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Occasionalism and Strict Mechanism: Malebranche, Berkeley, Fontenelle

1. Introduction

The rich connections between metaphysics and natural philosophy in the early modern period have been widely acknowledged and productively mined, thanks in no small part to the work of Margaret Wilson, whose book, *Descartes*, served as an inspirational example for a generation of scholars. The task of this paper is to investigate one particular such connection, namely, the relation between occasionalist metaphysics and strict mechanism. My focus will be on the work of Nicholas Malebranche, the most influential Cartesian philosopher after Descartes himself.

I begin with two crucial facts about Malebranche's philosophy: (1) Malebranche was an occasionalist, that is, he held that God was the only true cause, that all modifications of bodies and of minds can be produced by God alone. (2) Malebranche adhered firmly to strict mechanism. By strict mechanism, I mean the view, found most prominently in Descartes and in Boyle's more ideological writings, that the qualities of bodies are exhausted by a very short list (size, shape, motion, and perhaps solidity) and that, most importantly, bodies interact only at contact by impact. Another way of describing this "contact action" requirement is as the thesis that the only fundamental laws of physics are laws of inertial motion and laws of the communication of motion at impact. In

advocating strict mechanism Malebranche opposed attractionism, insisting that gravity, magnetism, etc. must be explained in terms of the impacts of other bodies. By "attractionism", I mean a family of theories (prominently including Newton's theory of gravity) which violate strict mechanism by suggesting that distant bodies may interact, that bodies may have attractive powers, and/or that the inverse square law of gravity may not be reducible to more fundamental laws of motion. Strict mechanism thus *entails* anti-attractionism.

The central point of this paper is to argue that Malebranche's strict mechanism and his occasionalism are in serious tension with each other. I take this point to be of both philosophical and historical interest for the following reasons: Both strict mechanism and occasionalism are characteristic of Cartesianism.[1] Thus, in diagnosing a tension in Malebranche along these lines, I identify a tension within Cartesianism as a broader movement. Furthermore, an investigation of this tension casts a very interesting light on Cartesianism's historical role as a critic of Newtonian attractionism. From the publication of the *Principia* through the early 1720's, Cartesianism, with its associated vortical, impact-based account of planetary motion and gravity, was perceived as Newtonianism's most serious competitor. Attacks on attractionism regularly issued forth from the Cartesian stronghold of the Paris Academy of Sciences, especially from its most prominent spokesperson, Bernard le Bovier de Fontenelle, the perpetual secretary of the Academy.[2] Moreover, the Newtonians themselves presented Cartesianism as their immediate predecessor and main competitor in natural philosophy.[3] Thus, in asking whether Malebranche, as an occasionalist, can justify his strict mechanism, I also ask the broader question:

What resources does the Cartesian system actually have for resisting Newtonian attractionism?

Nor will I consider Malebranche in isolation. In analyzing Malebranche's defense of strict mechanism, I will consider in passing whether Descartes' own Cartesianism offers any better prospects for resisting attractionism. Furthermore, my method of investigation will be partly comparative. In order to establish the nature of the tension between Malebranche's occasionalism and his mechanism, I pursue an extended comparison between Malebranche and the Irish philosopher George Berkeley. The point of the comparison is this: Malebranche and Berkeley *share* (to a large extent) an occasionalist metaphysics. This is to say that at a certain level of abstraction, Berkeley's system looks very Cartesian. Nevertheless, they diverge sharply on the question of attractionism and, more broadly, on the question of what constitutes a good physical theory. By examining the way in which Berkeley's receptiveness to Newton seems to flow naturally from his metaphysics, we will be lead to ask why Malebranche does not take the same course and whether his path is defensible. The result, I hope, is to nicely focus the question of whether Malebranche can legitimately resist attractionism, and, if so, how. Along the way, I explore the workings of Malebranche's and Berkeley's respective metaphysics and the ways in which they are connected to their respective philosophies of science.

I conclude, in the end, that Malebranche is in a poor position to resist attractionism, that is, his combination of occasionalism and strict mechanism is an unstable one. However, I also identify two stabler alternatives adjoining Malebranche's position, both of which are, in different respects, genuinely Cartesian: Berkeley's occasionalist openness to Newtonian attractionism

(properly understood), and Fontenelle's essentialist Cartesian mechanism. Thus, by examining the alternative positions available around the nexus of occasionalism and mechanism, as those positions were occupied by actual philosophers, we gain a better understanding of the logic of the debate over attraction, as well as of the systems of Malebranche, Berkeley, and Fontenelle.[4]

The structure of the paper is as follows: In section 2, I detail the consonance between Malebranche and Berkeley when it comes to metaphysics. Section 3 examines the way in which Berkeley's openness to Newtonian attraction flows from his occasionalist metaphysics, thus raising the question: Why does Malebranche not reach this same conclusion? How can he justify his anti-attractionism? In sections 4 and 5, I consider and reject two possible answers to this question, which purport to derive Malebranche's rejection of attraction from his conception of the aims of science or from his adherence to the plenum. In section 6, I identify Malebranche's intended answer to the question: that employing attraction or other non-mechanical concepts violates the principle that physical theorizing must be based on clear ideas. Section 7 uses the example of Berkeley to show why Malebranche's answer is problematic: Malebranche offers an account of the status of motive force that turns out to apply to attractive force, so that the latter can be made as clear as the former. In section 8, I consider another possible Cartesian defense of strict mechanism by appeal to God's simplicity or immutability, and explain why Malebranche does not, in the end, give such a defense. Having concluded that a Cartesian occasionalist such as Malebranche cannot justify a principled anti-attractionism, I turn in section 9 to a brief consideration of the position of Fontenelle, who embraced Cartesian mechanism (and anti-attractionism) while rejecting occasionalism.

2. Occasionalism and semi-occasionalism; bodies and ideas

In order to motivate the thought that the divergence between Malebranche and Berkeley over strict mechanism/attractionism *requires* explanation, I begin by examining the extent to which their metaphysical views overlap, particularly in their treatments of causation. For Malebranche, God is the only true cause. All modifications of body and of mind must be produced directly by God. His two central arguments for this occasionalist conclusion serve to further articulate the causal relation between God and the world: (1) Malebranche argues that causation requires necessary connection, and that this relation obtains only between the will of an omnipotent being and that which is willed (OCM II 316: LO 450). (2) Malebranche argues that, since conservation is just continuous creation, every state of every body continually depends on God in a way that rules out any supplementary, secondary causes: God's will is necessary for a body to be in a state and God's will is sufficient for it to be in that state (OCM XII 155-163: SJ 111-117).

Neither bodies, then, nor bodily events, can be genuine causes, but only "occasional" ones. An *occasional* or *natural* cause is merely that which "determines the Author of nature to act in such and such a manner in such and such a situation (*rencontre*)" (OCM II 313: LO 448). The notion of "determination" here is a tricky one. Malebranche's view is that God's intentions are fundamentally general, and that particular triggers, particular physical events, make those general intentions applicable to the world and thus require divine action.[5] These events, then, provide the occasion for God to act according to general law. Malebranche regularly cautions his readers not to mistake

occasional causes for true causes, for "one should not imagine that what precedes an effect is its true cause" (OCM II 318: LO 451).

Despite Berkeley's efforts to distance himself from Malebranche, his views about the causal relation between God and creation look quite similar. Of course, there is a significant difference when it comes to finite minds or spirits, as Berkeley emphasizes with his famous declaration that "We move our Legs our selves. 'tis we that will their movement. Herein I differ from Malbranch" (PC 548). Berkeley allows that human minds are active, causing their own ideas of imagination and even, it seems, the movements of their bodies.[6] Nevertheless, if we restrict our attention to the physical realm, and discount the modest causal input of finite spirits, Berkeley emerges as a *Malbranchiste de bonne foi*, as one of his early critics put it.[7] Berkeley argues, as had Malebranche, that the causes of physical change cannot be found in the realm of bodies. Rather, God is the sole true cause of the existence and properties of bodies. Berkeley's view, then, amounts to occasionalism for the physical realm, but not the spiritual; I will label this position 'semi-occasionalism'.

