

CAUSATION, DISPOSITIONS, AND PHYSICAL OCCASIONALISM

by Walter J. Schultz and Lisanne D'Andrea-Winslow

Abstract. Even though theistic philosophers and scientists agree that God created, sustains, and providentially governs the physical universe and even though much has been published in general regarding divine action, what is needed is a fine-grained, conceptually coherent account of *divine action, causation, dispositions, and laws of nature* consistent with divine *aseity*, satisfying the widely recognized adequacy conditions for any account of dispositions.¹ Such an account would be a basic part of a more comprehensive theory of divine action in relation to the fundamental concepts of science and of mathematics. Our aim in this article is simply to present such a theory.

Keywords: aseity; causation; concurrentism; dispositions; divine action; laws of nature; mechanism; occasionalism

In general, the available alternative theories of divine action have been some version of concurrentism or occasionalism. *Concurrentist* theories make a distinction between *primary* and *secondary* causation, holding that God (the primary cause) cooperates with secondary causes. *Occasionalism* holds that *sustaining divine action is occasional causation* and that the only real causes are God's immediate, existence-conferring volitions (Bradshaw 1996, 381; Nadler 2011, 30–37). As Nicholas Malebranche (1638–1715) wrote, “the nature or power of each thing is nothing but the will of God . . . all natural causes are not true causes but only occasional causes” (Malebranche [1674–75] 1997, 448). Although some writers have given constructive attention to contemporary occasionalism, none have addressed the issue at hand (Braine 1988; McCann and Kvanvig 1991; Vallicella 1966, 1999).

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Recently, however, Alvin Plantinga, in discussing how the necessity of laws of nature and of causation itself *might* be related to God, gives “qualified support” to “weak” occasionalism over secondary causation and decretalism, judging that it is the “best compromise” (Plantinga 2016, 127, 144). While many papers like Plantinga’s advance scholarship by describing the problems and obstacles, saying what an adequate theory *might* look like in general, few if any provide the analyses and syntheses we are looking for. In this article, we fill the lacuna by developing a version of occasionalism in some detail, which we call “Divine Compositionism” (Schultz and D’Andrea-Winslow 2014). It should be noted that, like the occasionalism of Louis de la Forge (1632–1666) of the seventeenth century, our view differs from pure occasionalism in that it applies *only* to physical causation, not to the intentions or choices of free agents (La Forge [1664]1997), thereby precluding one standard objection.²

As far as we could discover, no concurrentist theory has provided the desired synthesis either (Freddoso 1994, 2002; Dodds 2012; Page 2015). What is usually omitted is a *demonstration* that the analysis of dispositions (causal powers) satisfies the adequacy conditions and is consistent with only God’s being *a se*. Merely asserting as much or offering analogies is insufficient. Nevertheless, the aim of this article is not to criticize any contemporary theory of divine action. Furthermore, we are not claiming that there are no contemporary divine action accounts of causation, or dispositions, or laws of nature *per se*. Rather, we are bringing to attention the fact that divine action theorists have yet to provide a fine-grained, conceptually coherent account of *divine action, causation, dispositions, and laws of nature* consistent with divine *aseity*. Our aim is simply to present such an account. For a brief argument that concurrentism conflicts with *aseity*, see the Appendix.

The second section presents the five-category ontology of our theory of divine action. The third section describes its metaphysics of *causation*. The fourth section presents an analysis of *dispositions*, showing how it satisfies the adequacy conditions for such accounts. It includes a brief discussion of *laws of nature* and *mechanisms*. The fifth and final section summarizes the main points and discusses the issue of *intervention* on the one hand and *continuous creation* and *idealism* on the other, showing how our view of divine action overcomes another standard objection to occasionalism.

ONTOLOGY

Our theory of divine action involves a five-category ontology. Underlying all physical reality is only *God, God’s plan, and ways God enacts his plan*. We may conceptualize these for the purposes of metaphysical theorizing as *God, and an ordered domain of possibilities, dispositions, forces, and structures* (Schultz 2009, 331–37).

The domain of *possibilities* is the content and extent of God's awareness of the range of God's ability *ad extra*. One sequence of such possibilities is God's composite *plan* for the universe, which we may refer to as the *actual world*. The actual world is God's complete representation *for* the universe, not *of* the universe. It is one history out of a range of alternatives.

Since our idea of the actual world differs from standard usage, we should elaborate on it just a bit. Let the plans, which are representations *for* a state of the universe and collectively constitute the actual world, be *world states*. Accordingly, let a representation *for* the entire universe at a Planck moment be a *total* world state. (A Planck moment is a discrete, minimal duration of physical time.) A *composite* world state is any combination of atomic world states without a regional or temporal gap.

Whereas *world states*, on our view, are representations *for* a state of the universe and together constitute God's plan for the universe, which is the actual world or one alternative history among many constituting an *ordered domain of possibilities, dispositions, forces, and structures* are ways God confers existence to the universe; ways God enacts God's plan. The concept of *disposition* is developed in the third section, but for now let an introduction suffice. We posit that dispositions (ontologically considered) are God's commitments to act on condition. This is not a reduction, but an identity. From the complex disposition (which call the *solubility* of salt) to the simple disposition (which we call the *charge* of an electron), what *appear* as manifesting dispositional properties (complex or simple) are real, but at bottom are God's conferring-existence per God's commitments. In other words, while what we perceive is the *manifestation* of a complex disposition, what they are ontologically are matters of God's existence-conferring action. As it was illustrated in Schultz:

Consider the following analogy. Becoming a soldier involves *making a commitment* to take guard duty at some later time and *being on guard duty* during that later time is to be committed to acting on condition. Thus, the soldier makes an initial, yet enduring commitment (that is, he plans). That plan or commitment, in turn, involves him in later being committed over a defined duration to sounding an alarm when danger approaches. Likewise, [God's plan] including a type of causal process over a duration *is identical to* God's commitment to being committed to act on condition. . . . This is what gives an object's dispositional property its apparent necessity and intentionality. It is nothing other than an omnipotent, faithful creator's commitment to act according to plan. (Schultz 2008, 336)

The four *forces* (i.e., gravity, electromagnetism, the strong, and the weak nuclear forces)—are God's constant existence-conferring actings. A *structure* is God's unifying, coordinated acting. We perceive these structures as *patterns* of coexistence of some type, either as an aspect of a single physical system (e.g., structure of a molecule of H₂O) as the co-occurrence

of separate events. The inclusion of *structures* in our ontology reflects our commitment to a version of ontic structural realism (OSR) (Bird, Ellis, and Sankey 2012; French 2014).

