

Complementarity, Agency Theory, and the God-of-the-Gaps

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There has been a growing debate about the proper way to integrate science and theology. On the one side are those who accept a complementarity view of integration and claim that science must presuppose methodological naturalism. On the other side are those who accept some form of theistic science. Central to this debate is the nature of divine and human action and the existence of gaps in the natural causal fabric due to such action that could, in principle, enter into the use of scientific methodology. In this article, I side with the second group. To justify this position, I first state the complementarity view and its implications for the nature of human personhood, second, explain libertarian agency in contrast to compatibilist models of action, and third, show why "gaps are part of divine and human agency and illustrate ways that such a model of agency for certain divine acts could be relevant to the practice of science.

The relationship between science and miracles contains many aspects that are worthy topics of study in their own right. Currently, however, there has been a growing and sometimes heated dialogue about the proper way to view the integration of science and theology. A major part of this dialogue is a debate between those who accept the idea that science must presuppose methodological naturalism and those who reject this notion. The different camps in this dispute accept very different ways of viewing the nature of a direct, miraculous act of God and its relationship to the practice of science. Given the ideological importance of science in contemporary culture, it is not surprising to see naturalists claim that miracles, even if they happened, are totally outside the limits of scientific theory formation, explanation, and confirmation and, thus, are unscientific in this sense. For example, atheist philosopher Michael Ruse claims that "even if scientific creationism were totally successful in making its case as science, it would not yield a

scientific explanation of origins. Rather, at most, it could prove that science shows that there can be nonscientific explanation of origins."¹ Elsewhere, Ruse asserts that "The Creationists believe the world started miraculously. But miracles lie outside of science, which by definition deals with the natural, the repeatable, that which is governed by law."² What I find surprising is the fact that a significant number of Christian intellectuals agree with this position.

Let us define theistic science as a viewpoint which includes a commitment to the following three propositions:³

1. God, conceived of as a personal, transcendent agent of great power and intelligence, through direct, immediate, primary agency and indirect, mediate, secondary causation created and designed the world for a purpose. He acted directly through immediate, primary agency in the course of its development at various times (including prehistory - history prior to the arrival of human beings).⁴
2. The commitment expressed in Proposition 1 can appropriately enter the very fabric of the practice of science and the use of scientific methodology.
3. One way this commitment can appropriately enter the practice of science is through various uses in scientific methodology of gaps in the natural world. These gaps are essential features of direct, immediate, primary divine agency properly understood.

The Christian intellectuals mentioned above reject theistic science because, among other things, it supposedly uses an inappropriate god-of-the-gaps strategy for doing science and integrating it with theology. Instead, science requires the adoption of methodological naturalism, the idea that science must study natural (physical) entities from a natural point of view and seek explanations for things in terms of natural events and laws that are part of the natural causal fabric of the spatio-temporal world. Thus, theological beliefs in general, and direct, immediate, miraculous acts of God lie outside science, properly understood. The proper way to integrate science and theology is to view them as non-interacting, complementary approaches to the same reality; as such, they adopt very different standpoints, ask and answer very different kinds of questions, involve different levels of description, employ very different cognitive attitudes (e.g., objectivity and logical neutrality in science, personal involvement and commitment in theology), and are constituted by very different language games. These different, authentic perspectives are incomplete and, therefore, must be integrated into a coherent whole. But, each level of description (e.g., the chemical vs. the theological) is complete at its own level, with no gaps at that level for other perspectives to fill, and with no possibility for direct competition, conflict, or mutual epistemic reinforcement.⁵

I do not agree with this perspective if it is taken as the total picture of science/theology integration. In my view, theistic science is a legitimate research program. I have defended my views elsewhere and cannot undertake here a general treatment of this controversy.⁶ Instead, I shall focus on Proposition 3 above and defend the idea that a certain understanding of agency theory shows that the complementarity view is inadequate and

that libertarian, agent acts (human and, in some cases, divine) leave gaps in the causal fabric of the natural world that could play a role in the practice of science. In what follows, I will, first, state the complementarity view; second, explain libertarian agency in contrast to compatibilist models of action, and third, show why "gaps" are part of such agency and illustrate ways that such a model of agency for certain divine acts could be relevant to the practice of science.

The Complementarity View

Currently, the complementarity view enjoys wide popularity among both Christian and non-Christian intellectuals. Among its Christian proponents are D. M. Mackay,⁷ A. R. Peacocke,⁸ Richard Bube,⁹ Howard J. Van Till,¹⁰ Paul de Vries,¹¹ and David G. Myers.¹² While scholars differ about certain details of this approach, nevertheless, there is broad agreement among them regarding the following components.