Their doctrinal similarities when it comes to causation are still more specific. Berkeley too emphasizes that God works according to general laws, and that this fact may mislead us into attributing causal powers to corporeal creatures:

> And yet this consistent uniform working, which so evidently displays the goodness and wisdom of that governing spirit whose will constitutes the Laws of Nature, is so far from leading our thoughts to him, that it rather sends them a wandering after second causes. For when we perceive certain ideas of sense constantly

> followed by other ideas, and we know this is not of our doing, we forthwith attribute power and agency to the ideas themselves, and make one the cause of another, than which nothing can be more absurd and unintelligible. (PHK 32)

It might seem, however, that a crucial difference between their two systems is brought out by this last quotation. To put it bluntly, one might ask: Wasn't Malebranche talking about material objects, while Berkeley is talking about ideas? Of course this is true, but it is remarkable how little this difference comes to when we consider their metaphysical systems and their implications for philosophy of science. It does have implications for how their occasionalism is established. Berkeley's argumentative route to occasionalism is different and in a way easier than Malebranche's, in that once he has purportedly established that ordinary objects are just ideas, he concludes from the manifest passivity of ideas that ordinary objects have no causal powers (PHK 25). An argument from elimination leads quickly to his semi-occasionalism.[8]

The results of their divergent arguments, however, closely coincide. We can see this from two perspectives. From a Berkeleyian perspective, ordinary physical objects just *turn out* to be bundles of ideas, but there is still a natural, physical world, distinct from imagination (PHK 34-35). In what follows, I adopt Berkeley's practice of using the term 'matter' to single out the mind-independent stuff whose existence he rejects; however, I take it that he *endorses* the existence of ordinary objects, physical objects, bodies, etc., albeit construed in an idealist fashion. Whether or not he can fully succeed in this effort, Berkeley intends his metaphysics *not* to be a radically revisionist one. Thus, where Malebranche

posits a material billiard ball striking a second, followed by the movement of the second, with God causing all the motions and no necessary connection between collision and motion, Berkeley sees a series of ideas which *are* sensible objects, and no necessary connection among them. Berkeley's idealist account (if successful) mirrors Malebranche's.[9]

Fascinatingly, Malebranche himself clearly acknowledges (and even argues for) the possibility of an idealist mirroring of his dualist system. At the general metaphysical level, he argues that the existence of material bodies is merely probable, although, he says, faith obliges us to believe that they exist. It is worth examining the argumentative structure of this section of Elucidation Six of the *Search After Truth* in some detail. First, Malebranche specifically considers Descartes' argument for the existence of bodies:

> But although Descartes has given the strongest proofs that reason alone can muster for the existence of bodies, and although it is evident that God is no deceiver and that He would be said really to deceive us if we deceived ourselves by making the use we must of our mind and of our other faculties of which He is the Author—still we can say that the existence of matter is not yet perfectly demonstrated, i.e., with geometric rigor. For in philosophical matters, we must not believe anything till evidence obliges us to do so. We must make as much use of our freedom as possible; our judgments should have no greater extent than our perceptions. (OCM III 60: LO 572)

> Thus, in order to be fully convinced that there are bodies, we must have demonstrated for us not only that there is a God and that He is no deceiver, but also that He has assured us that He has really created such a world, which proof I have not found in the works of Descartes. (OCM III 61: LO 573)

> It is true that we have a strong propensity to believe that there are bodies surrounding us; I agree here with Descartes. But this propensity, as natural as it is, does not constrain our belief through evidence; it merely inclines us toward belief through impression. Now, our free judgment should follow only light and evidence….(OCM III 62: LO 573)

Thus, because we don't clearly and distinctly perceive that there are material bodies, we are capable of withholding assent to the claim that they exist. Since we are capable of withholding our assent on this issue, the nonexistence of bodies would not render God a deceiver.

Having rejected Descartes' argument as an attempt to *demonstrate* the existence of bodies, Malebranche then offers up another version of the argument, reconfigured as an argument for the *probable* existence of bodies:

> Certainly it is at least possible that there are external bodies. We have nothing that proves to us there are not any, and on the contrary we have a strong inclination to believe there are bodies. We have, then, more reason to believe there are bodies than to believe there are not any. Thus, it seems that we should believe

there are bodies; for we are naturally led to follow our natural judgment when we cannot positively correct it through light or evidence. For since all natural judgments come from God, we can make our voluntary judgments agree with them when we find no means of discovering them to be false; and if we are mistaken in these instances, the Author of our mind would seem to be to some extent the Author of our errors and faults.

This argument is perhaps sound enough (*peut-être assez juste*). Nevertheless, it must be agreed that it should not be taken as a necessary demonstration of the existence of bodies, for God does not invincibly urge us to yield to it. If we consent to it, we do so freely—we are able not to consent to it. If the argument I have just given is sound, we must believe it entirely probable (*vrai-semblable*) that there are bodies; but we must not rest fully convinced by this single argument. Otherwise, it is we who act and not God in us. It is by a free act, and consequently one liable to error, that we consent and not by an invincible impression; for we believe because we freely will to do so, and not because we perceive with an evidence necessitating us to believe, as in the case of mathematical demonstrations. (OCM III 63-4: LO 574)

Interestingly, even the claim that the existence of bodies is *probable* is hedged, here, with the qualification "if this argument … is sound (*si le raisonnement … est juste*)". Indeed, there is more than one obvious problem with the argument. One difficulty is that an argument *against* the existence of bodies has not been

considered: Because bodies play no causal role, it would be simpler if they did not exist.[10] Given that Malebranche unhesitatingly appeals to simplicity in other contexts, it is difficult to believe that he would not have noticed its ready application to the question of the existence of bodies.[11] And, if the argument from simplicity is acknowledged, it is no longer clear that we have more reason to believe that there are bodies than that there are not.

A more serious problem, however, can be located in the premise which states that we *can* make our voluntary judgments agree with our natural judgments when we find no means of discovering them to be false. This premise is crucially ambiguous; there are two ways of reading it. On the first reading, the claim is merely that we are *able* to do this: it lies within our powers. On the second, it is claimed that it is legitimate, epistemically responsible, for us to do this. The problem with the argument is that the premise is only true (by Malebranche's lights) on the first reading, but it only supports the conclusion on the second reading. That is, Malebranche himself emphatically denies, just a few paragraphs earlier, that we are entitled to follow our natural judgments on this matter: we ought only to believe where we are constrained to do so by the light of reason. But, given that we need not and ought not follow our natural judgment here, the mere fact that we are *able* to do so and that we go wrong *if* we do so surely does not suffice to undermine God's goodness in any way.[12] Furthermore, if Malebranche were to insist that it does, he would be left with no viable reply to the problem of evil.[13] It seems overwhelmingly likely that Malebranche was aware of this problem with the argument, and that this fact explains his heavily qualified "endorsement" of it. Note that Malebranche observes that if we rest convinced by this argument, it is we who act, rather than

God in us. This is to say that the argument is not a valid one whose premises are clearly and distinctly perceived.

His claim that faith *does* definitively establish the existence of material bodies, while apparently stronger, turns out to be similarly hedged:

> It is true that initially faith seems to assume the existence of bodies, *fides ex auditu*. It seems to assume prophets, apostles, Sacred Scripture, miracles; but if you attend closely you will see that although only the appearances of men, prophets, apostles, Sacred Scripture, miracles, and so on, are assumed, what we learn from these supposed appearances is absolutely undeniable because, as I have proved in several places in this work, only God can represent these appearances to the mind, and because God is no deceiver, for faith itself assumes this. Now in the appearance of Sacred Scripture and from the appearance of miracles we learn that God has created a heaven and an earth, that the Word was made flesh, and other such truths that assume the existence of a created world. Hence it is certain through faith that there are bodies, and that through it all these appearances become realities. There would be no point to my pausing here to reply at greater length to an objection that seems too abstract to the ordinary man, and I believe that the above will satisfy anyone who is not overly demanding.[14] (OCM III 64-65: LO 575)

Surely the overly demanding person imagined by Malebranche will object that just as our experience of sacred scripture only requires the existence of the

appearances of sacred scripture, so what we learn from sacred scripture about the created world merely assumes the existence of a world of appearances. It is scarcely credible that Malebranche would not have considered this objection and recognized its implications.

While Malebranche's official metaphysics includes a material realm, he clearly recognizes that the evidence for its existence is weak and that, in terms of the workings of his philosophical system, not much hangs on the question of whether or not matter exists. In a more speculative vein, I would suggest that Malebranche's true position in the *Search* on this issue is agnosticism about matter, which he steps back from in order to avoid apparent conflict with the dictates of faith.[15] At any rate, we should not be surprised to find, as we do, that Malebranche holds that the question of the existence of material bodies, which "contains too many great difficulties," does not need to be resolved "even to have an exact knowledge of physics" (OCM II 373: LO 482). Whether material bodies exist is, then, in Malebranche's view, immaterial to physics.[16]

3. Causation, scientific explanation, and paradigmatic science

Malebranche and Berkeley thus agree in their views about the causal relations that organize creation. Furthermore, they agree in that while Berkeley positively denies the existence of a mind-independent material world, Malebranche shows little concern over its existence, and holds that a world of appearances will serve just as well for the purposes of science. What further overlap in doctrine should we expect to follow from what we have seen so far?