Our ontology is non-Aristotelian by its affirming that physical existence is creation *ex nihilo* and by its denying that so-called “substances” or “causal powers,” or any other created thing, even *can* be ontologically fundamental. Our ontology is non-Platonic by its denying that any so-called “abstract object” exists independently of God and by its affirming that all of them can be accounted for in terms of God’s awareness of God’s ability *ad extra* and ways God enacts God’s plans.

We postulate that every created thing and every fundamental concept of physical, chemical, and biological science can be accounted for in terms of some combination of this five-category ontology. If this conceptualization is on the right track, then we may say that what physical science studies are the *ways* God confers existence in accordance with his plan. But we are not the first to say such things. As Jonathan Edwards (1703–1758) said in the eighteenth century, “to find out the reasons of things in natural philosophy is only to find out the proportion of God’s acting” (Edwards 1980, 353). As Isaac Newton (1642–1757) said in the seventeenth century, “All that diversity of natural things which we find suited to different times and places could arise from nothing but the ideas and will of a Being, necessarily existing” (Newton [1687]1825). And as Herman Bavinck (1854–1921) declared in the twentieth century, “The whole world is thus the realization of an idea of God” (Bavinck 2004, 425). Our five-category ontology rigorously develops these intuitions.

METAPHYSICS OF CAUSATION

Events

With our ontology in place we can say something about our metaphysics of causation; the causal *relata* and the causal *connection*. We take the apparent causal *relata* to be *events*. Doing so affirms the empirical grounds of science. Nevertheless, the real causation underlying the apparent regularity of events is God conferring existence according to his commitments. Our view of causation is developed in the next subsection, but to provide sufficient background and to forestall mistaken inferences or unnecessary criticism, we should first clarify what we mean by “event.” An *event* may be characterized in four complementary ways. Each of these characterizations is a different way of considering the same thing. First, a nonelementary *event* may be viewed as a finite sequence of discrete *states* of a physical system. This is an event understood *physically* or *scientifically* (Chew 1985; Dowker 2006). Second, *perceptually* understood, an event just is a *change* in a physical system (or interacting systems) over a duration. The acorn

becomes an oak tree. The boulder warms as the sun shines upon it. Third, an event may be understood *conceptually* as a *manifesting* disposition (fundamental or complex). The ionic bond of sodium chloride (NaCl) molecules is an event that may be conceptualized as the manifesting dispositions of sodium and chlorine ions. The complex biological process of protein synthesis is an event that may be conceptualized as a manifesting, complex structure of dispositions. Finally, on our view, what we *perceive* as a change and *conceive* as a manifesting disposition is the *acting/result* of God's compositionally conferring existence to that physical system over a sequence of moments. This is an event understood *ontologically*. This is what underlies the phenomena and theoretical entities of fundamental science. To recapitulate, an *event* understood *scientifically* as a sequence of states of a physical system, *perceived* as a change, *conceived* as a manifesting complex of dispositional properties, is a divinely realized composite world state.

This account of events is only an approximation which serves the purpose of getting the ideas on the table. To refine the account, both *complex* (or *derivative*) events should be differentiated from *elementary* (or *fundamental*) events. Only derivative events—events that are individuated or abstracted through perceptual experience—play a role in biology and ordinary life. No derivative event can be completely accounted for in terms of simple classical mechanics, much less quantum mechanics—assuming of course that these fundamental theories and their presupposed ontologies represent things the ways they are physically “at the bottom.”

Causation

Now that we have declared our view of events as *causal relata*, we can explain our view of the *causal relation* or *connection*. There are two ideas at play here that are often conflated and are difficult to conceptually separate. As we consider our (nonscientific) ordinary concept and experience of *causation*, it seems to us to involve the *production* of some event by some earlier event. The two intertwined ideas are, first, that there are apparently causal relations between events and, second, that *that* relation is the *apparent* causing of an event. Ordinarily, we all believe that the vase falling on the tile floor “causes” it to break, that smoking “causes” cancer, that the wind blowing against the trees “causes” them to bend. It looks to us as though events cause other events. Furthermore, we all learn early on that not every pair of sequential events stands in a causal relation. Our ability to discern and to discover these relations enables us to function in the world. It grounds our scientific understanding and, of course, makes modern medicine possible. So, we have come to expect and to treat the “producing” as the causal relation. In sum, this standard *two relata—one relation* model of causation *seems* to suggest that the *apparent* causal relation is the *causing* of the effect.

This is, of course, what David Hume (1711–1776) claims in his analysis of our ordinary concept. But since he argues that the causing, that is, the “necessary connection,” cannot be observed, all we can see is a regularity (Hume [1748]1977, 49–50).

Our view is an alternative to this Humean understanding. *First*, the apparent “causal” relation between events is not the productive causation; it is not the causing, the producing, the bringing about, or the making happen. The same point has been recently argued by Stephen Mumford and Rani Lill Anjum who claim that “causation should not then be understood as a relation between two events, but rather as what makes an event occur” (Mumford and Anjum 2011, 23). We agree entirely, but what could it be that “makes” an event occur? Answering this brings us to a second point.