The Nature of Science

The goal of natural science is to study the spatiotemporal natural world of matter and energy and seek natural explanations for the physical properties, behavior, and formative history of the physical universe. The very nature of natural science requires one to adopt methodological naturalism, the idea that explanations of phenomena are to be sought within the non-personal causal fabric of events and processes in the created order. For example, in describing how two charged electrodes separate hydrogen and oxygen gas when placed in water, the "God hypothesis" is both unnecessary and out of place. In general, an appeal to personal intentions or actions of an agent, especially a supernatural one, violates the methodological naturalism that constitutes proper scientific methodology. Methodological naturalism is unrelated to metaphysical naturalism (the view that the spatiotemporal world of physical entities open to scientific investigation is all there is) because philosophical theses about the existence, nature, and acts of God are beyond the limits of, and are complementary with, science.¹³

Reality: A Hierarchy of Systems Standing in Part/Whole Relationships

In nature, wholes are often more than the additive sum of their parts. Reality consists in a hierarchy of different levels of systems or things that are parts of and give rise to wholes (systems or things) at higher levels of organization due to the complex interaction of the parts at lower levels. For example, ascending from bottom to top through the hierarchy we have the following: energy, subatomic entities, atoms, molecules, constituents of cells (e.g., organelles), cells, biological systems (e.g., the respiratory system), whole biological organisms, the psychological level, the sociological level, and the theological level. As one ascends, each new level does not exist because some new entity has been added "from the outside," but rather, because it emerges from the lower level due to the complex interaction of parts at that level. For example, psychological

states emerge and supervene upon the brain and central nervous system when the latter reaches a certain level of complexity needed to generate such an emergence.¹⁴ There are different understandings of supervenience.¹⁵ However, a generally accepted understanding of it for properties runs as follows: Property P supervenes on property Q just in case (1) P and Q are completely distinct properties in that neither P nor Q enters the very being or constitution of the other; (2) P is ontologically dependent on and determined by Q; (3) the relationship between P and Q is nonreductive; (4) For any possible world in which some entity x exists, if x has Q then that is sufficient for its having P; there cannot be two entities alike in having Q but differing with respect to P. An entity cannot change in respect to P, cease to be P, or become more or less P without changing in respect to Q.

In this view, human persons are not genuine substances with natures, but rather, are property-things (ordered aggregates) - structured collections of externally related parts with emergent properties. To clarify this point, it will be helpful to step back for a moment and compare two different metaphysical positions about two very different kinds of wholes with parts: substances, understood in the classic interpretation of Aristotle and Aquinas, vs. property-things or ordered aggregates.¹⁶

According to the traditional view, living organisms, historically, were taken to be paradigm cases of substances. First, a substance is a thing which has or owns properties but is not had by something more basic than it. Secondly, a substance is a deep unity of parts, properties, and capacities at a point in time; it maintains absolute sameness through (accidental) change. Substances are wholes that are ontologically prior to their parts in that those parts are what they are in virtue of what the substance is, taken as a whole. For example, a chamber of a heart is defined in terms of the heart as a whole; the heart is defined in terms of the circulation system as a whole; and the circulation system is defined in terms of the organism as a whole. Thirdly, a substance is a this-such, i.e., an individuated member of its natural kind which, in turn, constitutes its essence. For example, two dogs are different, particular animals with the same nature. The unity and nature of a substance derive from its essence that which lies within it. Its parts (e.g., the nose and claws of a dog) stand in internal relationship to each other in that if a part is removed from its whole, it loses its identity with itself. As Aristotle said, a severed human hand is, strictly speaking, no longer human - a fact that will become evident in a few days.

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An artifact, like a table or automobile, is a paradigm case of a property-thing. Property-things derive their unity from an external ordering principle (either in the mind of a

designer or from a law of nature) imposed from the outside on a set of parts to form the object. A property-thing is structured stuff, i.e., parts placed in some type of ordering relationship. In such wholes, the parts are prior to the whole; the whole contains some sort of structural property that supervenes upon those parts (it is defined in terms of the parts and the ordering relationship); the parts are related to each other by means of external relationships; they remain identical to themselves regardless of whether or not they are in the whole property-thing (e.g., a car door is still what it is when detached from a car); and property-things do not maintain strict identity through loss of old parts or properties and gain of new ones.