Here I want to turn to Berkeley and examine how aspects of his philosophy of science seem to flow naturally from his metaphysics. This will

then highlight the question of why Malebranche reaches different conclusions from a similar metaphysical starting point. As we have seen, Berkeley follows Malebranche in noting that our experience of one sort of idea regularly following another does not license a conclusion that one causes the other. In the *Principles* and *De Motu*, Berkeley develops this thought into a sophisticated account of scientific explanation as involving reduction to regularity:

> There are certain general laws that run through the whole chain of natural effects: these are learned by the observation and study of Nature, and are by men applied as well to the framing artificial things for the use and ornament of life, as to the explaining the various *phenomena*: which explication consists only in shewing the conformity any particular phenomenon hath to the general Laws of Nature, or, which is the same thing, in discovering the *uniformity* there is in the production of natural effects; as will be evident to whoever shall attend to the several instances, wherein philosophers pretend to account for appearances. (PHK 62)

A phenomenon is explained, according to Berkeley, when it is shown to follow from a general rule. The goal of the natural philosopher is simply to generate the generalizations that allow us to predict and interpret nature, to grasp the relation between sign and signified:[17]

> …the connexion of ideas does not imply the relation of *cause* and *effect*, but only of a mark or *sign* with the thing *signified*. The fire which I see is not the cause of the pain I suffer upon my approaching it, but the mark that forewarns me of it. […]And it is

> the searching after, and endeavouring to understand those signs instituted by the Author of Nature, that ought to be the employment of the natural philosopher, and not the pretending to explain things by corporeal causes…. (PHK 65-66)

Thus, the aims of natural philosophy are to be sharply distinguished from the aims of metaphysics.[18]

An apparent implication of this view is that any regularity will do, for purposes of scientific explanation. Indeed, this might seem to be a defect of Berkeley's view, in that scientific explanation comes rather too easily if every regularity provides it. *De Motu* (1721) represents an advance over the *Principles*, in that there Berkeley acknowledges the importance of generality to scientific explanation:

> Similarly in mechanical philosophy those are to be called principles, in which the whole discipline is grounded and contained, those primary laws of motions which have been proved by experiments, elaborated by reason and rendered universal. These laws of motion are conveniently called principles, since from them are derived both general mechanical theorems and particular explanations of the phenomena.
>
> A thing can be said to be explained mechanically then indeed when it is reduced to those most simple and universal principles, and shown by accurate reasoning to be in agreement and connection with them. For once the laws of nature have been found out, then it is the philosopher's task to show that from the

> constant observance of these laws, that is from these principles, any phenomena necessarily follow. In that consist the explanation and solution of phenomena. . . . (DM 36-37)

The goal of natural philosophy is to locate the most general principles from which regularities in the phenomena can be deduced; it is these that deserve the title of laws of nature.

More significantly for our purposes, however, Berkeley's regularity theory of scientific explanation has liberatory implications from the perspective of the debate between strict mechanism and Newtonianism. Because any general regularity is explanatory, there is, for Berkeley, no requirement that the basic regularities be mechanical. To put it in a way that better displays the metaphysical origins of this point: if there is no bodily action, then there is no reason to require that all "action" posited by a theory be contact action.[19] Of course, there won't be "action" at a distance either. The choice between strict mechanism and attractionism comes down to a choice between regularities involving only bodies in contact and regularities involving distant bodies. Presumably only experience can settle the question of which regularities hold. Indeed, this is exactly what Berkeley concludes and what allows him to prefer Newton to Descartes. Throughout his career, he is skeptical of the achievements of strict mechanism and holds up Newton's *Principia Mathematica* as his paradigm of good natural philosophy.

Berkeley's one reservation about dynamic physical theories is that they might be misinterpreted as entailing the activity of body. It is this worry that motivates *De Motu*, his 1721 tract on mechanics. There, Berkeley argues at

considerable length that we cannot make sense of force-talk as describing active qualities of bodies, and that we should instead understand Newton's physics instrumentally, as a calculating device which allows us to predict the motions of bodies. Had he been willing to invoke his metaphysics in this context, his argument would have been quite a bit shorter, since he could simply have pointed out that nature is fundamentally inactive. He would still have owed us some account, such as the instrumentalist one that he actually gave, of how Newtonian dynamics should be interpreted in keeping with that tenet.[20]

Given that Malebranche never exhibits any comparable metaphysical bashfulness, one might expect that he would have reached similar conclusions. It is clear that he does see his occasionalism as having implications for physics. For example, he rejects the traditional distinction between natural and violent motion on the grounds that bodies are thoroughly passive, so there is no motion that can be accounted for from the nature of body alone (OCM II 349: LO 469). Why not, then, reject the more modern privileging of contact action over action at a distance? Nevertheless, Malebranche adheres firmly to strict mechanism, insisting, in particular, that gravity must be given a mechanical explanation. As we have seen, Berkeley's openness to attractionism seems to flow naturally from the occasionalism shared by Malebranche and Berkeley. What then explains Malebranche's allegiance to strict mechanism?

One sort of explanation obviously suggests itself here, namely that Malebranche was writing earlier than Berkeley was, when Newton's achievements seemed more debatable, and, moreover, was writing in France, as part of the Cartesian establishment. I think this explanation is less persuasive than one might suppose, for several reasons. Malebranche was well aware of

Newton's work, as we see in a 1707 letter where Malebranche damns him with faint praise:

> Although Mr. Newton is not a physicist, his book is very curious and very useful to those who have good principles of physics; he is, moreover, an excellent geometer. (OCM XIX 771-772)[21]

Moreover, the last edition of the *Search*, which actually postdates Berkeley's *Principles*, clearly displays Malebranche's acquaintance with Newton's work.[22] Newton's experimental results in optics are cited at several points, and, although the *Principia* is never mentioned, Malebranche's mechanical account of gravity and planetary motion shows an appreciation of Newton's successes, in that Malebranche endeavors to show that his mechanism entails the truth of Kepler's third law.[23] The various editions of the *Search* also establish that Malebranche was more than willing both to question Descartes and to revise his own views about the laws of motion.[24] Thus, there is prima facie reason to be skeptical of what we might call Cartesian conservatism as an explanation for Malebranche's loyalty to strict mechanism. At any rate, we should be hesitant to assume that Malebranche could offer nothing beyond an argument from authority for his position. Moreover, the question of what actually moved Malebranche is not my main interest here. My task is to determine whether Malebranche can give reasons, grounded in his considered philosophical views, for this doctrinal allegiance to strict mechanism, and, if so, what those reason are.

4. Malebranche on the aims of natural philosophy

I next want to briefly raise and reject a plausible hypothesis as to what might explain this striking difference between Malebranche and Berkeley, while also accounting for Malebranche's claim that the physicist does not care whether material bodies exist. The hypothesis is that the nature of Malebranche's attachment to mechanism becomes clear once we take into account his theocentric rationalism, which leads him to a very unBerkeleyian conception of the *aims* of natural philosophy.

The thought is this: Malebranche favors a rationalist Cartesian physics, the primary aim of which is not prediction but rather a certain kind of idealized understanding. His physics is supposed to follow simply from the idea of extension (OCM II 325, 338: LO 455, 462), so it is an a priori science, a 3-dimensional geometry.[25] The objects of geometry made real can be ascribed only geometrical properties (including motion) and can act only in virtue of those properties; thus, all action is contact action. Such a science is true, or, as Descartes might have put it, has a sort of reality, whether or not God has created any actually extended things. Perhaps this physics could be expected to be reliable because God can be expected (from goodness) to give us ideas corresponding to his model of the world, truths that follow from the idea of extension, or intelligible extension, which is in God. It is worth doing this sort of physics, however, independently of the existence of bodies and independently of its utility, since it amounts to a sort of geometry, a following out of reason, which, for Malebranche, is equivalent to seeing and worshipping God. Thus, because of the aims of physics, it simply *is* geometry and thus is strictly mechanistic.