Second, the causing, the producing, the bringing about, or the making happen *is* God’s existence-conferring action. Causation seems primitive or basic and resists reductive analyses because it is not a productive relation by, of, or between physical things. Rather, causation *is* God’s compositionally conferring existence per God’s commitments—all of this is in accordance with the *actual world*, which is God’s plan. Our view is not strictly Humean. There is more to causation than *mere* regularity. Causation is not *in* nature; it grounds nature.

Third, the productive causation of an event (i.e., God’s conferring existence) is *simultaneous* with the occurring of the event. This may involve the completed transfer of energy or momentum, but it need not; and when it does, the transfer is not the causing. Transfer of energy or momentum distinguishes a causally related sequence from a noncausally related sequence of states; it is indicative, but not explanatory.

Finally, events (as effects) are legitimately associated with events (as causes), because the “causal” relation is a real relation. The “causal” relation between events is a real relation of *necessity* due to the irresistibility of God’s conditional commitment. Both dispositions and structures have a *modal* aspect: both are ways God confers existence and are (in some cases) what “must be” and (in others) what “cannot be,” for example, Pauli’s Exclusion Principle: two identical fermions *cannot* occupy the same quantum state simultaneously. Thus, *natural necessity* is not a primitive *of* nature, but is an aspect of the three ways God confers existence. Thus, we account for both the necessity and regularity aspects of our *concept* of causation: nothing can hinder God’s fulfilling God’s commitments (*necessity*) and God (almost) always acts per God’s commitments (*regularity*).

In sum, even though it seems *to us* that events cause events (or states of systems cause other states), in reality causing is not a brute, fundamental feature of nature. *Causation is* God’s compositionally conferring existence per God’s commitments, which are aspects of God’s plan. This explains why physical causation *seems* primitive or basic. Causation resists reductive

analyses because it is not a productive relation by and of purely physical things.

This account satisfies a crucial condition that William Vallicella describes: “The idea is that a total causal explanation of an event cannot merely specify the relations in which the *explanandum-event* [i.e., the effect] stands to other (typically prior) events [i.e., the cause], but must also explain the very existence or occurrence of the *explanandum-event*” (Vallicella 1996, 356). The very existence or occurrence of the *explanandum-event* on our view just *is* God’s existence-conferring action. The existence-conferring act and the resulting existence of state of a physical system are one and the same, though considered from two standpoints. This follows from the fact that God is self-existent and absolutely independent (*a se*) and the *aseity* is incommunicable. No entity, property, or relation exists apart from—before or after—God’s conferring existence, because it is impossible. Our position satisfies both conditions stated by Vallicella and, stated technically, is as follows:

DEF cause (*v*): A (discrete) event e^1 “causes” event e^2 just in case God’s coordinated, existence-conferring act¹ *is* event e^1 , which satisfies the set of initiating conditions attached to God’s commitment to act² on condition, and where such a divine, existence-conferring act² *is* each sequential state of the relevant physical system picked out as e^2 .

There are several things to take note of here. First, there are not two types of causation. We use the term, “causation,” univocally: only God causes events. Yet, apparent causation and empirical work is legitimate. It is legitimate because of the underlying reality of God’s commitments and existence-conferring action. Second, these divine commitments—experienced, perceived, or discovered by us as dispositions, laws of succession, or mechanisms—have *ranges* and *degrees* of manifestations and of initiating conditions. These variabilities serve God’s larger purposes. Third, it is reasonable to think that often several such divine commitments are jointly relevant to an effect. Fourth, given such ranges and degrees of manifestations and of initiating conditions, and the coordinating of multiple relevant commitments, prediction of what outcome will occur is often difficult, if not impossible. This is consistent with what Jason Colwell posits regarding *apparent* randomness: “God makes active decisions about each fundamentally random event in the universe” (Colwell 2000, 137). (We will add more detail to this idea in the next section.)³ Fifth, note again the complementarity of the divine act and its result here. If an event is a sequence of states of a physical system, and causing is simultaneous with effect, then there is a complementarity of act and result of God’s existence-conferring action.

The contiguity objection against event-causation. It might be thought that this view of events renders our view subject to an important objection

to event-causation. As Anjan Chakravartty puts it, for any two events A and B, “for A to bring about B causally, not mediated by other events, but directly, A and B must be contiguous in time. But A and B cannot be contiguous, because time is dense. That is, between any two instants, say that at which A terminates and that at which B begins, we can always find further instants. Therefore, it is impossible for successive events to be temporally contiguous. Thus, A cannot cause B” (Chakravartty 2005, 11). Note that this *contiguity objection* invokes two explicit premises. The first is the premise that causally related events must be contiguous, and the second is time is dense. Divine Compositionism holds that time and space are discrete and that events standing in a causal relation need not be temporally or spatially contiguous. The real, productive causation is God’s existence-conferring action and the apparent causal connection is God’s commitment. The temporal and spatial contiguity of events are not conditions of causation on our view, so the objection does not apply.

The light-cone objection against simultaneity of cause and effect. Our view holds that the *causing* is simultaneous with the *being caused*. It might seem obvious, but this means that God’s creative action *is* the causation and it *is* the result. But someone might object saying that “since no causal influence can travel faster than the speed of light, the set of point-instant (or physically minimal) events that lie on or inside the *past light cone* of event e^1 are the only ones which stand in a possible causal relation to e^1 as cause to effect. Likewise, the set of events that lie on or inside the *future light cone* of e^1 are the only ones which stand in a possible causal relation to e^1 as effect to cause, since productive causation *involves* a signal of some sort. The simultaneity of cause and effect is impossible for physically minimal events.”