Regarding human persons in particular, philosophers widely agree that the following are inconsistent with the property-thing position but are easier to justify on the substance view (and, in fact, may have the substance view as a necessary condition): the absolute unity of a person at a time; the irreducibility of the first person perspective; the absolute sameness of a person through change; the organic unity of the human body and the distinctive, irreducible, species specific, law-like ways it changes through time; the irreducibility or uneliminability of literal biological function or, more generally, teleology; the metaphysical possibility (let alone the reality) of disembodied existence; libertarian freedom; and the existence of human nature as that which constitutes the unity of the class of all humans.¹⁷ I am not arguing that the items on this list are real, though I take that to be the case. I do think, however, that one should think carefully about how the complementarity property-thing model of living organ-isms - more specifically, human persons - has difficulty allowing for these things to be the case. One should ask whether the complementarity view is intellectually worth the price of jettisoning these arguably real aspects of human persons. Here is the main issue: the complementarity view does not have the intellectual resources to allow for the precise type of unity necessary for these features of human persons to obtain and if they are, in fact, genuine, then the complementarity view's response to reductionism is simply inadequate.

Interaction Between Levels

Each level in the hierarchy is capable of an exhaustive description at that level using only concepts, theories, or laws appropriate to that level. Such descriptions are complete with no gaps that need to be filled in by theories or laws referring to entities, properties, or processes at higher levels. For example, when a person chooses to eat fruit (a good choice!), a complete description of that action can be given at each level (e.g., the atomic, the psychological). Each level of description is an authentic, though partial, perspective and the whole truth requires an appeal to all the levels of description that are complementary to each other. Moreover, it is interesting that the bottom level is the one studied by physicists. Lower levels are more basic and sustain higher levels in existence. Higher levels emerge upon and are determined by the entities and patterns of interaction at lower levels. If some story is true at a higher level, then some story must be true at a lower level but not vice versa.¹⁸ In general, some physical (e.g., neurophysiological) state is necessary for a higher level (e.g., mental) state to exist and when some specific physical state obtains, that is sufficient for the occurrence of the supervening (e.g., mental) state.

We have just noted the relationship among levels as far as sustaining something in existence is concerned. A closely related, but distinct, issue involves the relationship of causality between levels. Regarding causality, the first thing to note is this: events are what do the causing in the natural world, i.e., events cause other events to occur. For example, a brain event is the cause for a mental event. Secondly, a serious problem to be probed later involves the causal efficacy (and not the reduction) of higher levels of description, most important, the mental level.

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Advocates of the complementarity view appear to be caught in a dilemma. On the one hand, it is hard to avoid treating higher levels of description as causally impotent epiphenomena that supervene upon lower level systems because each lowest level physical state is (1) complete at its own level of description and (2) sufficient for the emergence of the higher level state. As philosophers Kathleen Lennon and David Charles argue, the only way to accept a psychological level of causal descriptions and also hold "that physical explanation is complete, i.e., that all physically characterizable events are susceptible to explanation on terms of physically sufficient cause...is to accept [the] reduction [of the psychological to the physical]." ¹⁹ On the other hand, in spite of the apparent inconsistency in doing so, advocates of this view allow that when higher level entities emerge, then events at that level can cause events to occur at lower levels through feedback mechanisms and event-event causation. As Jaegwon Kim has shown, the problem here is that "downward causation *prima facie* implies the failure of causal closure at the lower level, and the in principle impossibility of a complete theory of the lower-level phenomena in their own terms." ²⁰ *The question here is not that such feedback occurs, but whether there is room within the complementarity view for its occurrence that does not have an air of ad hoc-ness about it.*

Agency and Free Will

Later, I will clarify the difference between libertarian and compatibilist views of freedom and agency. But for now, it should be noted that the complementarity view eschews libertarian freedom and agency in favor of compatibilist models of freedom. An illustration may help us understand the complementarity view. Consider the act of raising one's hand to vote. At the various levels of natural science, a complete account of such an act could be given in terms of biological systems, neurons, brain states, etc. These levels of description would be ignorant of the psychological level in the sense that they would

be what they are, with or without the presence of the higher psychological level, and they would contain no reference to mental processes, events, properties, etc. But a complete, noninteracting account of the act could be given at a psychological level by appealing to the individual's desire to vote, his belief that raising his hand would satisfy this desire, and his willingness to raise his hand. Personal agency and action fall completely outside natural science levels of description, complementary to the psychological level.