Like many attractive hypotheses, however, this one falls afoul of the facts. Malebranche is clearly aware that physics is not geometry, and that it can be dangerous to assimilate the two:

> Geometry, then, is very helpful in making the mind attentive to things whose relations we wish to discover, but it must be admitted that sometimes geometry is an occasion of error for us because we attend so closely to the pleasant and certain demonstrations provided by this science that we do not sufficiently consider nature. […] Nature is not abstract; the levers and balls of mechanics are not the lines and circles of mathematics. (OCM II 276-277: LO 428)

Furthermore, Malebranche gives an account of the *aims* of physics which is very much in the spirit of Berkeley's. He stresses the usefulness of physics, as opposed to geometry, and states, further, that:

> … in physics we try to discover the order and connection of effects with their causes, either in bodies, if there are any, or in the sensations (*sentimens*) that we have of them, if they do not exist. (OCM II 377: LO 484)

Since the connection of so-called effect with occasional cause is not, in fact, a causal connection, it would seem that Malebranche's view here is that the physicist is concerned with regularities, among either things or experiences. But this just highlights further the doctrinal overlap between Malebranche and Berkeley and reinforces the puzzle about Malebranche's allegiance to strict mechanism; we have as yet made no progress in *solving* the puzzle.

5. A priori physics and the plenum

One might be tempted to object that we have made no progress because the extent of Maleranche's a priorism has not yet been adequately assessed and thus I have moved too quickly in assimilating Malebranche to Berkeley. Although Malebranche recognizes that physics and geometry are distinct and assigns a role to sensation in physics, he also claims (as noted above) that physics follows from the idea of extension. This suggests that the strictness of his mechanism might be grounded in a relatively a priori fashion. If Malebranche's mechanistic physics deductively follows from the idea of extension, then once we know that extension exists, we know what sorts of properties bodies have and do not have. In particular, if a mechanist explanation of gravity follows deductively from the mere idea of extension, then it seems that attractionism can be eliminated a priori. In order to respond to this objection, we must examine in what sense physics follows from the idea of extension, according to Malebranche. Can the a priorism suggested here ground a principled resistance to attractionism?

A close examination of the relevant section of the *Search* reveals that, strictly speaking, a priori reasoning does not get us all that far.[26] It is clear that Malebranche holds (with Descartes) that extension entails impenetrability, so if extension exists, there is a plenum (OCM II 325: LO 455). Furthermore, if there is motion in a plenum, there must be a closed curve of moving bodies, for no body can move unless the body "preceding" it moves. Further cosmological conclusions, however, depend on a hypothesis or supposition, namely, that God "formed the entire universe instantaneously, and in the same state in which its

parts would have been arranged through time, by the simplest means" (OCM II 328: LO 457). Although Malebranche notes that this assumption "seems very worthy of the wisdom and power of God" (OCM II 328: LO 457), its ultimate justification is a posteriori (see OCM II 331: LO 459). Thus, Malebranche does not claim to deduce an elaborate vortical cosmology from the mere idea of extension.[27] Furthermore, neither does Descartes, who introduces the system of vortices as an hypothesis to be justified by the fit between its implications and the phenomena.[28]

Surely the existence of a plenum does make a mechanical vortex theory an *obvious* choice as the source of an explanation of gravity. Here Samuel Clarke's assessment of Rohault's mechanical explanation of gravity seems right on target: "This was a very ingenious Hypothesis, and so long as the World was thought to be full, a very probable one."[29] However, the mere existence of a plenum does not obviously rule out an attractionist explanation of gravity and certainly does not dictate that the basic laws of motion must be exhausted by inertia and impact laws.[30] Thus, Malebranche might try to use the plenum to ground an argument for the probable truth of a mechanical explanation of gravity. However, what Malebranche seems to want and seems to think that he *has* is something stronger, namely, a way of ruling out appeals to attraction as illegitimate. Moreover, we will see that Malebranche's actual objections to attraction take a different form from this plenum-based argument.

6. Clear ideas and Malebranche's methodology

I want now to survey a few key passages from Malebranche's treatment of method, in order to see what we can glean from them about the sources of his resistance to attractionism:

> …for physics it is necessary to admit only notions common to all men, i.e., the axioms of geometers and the clear ideas of extension, figure, motion, and rest, and others as clear as those, if there are any. It will be said perhaps that the essence of matter is not extension, but of what importance is that? It suffices that the world we shall conceive to be formed from extension appears similar to the one we perceive…. (OCM II 376-377: LO 484)

> Neither is it necessary to bother about knowing whether there are some qualities in the bodies around us other than those of which we have clear ideas, for we should only reason according to our ideas; and if there is some other thing of which we have no clear, distinct, and particular idea, we will never know anything about it and we will never reason about it correctly. (OCM II 377: LO 484)

Two chapters later, Malebranche applies this general dictum to the case of magnetism:

> We clearly know it to be a law of nature that bodies move each other when they collide. We should therefore try to explain the motion of the magnet by means of some body that comes in contact with it. It is true that something other than a body might possibly move it; but if we have no distinct idea of this thing, we should not

> use it as an admissible means for finding what we seek, nor for explaining it to others. For it is not giving an explanation of an effect to give as its cause a thing that no one clearly conceives. We must not, then, trouble ourselves about whether there is, or is not, some natural cause of the motion of bodies other than their collision; rather, we must assume that there is none, and then carefully consider which body can collide with and move this magnet. (OCM II 401: LO 499)

Similarly, after enumerating three mechanistically acceptable hypotheses about the cause of cohesion, Malebranche justifies his claim that these exhaust the legitimate contenders with the observation that:

> I might still produce, as a cause for these things, the form of the bodies, the qualities of hardness or some occult quality, the harmony that would exist between parts of the same type, and so on. But because I have no distinct idea of these lovely things, I neither should nor can apply my reasonings to them. (OCM II 426: LO 514)

Malebranche, then, holds as a methodological principle that scientific theorizing must be based on clear ideas. Those who violate this principle will make no progress, for they don't know what they're talking about and they fail to reason. This is not to require that physics, like geometry, should be a deductive science based on axioms derived from an intuitive apprehension of a clear and distinct idea. Malebranche demands, however, that we be able to attach some clear,

specific sense to our theoretical terms. This is the force of his reference to occult qualities: scholastic explanation via forms or real qualities is portrayed as being empty because the key concepts are without meaning, mere words. Malebranche's list of terms devoid of sense includes not just the usual scholastic suspects—'nature,' 'form,' and 'faculties'—but also gravitation.[31] He also dismisses appeals to attraction as incomprehensible (OCM II 324: LO 455). It is this principle, apparently, which restricts scientific explanations to mechanical explanations.

It looks, then, as though we have located a justification that Malebranche can give and which he does give for his allegiance to strict mechanism. In the next section, however, I argue that this justification dissolves once we consider the full implications of Malebranche's occasionalism. This point comes out clearly via the comparison with Berkeley; further reflection on Berkeley's position reveals that Malebranche's aversion to attractionism is ill-founded.

7. The symmetry problem: what's wrong with *attractive* forces?

Berkeley's concern about the danger of attributing active, causal qualities to bodies extends not just to attraction, but to any kind of dynamic notion, including impetus, impressed force, force of percussion, etc. Newton's second law of motion, according to which "a change in motion is proportional to the motive force impressed and takes place in the direction of the straight line in which that force is impressed" requires an instrumentalist treatment just as much as Newton's theory of gravity does.[32] Berkeley thus treats impact phenomena and attractive phenomena in a completely symmetrical fashion. Malebranche, as we have seen, does not. His apparent justification for that asymmetry was that

we have no clear idea of attraction. However, it is now obvious how to challenge that justification. Do we have a clear idea of the forces involved in impact phenomena? If so, why can't we have a similar idea of attractive force? If not, then we can apparently do impact-based mechanics without such an idea, so why not attraction-based physics as well, as Berkeley in effect proposes?

Malebranche's clearest statement as to what sorts of ideas of force we can have comes in his treatise "Of the Laws of the Communication of Motions," which was originally published in 1692 and appended (in a heavily revised form) to the last two editions of the *Search.* Malebranche writes:

> Indeed, if one wishes to reason about bodies and their properties only upon clear ideas that one can have of them, one will never attribute to matter any other force or action than that which it takes from its motion. It is therefore necessary to recognize that the force of elasticity comes from some motion. (OCM XVII-1 83)[33]

Malebranche clearly takes this principle, that the only forces we can attribute to bodies are those derived from and associated with motion, to be a secure one, for he uses it to derive substantive physical results. He concludes that the tendency of an elastic body to restore itself must be attributed to the motion of the "subtle and invisible" matter surrounding it.