Here is our response. What the objector is referring to has to do with the relation between events, one being understood as the cause and the other as effect. But this is not the real causing of events. On our view, we must always ask: are the *relata* in question aspects of God’s commitment (i.e., realized world states observed as states of a physical system) or are they the *causing* and the *being caused*? The light cone pertains to the former, the relation. But the *causing* and the *being caused* is God’s acting. Thus, the appearance of an intrinsic productive *relation* between events is *God’s conditional commitment* and the event caused (i.e., the effect) is *God’s existence-conferring action*. Thus, again, even though it *seems* that event causation is brute, primitive, and unanalyzable, in reality—as both pure occasionalism and Divine Compositionism hold—physical causation is not primitive. We perceive a thing’s existence, but we cannot perceive *God’s conferring* its existence. Therefore, we cannot perceive the causation. We infer it. Our position on events and causation is basic to our view of dispositions, to which we turn next.

DISPOSITIONS, LAWS OF NATURE, AND MECHANISMS

There are four features of dispositions which are crucial for a general understanding. First, we may characterize a disposition, in general, as a state of being poised to do or be something, that is, *to effect a change* (active) or *to be changed* (passive). Some examples are the *elasticity* of a rubber band, the *fragility* of a vase, the *solubility* of sugar, and the *mass* and *charge* of an electron. Second, the characteristic way a disposition is expressed is called its *manifestation*. *Shattering* is a manifestation of fragility; *dissolving* is the manifestation of solubility. A physical system's manifesting a dispositional property over a duration is for the dispositions of its components to coordinate or coeffect at times as "mutual manifestation partners" (Heil 2005, 350) or as the "coactivation of reciprocal powers" (Marmodoro 2014, 1). The analysis given below is a simplification and does not reflect this. However, in the application of the analysis—in analyzing a mechanism, say the dissolving of NaCl—these are clearly represented. The third general feature of dispositions is that they have *activating* (or *initiating*) *conditions*. Striking a vase is an activating condition of fragility; seeing a person in pain or in need is an activating condition for compassion. Fourth, whatever accounts for an object's *having* a disposition (i.e., being in that state-of-being-poised) and the causal relation that holds between its activating conditions and its manifestations is said to be its *grounds* or *causal base*. For example, the so-called causal base of the fragility of the vase is the molecular nature of its material.⁴ With these basic ideas in place, let us now consider a divine action analysis of dispositions.

An Analysis of Dispositions

Every event is unique and is related to another by what appears to us to be a causal process, but which we claim is God's conferring existence per God's commitments. In other words, a *disposition* (ontologically considered) may be construed as God's commitment to confer existence on condition. What do we mean by the phrase, "on condition"? Let a "situation" be a state of a physical system. Since the actual world is God's plan, to say "the actual world includes *situation A*" is to say "God plans to create *A*." Likewise, to say "the actual world includes a representation *for* a type of *causal process* of which situation *A* is the terminal state" is to say "God plans to create a *situation A* (of some range of types) whenever a previous situation *B* is created that satisfies a certain set of conditions." Or to put it another way, it is to say "God is committed to confer existence to situation *B*, on the condition that situation *A* is realized." Thus, whether a physical system *has* a dispositional property is a matter of what the actual world includes. But since the actual world is God's plan in accordance with which God confers existence, we have related a conception of dispositions to a conception of

God's creative acting according to plan. With these comments in mind, the analysis may be stated as follows:

For any *physical system (object or substance) x*, any *state σ of physical system x*, any *disposition D*, and any *duration δ* , *physical system x has a disposition D over duration δ* if and only if

- (1) the actual world includes a representation for a type of causal process C_x associated with D and holding for some duration δ within which *state σ of physical system x* satisfies a set {i} of D 's initiating conditions over some duration δ' and *state σ' of physical system x* is a token of one of D 's manifestation types {m} occurring over duration δ'' later than δ'

and exactly one of the following holds: either

- (2) the actual world *does not* include a representation for which *state σ of physical system x* satisfies a set {i} of D 's initiating conditions at δ' , or
- (3) (i) the actual world *does* include a representation for which *state σ of physical system x* satisfies a set {i} of D 's initiating conditions over some duration and (ii) the actual world *does* include a representation for which *state σ' of physical system x* is a token m of one of D 's manifestation types {m} occurring over duration δ'' later than δ' , and (iii) the actual world *does not* include any representation for a type of causal process C_x^* associated with a competing disposition D^* over duration δ that overrides D , or
- (4) the actual world *does* include a representation for a type of causal process C_x associated with D , but a different causal process C_x^* associated with a competing disposition D^* interferes over duration δ .⁵

Therefore, *physical system x has a dispositional property D* just in case

- (1) and (2) hold, so that D is not manifested at δ'' , or
- (1) and (3) hold, so that D is manifested at δ'' , or
- (1) and (4) hold, so that D is not manifested because of some interference.⁶

In other words, whether a physical system *has* a dispositional property is matter of what the actual world, God's plan, includes.

Adequacy Conditions for Disposition Analyses

The extensive critical attention that has been given to analyses of dispositional properties at least since Rudolf Carnap (1936) revealed several conditions that any proposed analysis must meet. *First*, an analysis of dispositions should indicate how a disposition is associated with an object of some sort, whether an individual such as an electron or a quantity of some

substance such as water. As George Molnar emphasizes in his criticism of the conditional analysis, “The conditional does not seem to be saying anything about what it is *in the object*, makes the response follow upon the stimulus” (Molnar 1999, 1). This requirement is satisfied in part (1) of our analysis.