Divine Action and Creation's Functional Integrity

If we set aside human history, especially salvation history in which God performed primary causal miraculous acts, like parting the Red Sea or raising Jesus of Nazareth from the dead, then a consistent picture of divine action in the natural world emerges from what has already been said. God is not to be seen as a direct, primary, causal agent who suspends or overrides the laws of nature (by acting in a way different from his normal, regular activity), creating a gap in the natural fabric. Rather, God is constantly active in each and every event that happens. God sustains natural processes in existence, and expresses his freedom to act by employing natural processes mediately as secondary causes to accomplish his purposes in the world.²¹ He works "in and through" the natural causal fabric, unfolds its potentialities according to deterministic or probabilistic laws of nature and he does so without leaving any causal gaps in lower level physical processes and systems. God is the ground of all causes and the ultimate cause of all things. Moreover, God's acting in and through natural events can be understood as the meaning and purposive pattern that can be seen in the providential unfolding of those events. As Howard J. Van Till puts it, God has created the world with functional integrity:

By this term I mean to denote a created world that has no functional deficiencies, no gaps in its economy of the sort that would require God to act immediately, temporarily assuming the role of creature to perform functions within the economy of the created world that other creatures have not been equipped to perform.²²

God-of-the-Gaps

Advocates of the complementarity view have a disdain and loathing for what is called a god-of-the-gaps argument. According to many complementarians, this type of argument is an epistemically inappropriate strategy in which God only acts when there are gaps in nature; one appeals to God merely to fill gaps in our scientific knowledge of naturalistic mechanism; these gaps and the appeal to God just mentioned are used in apologetic, natural-theology arguments to support Christian theism; and God is manifest and proved only by the miraculous, by that which defies natural scientific explanation. This strategy is bad for at least two reasons. First, natural science is making these gaps increasingly rare and, thus, there is less need to believe in God if such a belief is justified solely or largely by the god-of-the-gaps strategy. Secondly, this strategy is based on a faulty understanding of the integration of science and theology and the proper model of human and divine action as depicted in the complementarity model. In particular, the strategy

fails because there simply are no such gaps in the natural world, given the views already presented in this section.

I have responded to this argument elsewhere, and I will address it later in this article.²³ The argument represents a caricature of advocates of theistic science who see gaps in the natural world due to direct acts of God which can, in principle, be relevant to scientific methodology. No advocate of theistic science claims that God only acts in the "gaps." God is constantly active in sustaining the world, in concurring with natural processes, and the like. But advocates of theistic science believe that there is a scientifically and epistemically relevant distinction between primary and secondary causality and that both types of actions are relevant to the task of integrating science and theology. Belief in such a gap (and an appeal to a primary causal act of God to explain it) should not merely be based on ignorance of a natural causal mechanism, but on positive theological, philosophical, or scientific arguments that would lead one to expect such a gap. While most advocates of theistic science do use such a strategy for positive apologetic purposes, such a purpose is not necessary for an advocate of theistic science. If apologetic purposes are part of a person's employment of theistic science, then that person need not hold that the entire ground for justifying belief in God is the explanatory work that "the God hypothesis" does in explaining gaps. Thus, most critical discussions of god-of-the-gaps issues generate far more heat than light precisely because they represent a gross caricature of those who actually employ this strategy.

The real issue is this: if God acts as a primary causal agent distinct from his action as a secondary cause, does it follow that there will be miraculous gaps in the natural causal fabric that could, in principle, be relevant to scientific methodology? I believe that the answer is "Yes," and to see why, we now turn to the difference between libertarian and compatibilist views of freedom and agency. Because the natures of freedom and agency are so central to the reality of causal gaps and theistic science, I must go into some detail in describing these competing models.

Libertarian and Compatibilist Models of Agency

All Christians believe we have free will, but they differ about what free will is. We can define determinism as the view that for every event that happens, there are conditions such that, given them, nothing else could have happened. Every event is caused or necessitated by prior factors such that given these prior factors, the event in question had to occur. Libertarians embrace free will and hold that determinism is incompatible with it. Compatibilists hold that freedom and determinism are compatible with each other and, thus, the truth of determinism does not eliminate freedom. As we will see, compatibilists have a different understanding of free will from the one embraced by libertarians and hard determinists.

General Comparison

1. **Compatibilism.** For compatibilists, if determinism is true, then every human action (e.g., raising one's hand to vote) is causally required by events that obtained prior to the action, including events that existed before the person acting was born. That is, human actions are mere *happenings*, parts of causal chains of events leading up to them. Freedom properly understood, however, is compatible with determinism.