Surely Malebranche's claims here provoke some pressing questions: What is this force of motion or motive force? What sort of clear idea of it do we have? In Book 6, Part 2, Chapter 9, Malebranche's discussion of the physical causes of hardness, he attributes the motive force of bodies to God's will:

> [T]he will of the Author of nature… creates *(fait)* the force and power that each body has for continuing in the state it is in…. (OCM II 432-3: LO 517)

The most obvious way of reading this passage is as suggesting that a body in motion has a motive force and that this force, though bestowed upon the body by God, is a genuine property of the moving body. Certainly this way of understanding the situation is suggested by the treatise on the laws of motion, where Malebranche treats motive forces as explaining the interaction of bodies at impact. On this reading there is a perplexing ambiguity in Malebranche: Do motions give rise to forces or vice versa? The statement above that matter has force which it takes from motion suggests the former, whereas Malebranche's claim that motive force is applied to produce motion (OCM XVII-1 59) suggests the latter.

However, Malebranche makes quite clear elsewhere that the reading which gives rise to this ambiguity must be rejected as entirely mistaken. For Malebranche reminds us repeatedly that matter is absolutely without any force (OCM II 428: LO 514).[34] What then is the status of motive force if it is not a genuine quality of bodies themselves? Malebranche's answer to this question is that the motive force is the will of God:

> That it is the will of God that moves bodies is a thing that seems indubitable to me…. Therefore the force that this ball I see rolling has is the will of God making it roll. (OCM II 430: LO 516)[35]

If God were to cease to will that a body move, it would cease to have any motive force and it would immediately come to rest.

Furthermore, Malebranche puts forward an account of *how* God's will serves as the motive force of body:

> I also know that it is His will that is the motor force which puts bodies in motion. For, since matter cannot move by itself, it seems to me that I must judge that it is a mind, and even the Author of nature, who preserves and puts it in motion by preserving it successively in several places…. (OCM II 428: LO 515)

Thus, if we understand motive force as a body's tendency to continue in motion, we now see that that force is nothing but God's intention to preserve the body in successive places. This account neatly explains the ambiguity we saw earlier as to whether motive force gives rise to motion or vice versa. Motive force, as God's intention to preserve the body in successive places, does cause motion, which is the body's existence in successive places. In a sense, however, motion gives rise to motive force, for the fact that a body is in motion, that is, that God is preserving it in successive places, gives him reason to intend to continue to do so, given that he follows set, general volitional policies. Thus, a body's being in motion explains its having motive force.

However, when we return to the question of Malebranche's reasons for rejecting attractionism, we see that the results of a correct interpretation of the status of motive force are less happy. We have discovered that our clear idea of motive force is an idea of God's intention to continue a body's motion, that is, to preserve it successively in different places. One of our earlier questions about

Malebranche's asymmetrical treatment of attraction and other forces was whether, if we had a clear idea of other forces, this idea could be parlayed into a clear idea of attraction. The answer now appears to be 'yes'. The attractive force between two bodies could simply be God's intention to move the bodies in accordance with the inverse square law, that is, to preserve the bodies in successive places in accordance with this law. Thus, a conception of attractive force is available to Malebranche which by his own lights is as clear as the one he helps himself to in his own physics.

What we have seen, then, is that Malebranche faces the same problem that Berkeley does: how to make sense of force-talk given the complete passivity of body. While Berkeley provides an instrumentalist solution to the problem, Malebranche, in effect, gives the following answer: talk of a body's motive force is glossed as a description of God's will, his intentions. The problem is that this account of the meaning of force-terms (like Berkeley's) applies not just to motive force but to attraction as well.

This is not to say that his appeal to the importance of clear ideas turns out to be completely hollow. His methodological stricture does (prima facie) apply against an attractionist who insists on a metaphysical account according to which attraction is some sort of intrinsic, active quality of bodies themselves. Furthermore, it should be noted in this context that the anti-attractionism of the *Search* was not originally directed against Newton (whose *Principia* had yet to be written when the *Search* was first composed), but rather against an older tradition including Roberval and Borelli.[36] What Malebranche does not seem to have noticed, however, is that his own system has room for a divinized notion of attraction and a (basic) law of gravity. Thus, an appeal to clear ideas cannot

eliminate attractionism altogether and, thus, cannot provide a firm foundation for strict mechanism.

8. God's nature and the laws of motion

Does Malebranche have any other means of defending the claim that God would not form the sort of intentions that could be attractive force, i.e. that God would not move bodies in accordance with an inverse square law of gravitation? Here it seems that Malebranche's only recourse could be to follow Descartes and argue that only Cartesian laws of motion can be grounded in God's nature. Descartes famously holds that God's immutability dictates inertial laws and impact laws (AT VIIIA 61-66: CSM I 240-243). He seems to hold, as a methodological principle, that one ought to attribute to God the minimal action necessary to preserve the physical world in its current state. Thus, God, having set bodies in motion, preserves their motions. Impact, however, requires some sort of change or adjustment, since extended bodies are impenetrable for Descartes, and cannot coincide. Here again, however, in Descartes' view, God does the minimum to ensure that quantity of motion, size times speed, is conserved. Although it is somewhat difficult to see why immutability dictates that it is quantity of motion that must be conserved, it does seem that Descartes' conception of divine immutability would supply some basis for the claim that having God move bodies according to the inverse square law requires God to do too much and to introduce too much variability into the universe.[37] Furthermore, this sort of appeal to God's nature is surely the only obvious way for an occasionalist to provide an a priori defense of particular laws of motion.

Can Malebranche make a similar move? There are some grounds for the thought that divine simplicity can do for Malebranche what immutability does for Descartes. In the *Dialogues on Metaphysics and Religion*, Malebranche flatly states that God's simplicity dictates his choice of laws of motion: "As for the natural laws of motion, God chose the simplest" (OCM XII 243: SJ 187). In laying out the basics of Cartesian physics in the *Search*, Malebranche maintains that rectilinear inertia follows from God's simplicity (OCM II 326: LO 456). In a later passage, he implies that impact phenomena can be explained in a similar fashion:

> [The universe is] a work that is conserved and constantly renewed through the general and simplest imaginable law that every body is moved in the direction in which it is most pressed, and to the extent to which it is pressed, I say a law that, let it be noted, does not draw its efficacy from matter—a purely passive substance whose motor force is nothing in it or belonging to it, as I have proved in the fifteenth Elucidation and elsewhere—but a law that the Almighty created and observes exactly in the ordinary course of His general providence over the arrangement of bodies, not only to endow His conduct with the character of His attributes in which He finds His law and motives, as I have proved elsewhere, but also to give to men and even to animals certain rules in order to preserve and conduct themselves. (OCM III 304: LO 718)[38]

Here we find another clear statement of Malebranche's view that motive force does not really belong to bodies but consists in God's observation of a law. The

particular laws that God follows, however, are dictated by his attributes, and so God chooses the most general and simplest law.

This doctrine of Malebranche's is surely part of a complete explanation of his attraction to mechanism. However, at least by the time of the last two editions of the *Search*, he is not entitled to rely on it as a defense of strict mechanism contra attractionism. As Thomas Hankins has argued, Malebranche ultimately admits that we are not particularly good at judging what exactly is dictated by God's simplicity and that we must have reference to experience to determine the laws of motion.[39] In a 1687 letter published in the *Nouvelles de la République des Lettres*, Malebranche concedes to Leibniz' criticism of his laws of motion with the observation that "it is experience which can bear witness to us of the way in which the Author of nature acts."[40] Indeed, in the *Dialogues*, Malebranche appeals to experience to support his conservation principle. He makes this point still more explicitly in the treatise on the laws of motion:

> Because we cannot comprehend the designs of the creator nor understand all the relations that they have to his attributes, whether or not he conserves an absolute quantity of motion in the universe seems to depend on a purely arbitrary volition of God, which, consequently, we can know only through some sort of revelation, such as that which experience gives us. (OCM XVII-1 55)

Thus, although God's will is not actually arbitrary,[41] and the laws he follows are dictated by his attributes,[42] they are, to us, epistemically arbitrary, that is, we cannot pretend to know them in any a priori fashion. It is interesting to note that

here Malebranche is expanding on Descartes' doctrine that we cannot know God's ends, a doctrine which removed teleological considerations from natural philosophy. As we have seen, however, Descartes did think that we could know something about God's nature and the implications of his nature for the laws of physics. By denying this latter claim, as well as denying knowledge of God's designs, Malebranche effectively removes any remaining nonempirical basis for discovering the laws of nature.[43]