Second, an analysis should represent what it is about the possessor of a disposition that renders it *poised* either to be an agent of a token of a type of causal process or else to be subject to some causal process. *What is it* that makes the object “powerful” or “liable”? *Why* does it have that “ability” or “vulnerability”? What about a salt such as NaCl that makes it liable to dissolving? There is a significant gap between scientifically informed metaphysics and standard metaphysics. Standard metaphysics posits “causal powers” and “liabilities.” Scientifically informed metaphysics holds that some dispositions are ungrounded, some are complex and coordinated. Complex and coordinated dispositions are mechanisms. For example, a scientific analysis of the mechanism of the solubility of salt (i.e., a liability) reveals a complex structure of dispositions (D’Andrea-Winslow and Schultz forthcoming). Even though water appears to have the power to dissolve and salt appears to have the liability to be dissolved, the analysis reveals only states of a physical system as stages in a process. In our analysis, the “double arrow” symbol in the formal analysis represents the connection between an initiation state and a manifestation of both an ungrounded disposition and a complex structure of dispositions.⁷ The double arrow also represents both the *intentionality* (i.e., directedness toward a manifestation) of the disposition and the apparent *causal necessity* of the manifestation of the dispositional property associated with object *x*. However, what the double arrow ultimately represents is God’s commitment and the manifestation is God’s existence-conferring action. There is nothing more. Water appears to have a causal power and salt appears to have causal liability, but all there is God’s existence-conferring action. Our metaphysical analysis is consistent with and does not compete with scientific analysis.

Third, an analysis should represent a disposition’s existence even when not manifesting (Broad 1933, 265). We represent this in the last paragraph of the analysis where (1) and (2) hold. God’s commitment *D* holds regarding some physical system *x* over some duration, but his plan, the actual world, *does not* include a representation for which *state* σ of physical system *x* satisfies a set {*i*} of *D*’s initiating conditions at δ' so that *D* is not manifested at δ'' .

Fourth, an analysis should represent the conditions under which object *x* has disposition *D* in a way that precludes it from being subject to refutation by examples of “finkish” dispositions, antidotes, or mimickers (Martin 1994; Lewis 1997; Bird 1998; Fara 2005). These counterexamples have forced revisions in many analyses. We represent this requirement in the last

paragraph of the analysis where (1) and (4) hold so that D is not manifested because of some interference.

Fifth, an analysis should *represent* the *apparent* ungroundedness of the dispositional properties of elementary particles (Mumford 1998, 2006; Thompson 1988; McKittrick 2003; Dorato 2005, 2007; Bigaj 2012). To reiterate what was said earlier, the grounds or causal base of a dispositional property is a “lower level” physical feature of the object. However, such features often turn out to be structures of *other* lower level dispositional properties, which, in turn, may be structures of even other lower level dispositional properties, and so “all the way down” to apparently ungrounded dispositions, such as those of an electron. Elementary particles seem to have no lower level components that could be the cause of the manifestation its dispositions. In our analysis, ungroundedness is *represented* by the double arrow just like any complex disposition. An ungrounded manifesting disposition is—like more complex dispositions—God’s conferring existence per his commitments. However, in the ungrounded case, the disposition is a “bare” commitment, governed by God’s purposes and plans only. (This idea is developed in the next paragraph.)

Sixth, an analysis of dispositions should represent the range of manifestation types that is usually associated with a disposition either by ordinary experience or by scientific research. For example, ordinary experience tells us that a rattlesnake bite can make one very sick and can even lead to death. This is because rattlesnake venom has the disposition of being poisonous. A person’s being sick and a person’s dying are types of manifestations. Scientific research may indicate that a repeated test result of some experiment maps onto a graph as a bell-shaped curve or that an elementary particle’s state is a matter of a “collapse” of its wave function ψ . In these cases, we have actual states of physical systems as instances (or tokens) of a type of manifestation of a complex disposition. Depending on the disposition in question, our analysis can represent both. That is, by the letter m in the formal analysis it can represent either a manifestation type or a manifestation instance. A *range* of manifestation types or instances can be represented by $\{m\}$, where the brackets enclose a set, taking m to summarize several types or instances: m_1, \dots, m_n . Thus, the *range* $\{m\}$ may represent the possibilities indicated by a bell-shaped curve or $\{m\}$ may be a set of values for any physical system’s wave function ψ .⁸ The range of manifestations of multitrack, higher level dispositions (molecular or macroscopic) is rooted in the indeterminacy at the subatomic level. However, we take the “indeterminacy” to be nothing other than God’s intentional, purpose-guided action. Such indeterminacy reflects God’s freedom in sustaining the physical world and God’s providential control of history.

Our analysis meets all six of these widely acknowledged adequacy conditions for an analysis of dispositions.

Laws of Nature

Laws of nature depend on dispositions and structures. In our view, “disposition” is a generic term that denotes a class of God’s commitments to confer existence on condition. Such dispositions may be simple or complex. The class includes what we refer to by the term *law of nature* as law of succession and “mechanism.” *Structure* is a term that denotes a class of ways God coordinates his existence-conferring action. It includes what we refer to by “law of nature” as law of coexistence. Both dispositions and structures have a modal aspect: both are ways God confers existence and (in some cases) are what “must be” and (in others) what “cannot be” (e.g., Pauli’s Exclusion Principle). For each, there is natural necessity, but it is not in nature in a primitive or brute way. What was said earlier regarding causation applies to laws. That is, that both the necessity and regularity aspects of our concept is accounted for; nothing can hinder God’s fulfilling God’s commitments (*necessity*) and God (almost) always acts per God’s commitments (*regularity*). In this way, our view differs from earlier theological views of laws of nature as *imposed* or as *governing* objects and events.