2. **Libertarianism.** Libertarians claim that the freedom necessary for responsible action is not compatible with determinism. Real freedom requires a type of control over one's action - and, more important, over one's will - such that, given a choice to do A (raise one's hand and vote) or B (leave the room), nothing determines that either choice is made. Rather, the agent himself must simply exercise his own *causal powers* and will to do one alternative, say A (or have the power to refrain from willing to do something). When an agent wills A, he also could have willed B without anything else being different inside or outside of his being. He is the absolute originator of his own actions. When an agent acts freely, he is a *first* or *unmoved mover*; no event causes him to act. His desires, beliefs, etc. may influence his choice, but free acts are not caused by prior states in the agent.

Suppose we have person P that freely did some act e, say changing his thoughts or raising his arm. A more precise, initial characterization of libertarian freedom and agency can be given as follows:

- 1.P is a substance that had the power to cause e.
- 2.P exerted its power as a first mover (an uncaused cause of action) to cause e.
- 3.P had the ability to refrain from exerting its power to cause e.
- 4.P caused e for the sake of some final cause, R, which is the reason P caused e.

We can delve more deeply into compatibilist and libertarian accounts of freedom by looking at four areas central to an adequate theory of free will.

Four Areas of Comparison Between Compatibilism and Libertarianism

1. **The Ability Condition.** To have the freedom necessary for responsible agency, one must have the ability to choose differently from the way the agent actually does. Compatibilists and libertarians agree that a free choice is one where a person "can" will to do otherwise but differ about what this ability is. Compatibilists see this ability as a hypothetical ability. Roughly, this means that the agent would have done otherwise had some other condition obtained, e.g., had the agent desired to do so. We are free to will whatever we desire though our desires are themselves determined. Freedom is willing to act on your strongest preference.

Libertarians view hypothetical ability as a slight of hand and not sufficient for the freedom needed for responsible agency. For libertarians, the real issue is not whether we are free to do what we want, but whether we are free to want in the first place. A free act is one in which the agent is the ultimate originating source of the act. Freedom requires that we have the categorical ability to act, or at least, to will to act. This means that if Smith freely does (or wills to do) A, he could have refrained from doing (or willing to do) A or he could have done (or willed to have done) B without any conditions whatsoever being different. No description of Smith's desires, beliefs, character, or other things in his makeup and no description of the universe prior to and at the moment of his choice to do A is sufficient to entail that he did A. It was not necessary that anything be different for Smith to do B instead. *This means that there will be a gap in the universe just prior to and after a free act due to the causal activity of the agent as first mover.*

Compatibilists and libertarians agree that a free choice is one where a person "can" will to do otherwise but differ about what this ability is.

The libertarian notion of categorical ability includes a dual ability: if one has the ability to exert his power to do (or will to do) A, one also has the ability to refrain from exerting his power to do (or will to do) A. By contrast, the compatibilist notion of hypothetical ability is not a dual ability. Given a description of a person's circumstances and internal states at time t, only one choice could obtain and the ability to refrain is not there; its presence depends on the hypothetical condition that the person had a desire (namely, to refrain from acting) which was not actually present. *There is no causal gap just prior to and after the act of a substantial first mover who contributes causal power into the natural causal fabric because this view of agency is rejected by compatibilists.*

2. The Control Condition. Suppose Jones raises his hand to vote. Compatibilists and libertarians agree that a necessary condition for the freedom of this act is that Jones must be in control of the act itself. However, they differ radically about what control is.

To understand compatibilist views of the control condition, recall that compatibilists take cause and effect to be characterized as a series of events making up causal chains with earlier events and the laws of nature (either deterministic or probabilistic) causing later events. The universe is what it is at the present moment because of the state of the universe at the moment before the present and the correct causal laws describing the universe. A crude example of such a causal chain would be a series of 100 dominos falling in sequence from the first domino on until domino 100 falls. Suppose all the dominos are black except numbers 40-50, which are green. Here we have a causal chain of events that progresses from domino one to 100 and that "runs through" the green dominos.

According to compatibilism, an act is free only if it is under the agent's own control. And it is under the agent's own control only if the causal chain of events - which extends back in time to events realized before the agent was even born - that caused the act (Jones's hand being raised) "runs through" the agent himself in the correct way. But what does it mean to say that the causal chain "runs through the agent in the correct way"? Here compatibilists differ from each other. But the basic idea is that an agent is in control of an act, just in case the act is caused in the right way by prior states of the agent himself (e.g., by the agent's own character, beliefs, desires, and values). This idea is sometimes called a causal theory of action.