In keeping with this concession, the methodology of the treatise on the laws of motion is rather different in spirit from that suggested by the relevant section of the *Search* itself (Book 6, Part 2, Chapter 6, "General Directions Necessary for Conducting an Orderly Search for Truth and in the Choice of Sciences"). In the latter, while Malebranche acknowledges the difference between geometry and physics, his suggestion seems to be that we should construct a physics by consulting our clear ideas and then check the results against experience. In the essay on the laws of motion, however, Malebranche consults experience[44] for the particular laws, then seeks to reconcile the result with reason, noting for example that a revised conservation law, according to which God conserves the sum total of motion in a given direction (but contrary motions destroy each other) "carries much more the character of the divine attributes… Because according to this proposition taken in its true sense, the motion of all the bodies in general is always the same; everything remains, so to speak, in a perfect and immutable equilibrium" (OCM XVII-1 75)

We have found, then, that Malebranche has no good principled grounds for resisting attractionism, no way to declare it impossible, unintelligible, or even *less* intelligible than strict mechanism. Of course, this does not render mysterious

his failure to *endorse* an attractionist hypothesis: Malebranche had gone to some trouble to develop a mechanistic explanation of gravity.[45] Nevertheless, it seems that he ought to allow that the only good reason for preferring his theory to an attractionist one would be its superior applicability to the phenomena. Again here we see the parallel with Berkeley, who held that the theories must be judged by their results.[46] Berkeley makes the comparison and its outcome explicit in *Siris*:

> Nature seems better known and explained by attractions and repulsions than by those other mechanical principles of size, figure, and the like; that is, by Sir Isaac Newton than Descartes. (S 243)

And surely Malebranche would have been hard-pressed to defend his theory of tourbillons on the basis of its actual predictive results.[47]

9. Fontenelle: natures, anti-occasionalism, and the vindication of mechanism

A dedicated foe of attractionism, then, would be well-advised to steer clear of occasionalism. Need a Cartesian be an occasionalist? Space does not permit a full treatment of this important and controversial point, but I would like at least to briefly indicate why it is no coincidence that occasionalism became part of mainstream Cartesian metaphysics. Descartes is committed to a number of positions that point in the direction of occasionalism. He endorses the doctrine that conservation amounts to continuous creation, which Malebranche persuasively argues entails that God can be the only cause of every state of every created being (AT VIIIA 66: CSM I 243). The Cartesian conception of body as

mere extension seems to leave no room for attributing any kind of force to bodies, such that they might be genuine causes. Both Malebranche and La Forge argue in this fashion,[48] and many contemporary commentators have agreed, concluding that Descartes must, in effect, be an occasionalist with respect to body-body causation.[49] Furthermore, the basic substance-mode ontology of Cartesianism seemed to many (prominently including Henry More) to raise a puzzle about how impact could exemplify body-body causation: motion is a mode of body, modes are not transferable, yet if this billiard ball does not transfer its motion to that one at impact, in what sense is it having a causal effect on it?[50] There is then a good case to be made for the claim that Cartesian mechanism requires occasionalism as part of its foundations: occasionalism solves certain fundamental problems that otherwise confront the theory.[51]

It must be admitted, however, that there is hardly unanimity on the question of whether Descartes is or must be an occasionalist about body-body interaction. Martial Gueroult, Alan Gabbey, and Desmond Clarke have all tried to argue that Descartes makes room for a notion of genuine motive force that can be predicated of body.[52] I am somewhat skeptical of these attempts myself,[53] but the point I want to make here is that even if they succeed in distinguishing Descartes' position from (body-body) occasionalism, it is not at all clear that they will provide a Cartesian strategy for resisting attractionism. Gueroult, for example, states that moving force "metaphysically… cannot (like the force of rest) be anything other than its very cause (that is, in the case of motion, the Divine instantaneous action producing the effect first here and then there)." [54] But this account, like Malebranche's, would seem to work equally well for attractive forces.

I have argued that several elements of the Cartesian system lead to occasionalism. Surely, however, one could advocate a more minimal Cartesianism—a vortical, impact-based Cartesian physics-- without endorsing occasionalism. It is interesting to note that Fontenelle self-consciously attempted to occupy just this niche. His commitment to the superior intelligibility of Cartesian mechanist physics was coupled with considerable hostility to the occasionalism of the Cartesian metaphysical tradition. I suggest that the former nicely explains the latter. Some of Fontenelle's deepest philosophical commitments were to the special intelligibility of strictly mechanistic scientific explanations, and he rightly saw that occasionalism threatened those commitments. This may well have helped to inspire his composition of the "Doutes sur le système physique des causes occasionelles," which was published anonymously in 1686.

As we have seen, the strict mechanist claim that bodies interact only by impact at contact is transformed by occasionalism into the claim that the basic laws of motion imposed by God's will are exhausted by inertial laws and impact laws. And this thesis, it seems, can only be defended through an examination of what follows from God's nature, an examination for which finite knowers may be ill-equipped. Fontenelle rightly sees that a prima facie more promising way to ground strict mechanism lies in restoring the bodily natures banished by occasionalism.[55]

Fontenelle tries to support his appeal to natures by invoking the principle that God's action is more perfect if he acts according to the nature of a subject, rather than in a way that is indifferent to or contrary to the nature of a subject.[56] What it means for God to act according to the natures of things, in seems, is that,

abstracting from God's ordinary continual preservation of things, God allows created things to operate on each other according to the essences with which he has provided them:

> Now, it is inconceivable that the divine wisdom, in forming his designs, demands from things more that what is in them through the participation of the divine nature which has determined their essences. It is inconceivable that their nature, being as perfect as it could be, should nevertheless be so imperfect as not to be able to execute the designs of God, or that the designs of God should be so excessive that they could not be executed by the natures of things, despite their great perfection. (OCF I 631)

The relevant nature, for material bodies in general, is impenetrability. Because bodies are impenetrable, there is a necessary connection between impact and change in motion. Therefore, bodies can be true causes of change of motion at impact. Impenetrability grounds the transfer of motion at impact.[57] The pro-mechanist, anti-attractionist implications are clear:

> …from impenetrability it cannot follow that a body will produce a motion which did not exist, but it does follow that a body will make motion pass into another body. (OCF I 636).

The nature of bodies, then, can explain their obedience to the laws of impact, as well as the laws of inertial motion. It cannot, however, explain a law of attraction, which would require an ability to generate new motion.

In 1686, the need to specifically oppose attractionism would not have been especially salient to Fontenelle. In his late work, *Théorie des tourbillons* (1752), however, he explicitly draws an anti-attractionist moral from the appeal to natures:

> The Newtonians can say that, since bodies only move by the will of God, it is possible that by this same will they mutually attract each other; but the difference [between these two points] is extreme. In the first case, the will of God merely puts into action an essential property of matter, its mobility, and determines to motion the natural indifference that it has to rest or motion. But, in the second case, there is no way of seeing that bodies have by themselves any disposition to attract each other: the will of God would have no relation to their nature and would be purely arbitrary, which is completely contrary to the order of the universe which everywhere affects us. (OCF I 608)

For God to make bodies attract each other would be for him to make them behave in a way that is beyond or against their own natures. But, as he had argued in the "Doutes," this is contrary to divine wisdom.

Fontenelle's strategy depends crucially on claims about what the natures of bodies are. How can he confidently exclude attraction from the nature of bodies? I think that Fontenelle saw little real need to defend the conception of bodily natures that he relies upon. He took it to be uncontroversial that bodies are passive, inert entities, and that this passivity is incompatible with attractive power, which entails an ability to generate new motion. In doing so, he was in

good company, not just with the Cartesian tradition, but with the Newtonian mainstream. Many Newtonians, following Newton himself, were reluctant to attribute attractive powers to macroscopic bodies.[58] Samuel Clarke, Newton's recognized spokesperson, clearly relies on a conception of body as mere solid, extended stuff, possessed of a nature capable only of grounding its obedience to the law of inertia.[59] Moreover, Clarke and Whiston explicitly argue for an incompatibility thesis: That which is in itself inert, i.e. which obeys inertial laws in virtue of its own nature, could not be the sort of thing that attracts in virtue of its own nature (Cl Works II 582, Earth 5-6). Fontenelle would, I take it, endorse this thesis. He claims explicitly in the *Théorie des Tourbillons* that, while we see the necessity of some effect following from impact, we see the *impossibility* of one body attracting another distant body (OCF I 608).[60]

Fontenelle does, in the *Théorie*, raise and address the possibility that someone might claim that mutual attraction is an essential property of bodies, although we are unable to perceive it. Such a person, Fontenelle asserts, will soon be weighted down with sympathies, horrors, and all the qualities which brought shame upon scholastic philosophy (OCF I 609). A more interesting argument is suggested in the *Doutes*, which provides some justification for a conception of the nature of bodies which would rule out attractive powers:

