state of the soul reflect its enjoyment of *x* or not? I submit there is nothing about the organism’s desires, or its striving *sub ratione boni*, that will answer this question. Whether or not it enjoys *x* will depend upon whether or not the world cooperates with the satisfaction of its desire, and *this* will depend on the confused perceptions that arise in it, corresponding to the “impressions of external things” on it. It is true that those confused perceptions arise as a result of *petites apperceptions*, but Leibniz’s most plausible account of how confused (or *petites*) perceptions develop is that they do so in accordance with the laws of fitness that govern the order of the physical world. It is reasonable to say that a teleological order is realized through the action of *petites apperceptions*, but it is an order that Leibniz has no way of describing independently of his account of the laws of nature as contingent decrees that evidence God’s wisdom.

To sum up: We started with the idea that the laws of nature (laws of optics, laws of motion) are contingent decrees, chosen by a perfectly “free and intelligent” being as the optimal order for the physical world. Leibniz objects, however, that to the extent that these laws define the order of *nature*, they require a ground in the *natures* of created beings, and this ground cannot be had if the nature of body is such as mechanists conceive it. For the grounding claim to be supported, a body must be constituted by principles of force, or primitive active power, which Leibniz

identifies with the form of a substance. This prompted the question of how we are to conceive of the determination of change within a substance: how do there arise the determinations of primitive active force which Leibniz identifies with the derivative forces found in bodies? In his late writings, Leibniz represents primitive active force as the principle of change within a non-extended, soul-like substance, and he attributes the changes within such substances to the exercise of a power of appetite. I have argued, though, that the exercise of this power can't be understood except by appeal to the very physical laws that initiated the original demand for explanation. So that in a nutshell is the story: on Leibniz's account, in the attempt to explain the order of nature, we are led from laws to powers and from powers back to laws.

Notes

¹ Cf. *Principles of Nature and of Grace*, sec. 11: “by a consideration of *efficient causes* alone, or by a consideration of matter, we cannot give the reason for the laws of motion discovered in our time, some of which I myself have discovered. For I have found that we must have recourse to *final causes* for this, and that these laws do not depend upon *the principle of necessity*, as do logical, arithmetical, and geometrical truths, but upon the *principle of fitness*, that is, upon the choice of wisdom. And this is one of the most effective and most evident proofs of the existence of God for those who can delve deeply into these matters” (AG 211).

² See McDonough 2009.

³ “I think that there is no natural truth in things whose reason ought to be sought directly from divine action or will, but that God has always endowed [*indita*] things themselves with something from which all their predicates may be explained” (*Specimen dynamicum*, Part I; GM VI 242/L 441*). See also *Theodicy*, sec. 207 (GP VI 240-1/H 257) and sec. 355 (GP VI 326/H 338-9); his comments on Lamy (GP IV 587-8, 594-5); and his letters to Basnage de Beauval, ca. 1696 (GP III 122) and Conti, 9 April 1716 (GB 277).

⁴ See Rutherford 1992.

⁵ “Change is an aggregate of two contradictory states, from the one of which the other follows immediately” (A 6.4.569).

⁶ “Of two contradictory states of the same thing, that one is *prior in time*, which is prior by nature, or which involves the ground [*rationem*] of the other” (A 6.4.563). For further discussion of these definitions, see Rutherford 2005, pp. 161-66.

⁷ See also *Theodicy*, secs. 64-5, 400; NE 2.21.72/RB 210; GP III 403/AG 195; GP IV 588.

⁸ The very notion of changing states seems to rule against the claim that the substance is actual in an unqualified way. At any moment, a substance is in one state and not another; if there are states that it is not in but which it could be in given its powers, then it is reasonable to conclude that some notion of potentiality is relevant to Leibniz’s understanding of substance. While he wishes to stress the idea of substance as *entelecheia*, actual or complete, it is never actual in every respect. It always exists in one limited way, or mode, and not another.

⁹ Rutherford 2005.