Libertarians reject the causal theory of action and the compatibilist notion of control and claim that a different sense of control is needed for freedom to exist. Consider a case where a staff moves a stone but is itself moved by a hand that is moved by a man. In *Summa contra Gentiles*I, Chap. 8, St. Thomas Aquinas states a principle about causal chains that is relevant to the type of control necessary for libertarian freedom:

In an ordered series of movers and things moved [to move is to change in some way], it is necessarily the fact that, when the first mover is removed or ceases to move, no other mover will move [another] or be [itself] moved. For the first mover is the cause of motion for all the others. But, if there are movers and things moved following an order to infinity, there will be no first mover, but all would be as *intermediate movers*.... [Now] that which moves [another] as an instrumental cause cannot [so] move unless there be a principal moving cause [a first cause, an unmoved mover].

Suppose we have nine stationary cars lined up bumper to bumper and a tenth car runs into the first car causing each to move the next vehicle until car nine on the end is moved. Suppose further that all the cars are black except cars 5 to 8 which are green. Now, what caused the ninth car to move? According to Aquinas, cars 2 to 8 are not the real cause of motion for car 9. Why? Because they are only *instrumental causes*, each of these cars passively receives motion and transfers that motion to the next car in the series. Car 1 (actually, the driver of car 1) is the real cause since it is the first mover of the series. It is the source of motion for all the others. Only first movers are the sources of action, not instrumental movers that merely receive motion passively and pass that on to the next member in a causal chain.

Compatibilists and libertarians agree that a necessary condition for the freedom [to] act is that [a person] must be in control of the act itself. However, they differ radically about what control is.

For libertarians, it is only if agents are first causes, unmoved movers, that they have the control necessary for freedom. An agent must be the absolute, originating source of his

own actions to be in control. If, as compatibilists picture it, an agent is just a theater through which a chain of instrumental causes passes, then there is no real control. Further, the control that an unmoved mover exercises in free action is a dual control " it is the power to exercise his own ability to act or to refrain from exercising his own ability to act.

3. The Rationality Condition. The rationality condition requires that an agent have a personal reason for acting before the act counts as a free one.²⁴ Consider again the case of Jones raising his hand to vote. In order to understand the difference between the two schools about how to handle this case in light of the rationality condition, we need to draw a distinction between an *efficient* and a *final cause*. An efficient cause is that by means of which an effect is produced. One ball moving another is an example of efficient causality. By contrast, a final cause is that for the sake of which an effect is produced. Final causes are teleological goals, ends, or purposes for which an event is done; the event is a means to the end that is the final cause.

Now a compatibilist will explain Jones' voting in terms of efficient and not final causes. According to this view, Jones had a desire to vote and a belief that raising his hand would satisfy this desire and this state of affairs in him (the *belief/desire set* composed of the two items just mentioned) caused the state of affairs of his hand going up. In general, whenever some person S does A (raises his hand) to do B (vote), we can restate this as S does A (raises his hand) because he desired to B (vote) and believed that by A-ing (raising his hand), he would satisfy desire B. On this view, a reason for acting turns out to be a certain type of state in the agent, a belief-desire state, that is the real efficient cause of the action taking place. Persons as substances do not act; states within persons cause latter states to occur. The compatibilist, in possession of a clear way to explain cases where S does A to do B, challenges the libertarian to come up with an alternative explanation.

Many libertarians respond by saying that our reasons for acting are final and not efficient causes. Jones raises his hand in order to vote, or perhaps, to satisfy his desire to vote. In general, when person S does A to do B, B states the reason (e.g., a desire or a value) which is the teleological end or purpose for the sake of which S freely does A. Here the person acts as an unmoved mover by simply exercising his powers in raising his arm spontaneously. His beliefs and desires do not cause the arm to go up; he himself does. But B serves as a final cause or purpose for the sake of which A is done. Thus, compatibilists embrace a belief/desire psychology (states of beliefs and desires in the agent cause the action to take place), while at least many libertarians reject it and see a different role for beliefs and desires in free acts.

4.Causation . From what has already been said, we can anticipate a difference between libertarians and compatibilists about causation. For the compatibilist, the only type of causation is called event-event causation. Suppose a brick breaks a glass. In general, event-event causation can be defined in this way: an event of kind K (the moving of the brick and its touching of the surface of the glass) in circumstances of kind C (the glass being in a solid and not liquid state) occurring to an entity of kind E (the glass object

itself) causes an event of kind Q (the breaking of the glass) to occur. Here, all causes and effects in the chain are events. If we say that a desire to vote caused Jones to raise his arm we are wrong. Strictly speaking, a desiring to vote caused a raising of the arm inside of Jones.