> But as the existence of creatures, being dependent and by participation, has a character which puts it infinitely below that of God, so their moving force must have some character which puts it infinitely below that which is in God.
>
> This is discovered without difficulty. The moving force of God is that by which he produces a movement which was not at all

> [which did not exist]: the moving force of creatures is that by which they make a movement which already was, and which they did not produce, pass from one body to another. (OCF I 636)

Fontenelle argues that an appropriate conception of the relation between God and creatures demands that the power to create motion be reserved for God. To bestow attractive power upon creatures, however, is to give them the power of creation. Thus, the common-sense conception of passive, inert body receives theologico-metaphysical backing.[6162]

10. Conclusion

We have seen that Malebranche's position represents an unstable attempt to combine occasionalism with a principled adherence to strict mechanism. My goal in the preceding has been to identify some of the main points of tension in Malebranche's views. We have seen, further, that two (relatively) stable alternatives were in some sense available to Malebranche, namely, (1) Berkeley's occasionalist openness to Newtonian attraction and (2) Fontenelle's strict Cartesian mechanism, founded on an essentialist rejection of occasionalism. In examining the interconnections among these views, I hope to have illuminated an historically significant and philosophically rich aspect of the dispute over attraction, which played a crucial role in the complex phenomenon known as "the scientific revolution."[63]

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[1] The claim that occasionalism is characteristic of Cartesianism may seem controversial. First, the claim should really be restricted to occasionalism about body-body causation. While such occasionalism still goes beyond anything explicitly avowed by Descartes, many both in Descartes' time and in our own have seen Malebranche as simply developing doctrines implied by Descartes' own commitments and suggested by his own remarks (see Steven Nadler, "Doctrines of Explanation in Late Scholasticism and in the Mechanical Philosophy," p.540, Daniel Garber, *Descartes' Metaphysical Physics*, pp.297-305, Gary Hatfield, "Force (God) in Descartes' Physics"). This issue receives further discussion in section 9. Moreover, via its presence in the works of Malebranche,

La Forge, and Cordemoy, occasionalism became a dominant metaphysical position within the Cartesian school.

[2] See e.g. Fontenelle, "Éloge de Montmort," "Éloge de Saurin," OCF I 278-285, 484-492.

[3] One can see this in the many Newtonian texts which present mini-histories of natural philosophy, e.g. Francesco Algarotti, Il Newtonianismo, Colin Maclaurin, Account.

[4] Fontenelle, of course, was not really a system-builder in the tradition of Malebranche. Nevertheless, I hope that my brief discussion below brings out the unity in his thought.

[5]See the *Dialogues on Metaphysics and Religion* (OCM XII: SJ), Dialogue 8, section 2; Dialogue 7, section 12. The qualifier 'fundamentally' is crucial here, for God, who causes every particular event, must will every particular event. Here I follow Steven Nadler, "Occasionalism and the General Will in Malebranche" in holding that for Malebranche, God wills particular events in accord with his general volitional policies. Since God's will must be unchanging, we are led to the view that in consequence of his general volitions, God wills all particular events in a time-indexed fashion, i.e. he wills eternally that X happens at t1, that Y happens at t2, etc.: "God resolved from all eternity to create certain things in certain times…." (OCM II 318: LO 451). God's will is also supposed to be simple—the closest we can get to understanding how that could be the case, I think, is to conceive of God as willing (again, in consequence of his general intentions) the entire history of the universe, rather than a "mere" sequence of

events. Thus, God is of course not surprised by occasional causes nor made to do anything that he had not already intended to do.

[6] It is not obvious that Berkeley can actually succeed in reconciling this latter claim with the rest of his metaphysics.

[7] See Harry Bracken, *The Early Reception of Berkeley's Immaterialism 1710-1733*, 16.

[8] Berkeley's argument (PHK 25-30) may be summarized as follows: Material objects have already been ruled out as possible causes of ideas; ideas cannot cause other ideas; I don't cause my own ideas of sense; therefore, some other spirit (God) must cause them.

[9] The most obvious way in which Berkeley's idealism might fail to mirror materialism has to do with submicroscopical objects—things too small to sense. I discuss this issue at some length in Lisa Downing, "*Siris* and the Scope of Berkeley's Instrumentalism".

[10] This rather obvious argument *was* explicitly made by Pierre Bayle in his *Historical and Critical Dictionary* (Dictionary V 614, under Zeno of Elea H). Arthur Collier (Clavis 64-68), the English Malebranchean, makes the closely related point that it is contrary to God's wisdom to produce useless objects. See Charles McCracken, *Malebranche and British Philosophy*, p. 196.

[11] In the 15th elucidation, Malebranche invokes the principle that "it is useless to multiply beings without necessity" (OCM III 241: LO 679) against the efficacy of secondary causes.

[12] Here I follow Bayle (Dictionary V 614), who makes the point nicely:

> Observe that when he affirms, that God doth not invincibly induce us by evidence to believe that bodies exist, his design is to teach us

> that the error in which we should be in this respect, ought not to be charged on God. This is rejecting Mr. Des Cartes's' proof, and saying that God would be no deceiver, even tho' not one body should exist in the nature of things.

[13] It might seem that the following distinction would helpf vindicate the argument for probable existence: While in philosophical argumentation, we ought not to assent unless constrained to do so by reason, in everyday matters, we may make our voluntary judgments agree with our natural judgments, unless reason prohibits it. Thus, I may assent to 'this book exists (independently of me),' "this pencil exists (independently of me),' etc. However, problems again arise if God's veracity is brought in to legitimate these judgments. Although we have no means of discovering these judgments to be false, surely Malebranche's previous remarks show us that we do have means of discovering these judgments to be dubitable/possibly false, and thus God cannot be blamed if they are false. This is to say that the notion of God being "*to some extent* the Author of our errors" (my emphasis) does not have a place in the Cartesian system, given its model of error. Malebranche's system would benefit from the official introductionof some notion of degrees or varieties of assent. (He does use the notion of "complete" consent at OCM I 59: LO 12.) He might then say that we can legitimately assent to these judgments as possibly true and plausible, though we ought not to grant them full assent. Again, however, this provides no basis for an application of God's veracity to guarantee probability.

[14] "[J]e croi que ceci suffit pour contenter tous ceux qui ne font point trop les difficiles."

[15] My comments here are confined to the *Search*. His treatment of the existence of bodies in the *Dialogues on Metaphysics and Religion* (Sixth Dialogue) parallels the one in the *Search*, although the treatment is less detailed and his conclusions (sense perception renders the existence of bodies probable, but faith establishes it definitively) are less hedged. Nevertheless, it is interesting that Malebranche ends by emphasizing the *difficulty* of the question while downplaying the *importance* of the question and the need to rely upon these arguments.

[16] See also OCM II 377: LO 484.

[17] See also PHK 104-105.

[18] See DM 71-2.

[19] A similar point is made by Maupertuis (OM I 991) in the *Discours sur les différentes figures des astres*: "[I]s it more difficult for God to make two distant bodies tend to move towards each other, than to wait to move them until one body has met another?"

[20] For an account of Berkeley's instrumentalism, see Lisa Downing, "Berkeley's Natural Philosophy and Philosophy of Science."

[21] Malebranche goes on to say that "everything I think about the properties of light agrees with all his experiments." It would appear that the book being discussed is Newton's *Opticks* (in its Latin edition of 1706). Nevertheless, Malebranche's judgment that Newton is a geometer but not a physicist reflects continental response to the *Principles*, as in the *Journal des Sçavans* review of 2 August 1688. See I. B. Cohen, *Introduction to Newton's 'Principia'*, pp. 156-157.

[22] The last edition (of six) of the Search was published in 1712; the first, in 1674-5.

[23] OCM III 282: LO 703-704. See Henry Guerlac, *Newton on the Continent*, p. 64; Paul Mouy, "Malebranche et Newton," p. 422; E.J. Aiton, *The Vortex Theory of Planetary Motions*, p.179.

[24] I agree with Mouy's (*Le développement de la physique cartésienne,* p.281) assessment here: "Ainsi, pour l'essentiel de la physique, Malebranche est cartésien. Mais il refuse de se laisser attacher à l'école."

[25] Something like this seems to be suggested by McCracken, *Malebranche and British Philosophy*, pp. 77-8:

> The geometer, [Malebranche] supposed, begins with a clear a priori concept of extension from which he can deduce truths about the figures of two- and three- dimensional objects, and the physicist, recognizing that extended things are movable, can discover a priori the general laws governing motion and its communication.

See also Ginette Dreyfus, *La volonté selon Malebranche*, p. 144.