We may summarize laws of nature as follows. Ontologically considered, laws of nature—as *laws of succession*—are regularities in God’s acting according to plan; as *laws of coexistence*, laws of nature are the coordination of God’s acting according to plan. Laws of nature—as law statements—subjectively considered, are descriptions of the regularities and coordinations of God’s actions as perceived and conceived. Statements of laws of succession (e.g., Newton’s Law of Inertia) are distilled from observed phenomena which are manifesting dispositions. Thus, laws depend on dispositions, rather than dispositions being determined by laws. Similarly, laws of coexistence (e.g., Newton’s Law of Universal Gravitation, Boyle’s Law, Pauli’s exclusion principle) reflect structures or the coordination of God’s acting per God’s commitments in carrying out God’s plans.

This brief account of laws of nature is consistent with both the “conditional analysis” of laws and the “summary of regularities” analysis of laws in early modern philosophy as discussed by Walter Ott. He adds that “the real question is not which analysis of the logical form of law-like statements is right, but rather what it is in virtue of which these statements hold” (Ott 2009, 8–10). The answer, in our opinion, is that such analysis holds in virtue of being descriptions of the regularities and coordinations of God’s actions as perceived and conceived. In his book, *Converging Realities*, Roland Omnès writes, “the fundamental laws of nature are pure mathematical forms accounting for the phenomena though providing no cause for them and showing no action. . . . The laws expressing the regularities of reality are much more accessible to understanding than reality itself. . . . They are prior to mathematics, however, just as reality is

absolutely prior to anything” (Omnès 2005, 157,163). Now replace “reality” with “God’s actings” in the Omnès quote.

Mechanisms

A chemical or biological *mechanism* is a manifesting complex disposition. In general, a mechanism may be understood dynamically or statically. On the one hand—approaching mechanisms dynamically—every mechanism is a process, every process is an event, and every event is finite sequence of discrete states of a physical system (treating the dynamics scientifically) and every event is a manifesting disposition (treating the dynamics metaphysically). Thus, we may define a mechanism alternatively as a process or as a manifesting complex disposition, depending on whether it is for scientific purposes or for metaphysical purposes. On the other hand—approaching mechanisms statically as a whole—a mechanism may be conceptualized and represented as involving “entities” and “activities” or as a structure of component, fundamental dispositions.

Properties

All *natural properties* (as opposed to mathematical or logical properties) are dispositional; there are no categorical or (purely) qualitative properties.⁹ Permit a brief explanation. The *scientific method* begins with “observation,” which is perceptual experience of the properties understood as being of some object, thing, substance, event, and so on. Thus, *properties* are things that are seen, felt, tasted, heard, smelled, or inferred by experimentation and discovery, or posited by theory only later to be empirically verified. Nevertheless, what properties are in themselves is not (usually) a scientific concern. The idea is presupposed. Confusion can easily result from failing to distinguish properties subjectively considered, that is properties as qualities of things (e.g., that thing’s redness) from a consideration of what they might be objectively—what might account for the thing’s being red and the perceptual experience of it as such. (Humean) *science* aims simply to accurately report or describe the observation and/or the phenomenology. *Metaphysics* and *theology* want more than description, they want understanding that goes as “far down” as possible—all the way down to ontological fundamentals. Accordingly, there are at least four views of natural properties. *Property dualism* holds that there are two irreducible kinds of properties categorical (qualitative) and dispositional). *Categoricalism* holds that all fundamental properties are essentially categorical. *Pandispositionalism* holds that all fundamental properties are dispositional. The *identity theory of properties* holds that all fundamental properties are both categorical and dispositional. Our theory of divine action, Divine Compositionism, entails the *pandispositionalist* view that all fundamental properties are dispositional, but adds that every disposition is a way God

confers existence on condition. Given God's *aseity*, this latter point differentiates our view from neo-Aristotelian pandispositionalists (both theistic and naturalistic) who treat such dispositions as independently existing. What this means is that, given our five-category ontology, every property of a thing (as perceived) is really the manifestation of a simple disposition, or of reciprocal disposition partners, or of a cluster of complex dispositions which constitute the thing. Each of these are God's existence-conferring action.

Divine Compositionism also explains property attributions and the perceptual experience that underlies them. A property is *attributed* to an object (or to a system) on the basis of that property's having been perceived as belonging to that object or system. Since a perceptual experience is an event, it too is such a manifestation. For example, say we see a brown dog. The dog *seems* to us to be brown. We attribute the property *brownness* to the dog. However, upon reflecting on the results of the relevant science, we realize that the molecules of the hair on the dog are not themselves brown. Our perceptual experience of brownness is a function of the nature of light and of the molecular structure of the dog's hair as well as features of our capacity to perceive.¹⁰ But is the dog really brown? Each of these factors—the nature of light, the molecular structure of that hair, and the physical features that constitute our visual capacity—are dispositional “all the way down.” Color is thus objective in that our experience of color is a manifestation of a network of disposition configurations constituting a system.¹¹

Some Implications

Taking dispositions to be God's commitments to confer existence on condition bears on several issues which can only be briefly stated. Every *manifestation* of a disposition (simple or complex) is God's conferring existence on condition. God's commitments govern the *succession* of all the states of all the physical systems that constitute the universe. The *causal structure* of the universe results from the various commitments God has made to act on condition in successively sustaining the universe. The composite macroscopic *objects* and *systems* of our *perceptual experience* are thereby created and sustained by God. What we perceive or individuate as macroscopic objects (whether “entities” or neo-Aristotelian “substances”) over some duration are relatively invariant structural features of processes occurring over that duration, which are nothing but God's existence-conferring action. This applies “all the (compositional) way down” to collapses of wave functions. It is all compositional. However, the initiating conditions at this, the apparent fundamental level, cannot be other events, because presumably there are none. Rather, the dynamic universe is orderly, yet apparently random or probabilistic because each manifestation of a divine commitment

to *act on condition* is a token of a range of options and the choice is guided by *divine purposes*. As Jonathan Edwards observed, “the original ultimate end or ends of the creation of the world is *alone*, that which induces God to give the occasion for consequential ends, by the first creation of the world, and the original disposal of it. And the more original the end is, the more extensive and universal it is. That which God had primarily in view in creating, and the original ordination of the world, must be constantly kept in view, and have a governing influence in all God’s works, or with respect to everything God does towards God’s creatures” (Edwards 1989, 413).