Libertarians agree that event-event causation is the correct way to account for normal events in the natural world, like bricks breaking glasses. But when it comes to the free acts of persons, the person, as a substance and an agent directly produces the effect. Persons are agents and, as such, in free acts they either cause their acts for the sake of reasons (called agent causation) or their acts are simply uncaused events they spontaneously do by exercising their powers for the sake of reasons (called a noncausal theory of agency). Either way, persons are seen as first causes, unmoved movers who have the power to exercise the ability to act as the ultimate originators of their actions. It is the I, the self that acts; not a state in the self that causes a moving of some kind. Libertarians claim that their view makes sense of the difference between actions (expressed by the active voice, e.g., Jones raised his hand to vote) and mere happenings (expressed by the passive voice, e.g., a raising of the hand was caused by a desiring to vote, which was caused by x, ...).

For the compatibilist, the only type of causation is called event-event causation....[For the Libertarian,] when it comes to the free acts of persons, the person, as a substance and an agent, directly produces the effect.

At this point it may be helpful to discuss the relevance of quantum physics to the free will debate. According to some, certain quantum events (e.g., the precise location of an electron hitting a plate after being shot through a slit, the exact time a specific atom of uranium will decay into lead) are completely uncaused events and, as such, are indeterminate, random happenings. Thus, it is argued, a quantum view of reality abandons determinism and makes room for freedom. As chemist Michael Kellman puts it, "...the theory of quantum mechanics...is compatible with a role for mind as agent in determining some actions of purely material portions of biological systems."²⁵

Unfortunately, quantum physics has little relevance to the free will debate. For one thing, many scientists believe that the quantum world is just as determined as the regular world of macro-objects, like baseballs and cars. We just do not (perhaps cannot) know what the causes are for some events and we cannot predict exactly the precise behavior of quantum entities. For another thing, even if we grant that the quantum world is really a place where determinism is false, it could still be argued that determinism reigns in the macro world. More important, a necessary condition of libertarian freedom is a view of the person as a substance that acts as an agent, i.e., as a first cause or an unmoved mover. Thus, determinism is sufficient for a denial of libertarian freedom, since it says that all

events are caused by prior events and there are no substantial agents that act as unmoved movers. But determinism is not necessary to deny such freedom. Completely uncaused events that randomly occur without reason (as in the quantum world) do not give the type of agency needed for libertarian freedom either. The main debate between compatibilists and libertarians is one about the nature of agency and not determinism per se, although the truth of determinism is sufficient for the denial of libertarianism as was already mentioned.

With this in mind, we can modify the understanding of modern compatibilism we have used up to this point. Compatibilism is basically the thesis that freedom and determinism are compatible with each other, i.e., that both can be true. But some, indeed, most compatibilists go on to accept the truth of determinism, while others do not make a commitment to accepting determinism. However, both groups of compatibilists reject libertarian agency. So while we will continue to focus on the majority of compatibilists who accept determinism, we need to remember that the nature of agency, and not determinism per se, is the main disagreement between compatibilists and libertarians. Next let us apply these insights about agency to questions regarding miracles, gaps, and theistic science.²⁶

Miracles, Agent Gaps, and Science

Complementarian A. R. Peacocke has said that the "problem of the human sense of being an agent...acting in this physical causal nexus, is of the same ilk as the relationship of God to the world."²⁷ I agree. But whereas Peacocke uses this point to support the complementarian view and place miracles outside the bounds of science, I claim that the analogy between human and divine action actually supports theistic science and the possibility of miraculous acts being part of science. The difference between us is this: Peacocke and complementarian methodological naturalists in general adopt compatibilist models of (divine and human) action (at least for causality outside of salvation history) with the result that no gaps exist in the causal fabric. I see (divine and human) action in terms of libertarian agency and believe that free acts leave scientifically detectable gaps in the natural world.