[26] See Mouy, "Malebranche et Newton," pp. 412-413.

[27] I thus agree with Tad Schmaltz's (*Malebranche's Theory of the Soul*, p. 69) contention that "on Malebranche's own view it is geometry, rather than physics, that best illustrates the nature of knowledge through a clear idea."

[28] More specifically, Descartes' central assumptions are that God established vortices of fluid matter around certain centers (corresponding to what are now stars, planets, and comets) and that the sizes, shapes, motions, and arrangements of the material particles that constitute the cosmos are such as they would have been had they evolved from an initial state where they were all of "medium" size (AT VIIIA 100-101: CSM I 256-257).

[29] Rohault 96.

[30] This is not to deny that there might be problems applying the notion of attraction to a plenum. However, many physical concepts are problematic in a plenum, so this hardly seems like a fair objection! Surely one could come up with an account of how attractive forces work in a plenum that would be at least as plausible as Descartes' explanation of density or of the individuation of bodies. What one would need is some way of discounting the effects of attraction among tiniest particles, in order to make them function more like empty space. The supposition that attraction between bodies of tiny volume is negligible compared to that which obtains between large bodies would seem to do the job.

[31] See OCM III 179: 643 : "The terms *gravity (pesanteur), form, nature* and the like call up the idea of neither a being nor a manner of being. They are terms devoid of sense, which wise people ought to avoid."

[32] PNPM I 54: MPNP 416.

[33] I quote from the 1712 edition, in keeping with my practice for the *Search* itself.

[34] To anyone who might be inclined to insist that we must take his attributions of motive force to bodies at face value, Malebranche offers the following piece of exegetical wisdom (OCM III 231: LO 672):

> When an author seems to contradict himself, and natural equity or some stronger reason obliges us to make him agree with himself, it seems to me that we have an infallible rule to discover his real view. For we have only to observe when this author speaks according to his lights, and when he speaks according to common

opinion. When a man speaks as do others, that does not always signify that he is of their opinion. But when he positively says the opposite of what is customarily said, though he might say it only once, we have reason to judge that it is his view—provided that we know that he is speaking seriously, and after having given careful thought.

[35] See also OCM XII 164: SJ 119.

[36] See Mouy, "Malebranche et Newton," p. 415-6; Aiton, *Vortex Theory*, pp.57-8, 91.

[37] Given Descartes' conception of size and speed as basic properties, having God put bodies into motion and increase their speeds according to the inverse square law might well seem to be in tension with divine immutability as it applies to creation.

[38] See also OCM III 216-7: LO 664.

[39] Thomas Hankins, "The Influence of Malebranche on the Science of Mechanics during the Eighteenth Century."

[40]André Robinet, *Malebranche et Leibniz: Relations personelles*, p. 252.

[41] It is true that in the above cited letter replying to Leibniz in the *Nouvelles de la République des Lettres* (Robinet, *Malebranche et Leibniz*, p. 252), Malebranche seems to suggest that which impact law God establishes is actually arbitrary. However, this need not and ought not be Malebranche's considered view. Moreover one could read "arbitrary" in this passage as short-hand for epistemically arbitrary.

[42] "This principle, that the conduct of God must bear the character of his attributes, cannot be contested…." OCM XVII-1 73.

[43] Discounting special divine revelation. I take it that this is a real possibility for Malebranche, but not one he believes to have been actualized.

[44] More accurately, he consults an authority, Mariotte, whom he takes to have consulted experience. See Pierre Costabel's editorial notes, OCM XVII-1: 201.

[45] Malebranche's particular mechanical explanation of gravity derives from Descartes', but relies on one of Malebranche's innovations, the petits tourbillons. Malebranche transforms Descartes' particles of the second element into tiny vortices, each with their own centrifugal force, outward pressure, and elasticity. They explain terrestrial gravity as follows: These mini-vortices surrounding the earth are thrown into disequilibrium by having an earthy body (that is, a body composed mainly of third element particles) in their midst, which lacks the centrifugal force to press out on its neighboring mini-vortices. The pressure from below this body (that is, from the direction of the earth) is stronger than the pressure from above, because the earth compresses the vortices near the it. Or, as Malebranche puts it, the downward centrifugal tendency of the mini-vortices near the earth is "returned to them" due to the immobility of the center, and transformed into a greater upward tendency. The body is thus pushed down on either side by mini-vortices moving upwards. (OCM III 276-280: LO 699-702).

[46] Thus I agree with Thomas Lennon's remark (LO, "Philosophical Commentary," 883) that "…in occasionalism one finds a budding instrumentalism that bloomed historically with Berkeley and Hume."

[47] As suggested in section 5, however he might have tried to argue that in a plenum, a strictly mechanistic theory has better odds of being vindicated by the phenomena.

[48]OCM XII 150-151: SJ 106-107, OP 238. See Nadler, "Doctrines of Explanation," p.538, and "The Occasionalism of Louis de la Forge," p.62.

[49] Garber, *Descartes' Metaphysical Physics*, pp.297-305, Hatfield, "Force (God) in Descartes' Physics"

[50] Henry More put this problem to Descartes in his letter of 23 July 1649; AT V 404: CSMK III 382. Malebranche raises it at OCM VII: 515-516, and La Forge does at OP 238-9.

[51] That this is one motivation for occasionalism is suggested by Nadler, "Doctrines of Explanation," p.537.

[52] Martial Gueroult, "The Metaphysics and Physics of Force in Descartes," Alan Gabbey, "Force and Inertia in the Seventeenth Century: Descartes and Newton," Desmond Clarke, "The Concept of *Vis* in Part III of the *Principia*."

[53] For a brief but interesting critique of Gueroult, Gabbey, and Clarke, see Helen Hattab, "The Problem of Secondary Causation in Descartes: A Response to Des Chenes," pp.99-101.

[54] Gueroult, "Metaphysics of Force," p.220. It should be noted that Gueroult himself concludes (p. 222) that Descartes lacks an adequate ontology of moving force.

[55] It should be acknowledged that Malebranche does speak of bodies as having natures. In his view, however, body's nature as an extended thing grounds only a purely passive capacity to be moved by the will of God. It is not clear to me that Malebranche is really entitled even to such minimal natures, given the implications of his continuous creation doctrine, which suggests that the world is something like a continuous emanation of God.

[56] Fontenelle's claim that natural laws should be grounded in the natures of things may remind us of Leibniz. However, Fontenelle's rather caustic summaries of Leibniz' metaphysics and physics in his éloge make quite clear that Fontenelle would not have viewed Leibniz as a source of inspiration (OCF I 226-252).

[57] More specifically, impenetrability grounds a genuine moving force in bodies, which in turn grounds the transfer of motion at impact (OCF I 635-6).

[58] Newton's views on this subject are famously conflicted. However, his published works contain frequent disclaimers to the effect that he leaves open the question of the cause of gravity and does not intend to posit attraction as an intrinsic power of bodies. Furthermore, in his well-known letter to Bentley, he denounces action at a distance by "brute matter" (Papers, 302).

[59] This is also true of Bentley and Whiston. See Cl Works II 697, Bn Works III 168, Earth 5-6.

[60] It should be noted, in Fontenelle's defense, that the *Théorie* also includes a number of interesting arguments for the unworkability of attractionism as a system of physics.

[61] Further backing of this sort can be supplied by the specter of thinking matter, which Fontenelle explicitly invokes (OCF I 608). If matter can create new motion by nature, what can it not do?

[62] This is not, of course, to suggest that Fontenelle's position is invulnerable. On the contrary, it was actually attacked from the Cartesian side, by Malebranche and Bayle (OCM XVII-1 579-586, 590-594), who argued in effect that Fontenelle could not avoid occasionalism because the minimal natures possessed by bodies

did not suffice for them to be efficient causes. And it was liable to attack from Newtonians such as 'sGravesande (MENP, Preface) who would disclaim all knowledge of the nature of bodies and insist that the natural philosophy should simply search out regularities in the phenomena.

[63] Ancestors or descendents of this paper were read before audiences at Northwestern, the University of Wisconsin-Milwaukee, the Ohio State University, the 2000 California Conference on Early Modern Philosophy at UC Irvine, the Pittsburgh Center for Philosophy of Science, and the Institute for the Humanities at the University of Illinois at Chicago. I profited greatly from the discussions that followed. Particular thanks go to Daniel Sutherland, Michael Liston, and William Taschek for questions in discussion which led to significant reworking of the paper. Many thanks to Abraham Roth for reading and commenting on the paper. Thanks also to the Institute for the Humanities at the University of Illinois at Chicago for research support during the period in which this paper was completed.