SUMMARY

Underlying all physical reality and interaction is only *God, an ordered domain of possibilities, dispositions, forces, and structures*. The domain of *possibilities* is the content and extent of God’s awareness of God’s omnipotence. One sequence of such possibilities is God’s composite *plan* for the universe, which we refer to as “the *actual world*,” components of which are *world states*. *Dispositions, forces, and structures* are ways God acts or confers existence. A *disposition* is one of God’s commitments to act on condition. Dispositions involve events and apparent causation. An *event* (i.e., a sequence of states of a physical system) can be conceptualized as God’s compositionally conferring existence over a sequence of Planck moments, creating a region of the universe. An *event* understood *scientifically* as a sequence of states of a physical system, understood *perceptually* as a change, *conceived* as a manifesting complex of dispositional properties, is a matter of a realized composite world state. *Causation* is a matter of God’s speaking, thinking, imagining, creating, or conferring existence. The causing, the producing, the bringing about of an event is God’s acting or God’s “REAL-izing” a composite world state. In other words, while *causation* is God’s “REAL-izing” a plan (the acting), an *event* is God’s “REAL-ization” of a plan (the result). Both the actual world and ways God confers existence are governed by and subordinated to God’s original ultimate end in creation. No apparent physical object, property, or relation is ontologically independent. Therefore, this view does not conflict with God’s *aseity* or sovereignty.

Intervention/Nonintervention

Recently, many theologians and philosophers have framed the broad issue of divine action in relation to science as a problem of saying *how* God acts in sustaining the creation, given a naturalist view of science and the universe (Smedes 2004). The idea was that maybe God can act through quantum indeterminacy. Some have asserted that God can *intervene* at that level, while others denied it. However, notice that the problem of intervention/nonintervention (Plantinga 2008) does not arise under

Divine Compositionism as it does under concurrentism, because the *laws of nature* (both of succession and of coexistence) are not *intermediaries* in divine action, but rather *are* the *regularities* of God's acting, the *necessity* of which lies in God's commitment to act on condition. The decision to treat the universe as a *closed system* or an *open system* of secondary causes also does not arise, for the causal structure of the universe *is* a structure of God's actings.

Continuous Creation, Idealism, and Panentheism

Divine Compositionism entails *continuous creation*, which is the traditional view that the divine action required to *conserve* things in existence is identical to what is required to *create* in the first place. In each case—God's initial creation of an object and God's sustaining it—God confers existence. It has been objected that *continuous creation* is incompatible with the reality of material objects. In response, we hold that no created thing is ever, in any aspect, self-existent. Only God is *a se*. The universe at any moment just *is* God's acting or willing it to be. This is congruent with what the quantum theorist Lee Smolin writes: "We cannot understand the world we see around us as something static. We must see it as something created, and under continual recreation, by an enormous number of processes acting together. The world we see around us is the collective result of all those processes" (Smolin 2005, 64). The universe, therefore, exists entirely "within God's consciousness" (so to speak). A person's imagining a scenario is a helpful analogy. Thus, our view may be thought of as a kind of *idealism*. However, the objection fails to distinguish between two kinds of idealism introduced in Darren Hibbs: *mens*-idealism and *res*-idealism. *Mens*-idealism, rejecting the notion that material objects are real to humans, holds that material objects are merely phenomenal constructs within the mind. However, there is another kind of idealism, which is called *res*-idealism. As Hibbs writes, "extramental material objects exist, but they are ontologically dependent upon a nonmaterial source" (Hibbs 2005, 569). Biblical *res*-idealism holds that material objects are real—they exist independent of human perception—even though they depend entirely on God's willing them to be. Divine Compositionism is a version *res*-idealism and is not a version of Berkeleyan idealism. Therefore, *continuous creation* is not incompatible with the reality of material objects. It follows from all this that, since things willed, thought, or imagined are items of consciousness, known as intentional objects, Divine Compositionism is *intentional object panentheism*.

In this article, we have provided a fine-grained, conceptually coherent account of *divine action*, *causation*, *dispositions*, and *laws of nature* consistent with divine *aseity*. The analysis of dispositions and disposition ascriptions satisfies the widely recognized conditions for such analyses.

APPENDIX

There are good reasons to think that a *demonstration* of the consistency of concurrentism with divine *aseity* cannot be given. Since *only God is self-sufficient and absolutely independent* (i.e., *a se*), and *aseity is incommunicable*, nothing created ever self-exists at any moment of its existence. Therefore, at no moment could any aspect of creation ever be ontologically independent or ever be a “fundamental feature of reality.” This entails that the idea of “ontological momentum” (Menzel 1987, 366; 2001, 71) or the idea of “existential inertia” (Feser 2011) for any aspect of any created thing are not available for a demonstration of the consistency of concurrentism with the doctrine of divine *aseity* and what it entails.

Jonathan Kvanvig and David Vander Laan observe that “the best hope here [i.e., to avoid Deism and Occasionalism] is on the basis of further work on the nature of causation itself. . . and though there are some glimmers of hope on this score, the work remains to be done” (Kvanvig and Vander Laan 2014). Maybe the issue is not the existence of the cause, but the nature of the causation. A formidable obstacle stands in the way of the completion of that work. Timothy Miller had already demonstrated that only a necessitarian view of causation is available for concurrentists in general, adding that “unlike reductionist theories, which attempt to analyze causation in terms of more basic non-causal facts, the necessitarian theory takes causal facts to be *fundamental features of the world*” (emphasis added) (Miller 2010, 15). Michael Rota provides just such a necessitarian view of causation, saying of scholastic antireductionism (SAR) that “the relation of causation is a basic or primitive relation; it cannot be reduced to any other relation, or set of relations, or any other ontological items whatsoever. . . any instances of the relation of direct productive causation are ontologically primitive, which is to say that instances of the direct production relation are a *fundamental feature of reality*; they cannot be reduced to some set of more basic entities. . . SAR denies that [causal] facts can be reduced to anything” (emphasis added) (Rota 2009, 138, 141). However, the idea of causation being a “fundamental feature” of the world or reality—something not reducible to any “ontological items whatsoever”—contradicts the fact that only God is *a se*. Thus, if Miller and Rota are correct, then the concurrentist project to provide a fine-grained, conceptually coherent account of *divine action* and *causation* alone seems improbable, if not impossible.

Not so quick. Perhaps, the idea of being a fundamental feature is not intended to include ontological *independence* of the cause or the causation. Maybe divine and creaturely causation are of “different orders”—either “univocal and transcendent” (Dodds 2012, 209–10, 227) or “principal and instrumental” (Freddoso 2002, xcvi). Doing so, however, transfers the burden of explication to secondary causation and, as Plantinga

observes, there appears to be no sufficiently fine-grained *notion* of secondary causation (Plantinga 2016, 143). Whether Plantinga is justified in this claim (and we think he is), or whether our literature search has overlooked or misjudged extant accounts, the theoretical challenge stands. The problem for concurrentists is to indicate, with scientifically rigorous examples, just *how* any ontologically dependent thing functions independently in at least some way so as to deserve to be called a “genuine” cause. What is needed is not a *definition* of concurrence, but an *explication* of an example of such. But given God’s unique *aseity*, it at least looks as though no explication could identify any elements involved in the independent function of any completely ontologically dependent entity. Every state of every physical system at every Planck moment of its existence just is God’s existence-conferring action.

One might think that this impasse can be overcome by holding that God confers a certain amount of self-existence. But the idea of God *conferring aseity* to anything even thought to be the “cause” in a cause–effect relation is self-contradictory and not an option (Braine 1988). Self-existence is not something that can be conferred, because it is always ultimately a *conferred* existence and, therefore, a dependent existence not a self-existence. John Beaudoin has offered what might be an essential element in a viable notion of secondary causation, claiming that “the continuance of these atoms is secured for as long as the only power capable of destroying them goes unexercised” (Beaudoin 2007, 86). But this fails to appreciate the fundamental issues at stake: if at any moment God—who alone is self-existent—ceases *actively* to confer existence to a created thing, which is incapable of self-existence, that thing *cannot* exist the following moment. Its annihilation does not require God’s *actively* annihilating it, because even if God refrained from doing so “created things can have no capacity for self-sustenance” (Kvanvig and McCann 1988, 49). What William Hasker noted almost 20 years ago holds today: “occasionalism presents theistic philosophy with a challenge it has not yet met” (Hasker 1998, sec. 3).

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NOTES

1. We use the term *disposition* generically to refer to what many are calling “active and passive causal powers.” While the term *powers* is of medieval origin, the concept is from Aristotle (*δυναμεις*, “potentiality”) (Marmodoro, 2014, 3).

2. Divine Compositionism is consistent with a theory of human freedom that preserves the functional independence of the capacity to choose while maintaining its complete ontological dependence. Schultz (2008) argues that libertarian-free *actions* depend on the completion of libertarian-free *choices* which arise from the (contingently) causally immune and (contingently) causally impotent *power* (i.e., capacity) of proximal intention formation. But culpability depends only on the “thoughts and intentions of the heart” so God cannot be the author of sin on our view.

3. God’s having a plan like what is described here makes sense, not only of the apparent randomness of physical events, but also of God interacting with created agents, securing God’s sovereignty while preserving the freedom and responsibility of agents (Schultz 2008).

4. However, even the relative strength of molecular bonding is itself a dispositional property.

5. Formally, the analysis is as follows:

$$\forall x, \forall \sigma_x, \forall D, \forall \delta, \quad Dx\delta \leftrightarrow$$

$$1. \alpha \sqsubset \llbracket [\sigma_x \models \{i\}]^{\delta'} \Rightarrow [\sigma'_x \in \{m\}]^{\delta'' > \delta'} \rrbracket^\delta = C_x, \text{ and}$$

exactly one of the following:

$$2. \alpha \sqsubset [\sigma_x \models \{i\}]^{\delta'}$$

$$3. \alpha \sqsubset [\sigma_x \models \{i\}]^{\delta'} \text{ and } \alpha \sqsubset [\sigma'_x \in \{m\}]^{\delta'' > \delta'} \text{ and } \forall C_x * > C_x \alpha \sqsubset C_x^{*\delta}$$

$$4. \alpha \sqsubset [\sigma_x \models \{i\}]^{\delta'} \text{ and } \alpha \sqsubset [\sigma'_x \in \{m\}]^{\delta'' > \delta'} \text{ because } \exists C_x * > C_x \alpha \sqsubset C_x^{*\delta}.$$

6. Condition (1), that is, that the actual world includes a representation for a type of process, differentiates this analysis from a *simple subjunctive conditional analysis* and prevents it from holding vacuously.

7. See footnote 5.

8. A miracle would be an outlier *m* in {*m*}.

9. This is a version of *pan-dispositionalism* (Esfeld 2010; Marmodoro 2010).

10. Note that honeybees have a limited UV range and that some persons are colorblind. Perceptual experience is a matter of perceptual capacities “working properly,” which structures of dispositions.

11. See Marmodoro (2014) for an alternative dispositional view of perception.

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