To see why complementarian compatibilists have no room for gaps, consider the following statements from naturalist philosophers. John Searle has said that "our conception of physical reality simply does not allow for radical [libertarian] freedom."²⁸ The reason for this is that once you claim that the physical level of description is both basic and complete, you rule out the possibility of top-down feedback. As naturalist David Papineau has argued:

I take it that physics, unlike the other special sciences, is *complete*, in the sense that all physical events are determined, or have their chances determined, by prior physical events according to physical laws. In other words, we never need to look beyond the realm of the physical in order to identify a set of antecedents which fixes the chances of subsequent physical occurrence. A purely physical specification, plus physical laws, will

always suffice to tell us what is physically going to happen, insofar as that can be foretold at all.²⁹

Jaegwon Kim says that someone who holds that the physical level is basic and complete must "accept some form of the principle that the physical domain is causally closed "that if a physical phenomenon is causally explainable, it must have an explanation within the physical domain."³⁰ Here is the reason for the remarks by Searle, Papineau, and Kim. In every alleged case where there is a description of top-down causation (e.g., where a state of intending to raise my arm causes the raising of the arm), there will be a corresponding description of a causal sequence of events that run along the bottom level (e.g., there will be a physical state "associated with" the mental state of intending to raise one's arm and a physical state "associated with" each moment of the arm being raised).

Moreover, when we claim that the physical is the bottom level, this means not just that each upper level event has some lower level event or another correlated with it. It means that the description of the bottom level sequence of events is complete without any gaps. For example, at each moment during the process of voting - desire to vote, believe that raising my arm will satisfy that desire, deliberate about whether to vote, will to raise my arm, and raise it - throughout a time of a few seconds, there will be a physical state in my brain and nervous system that is sufficient to produce the next physical state without room for feedback. Remember, the physical level description is complete and basic. There is no room for mental entities to make a physical difference in the world because once the physical antecedents are fixed, so are the physical consequences (or at least their probabilities). This is simply what it means to claim that the physical is both basic and complete at its own level of description. Moreover, each alleged description of a top-down causal connection will have a description that runs the other way and that is more consistent with the view that the physical level is at the bottom. In any case, even if one allows for top-down mental-to-physical feedback, this type of causality will still be event-event causation with no room for libertarian agency.

**Complementarian methodological naturalists in general adopt
compatibilist models of...action...with the result
that no gaps exist in the causal fabric. I see...action in terms of libertarian
agency and believe that
free acts leave scientifically detectable gaps in the natural world.**

By contrast, in cases of libertarian action, say, just before one acts to raise one's arm and during the raising of it, the description of one's brain and central nervous system just before acting will not be sufficient to entail or causally account for the physical description resulting from the agent's own (first mover) exercise of causal power. Of course, at each moment there will be some physical state, but the events at the physical

level will not form a continuous chain of causal events. Instead, there will be a causal gap due to the action of the agent. This is why some have objected to libertarian agency since libertarian acts violate the first law of the conservation of energy. I think such acts do indeed violate the first law and, in fact, this is part of what it means for an agent to be in the image of God - he or she is capable of genuine creativity and novelty. Moreover, Robert Larmer argues that we must distinguish two forms of the First Law. A strong form states that energy can neither be created nor destroyed. A weak form states that in a causally closed system, the total amount of energy remains constant. Larmer says that libertarian agency is inconsistent with the strong, but not the weak, form because the human body is not a causally closed physical system.³¹ He correctly sees that libertarian acts leave gaps in the natural causal fabric.

If we assume for a moment that libertarian agency is the correct model of divine action for primary causal miracles, then whenever God acts in this way, there will be a gap in the natural world that could figure into scientific practice in at least three ways. First, scientific methodology includes the psychology of discovery, roughly, the psychological processes scientists go through to come up with theories to guide their research. Now it is a known fact that in the history of science, a hypothesis often has suggested itself to a scientist from his theological or metaphysical beliefs. If someone held that various things in the natural world were the result of a libertarian, miraculous act of God (e.g., the beginning of the universe, the direct creation of first life and the various kinds of life, the direct creation of human beings in the Mid-East, the flood of Noah), then such a belief could guide a scientist in postulating that there will be no natural explanation for the occurrence of these things. This could, in turn, lead him or her to try to discover evidence for these events (the flood of Noah, a Mid-Eastern origin for human beings) or to try to falsify the fact that they were the result of miraculous acts by trying to discover natural mechanisms for their occurrence that he or she believes are not there.

Secondly, in a number of areas of science (forensic science, SETI, archeology, psychology), scientific explanations for some phenomenon appeal to the desires, beliefs, intentions, and actions of personal agents. Thus, for example, if one discovered that living systems are discontinuous with nonliving systems in such a way that living systems bear certain features that usually result from personal agency (e.g., information in DNA, different kinds of design such as beauty, order, etc.), and if one has grounds for thinking that it is improbable that a naturalist mechanism will be found to account for this, then one could legitimately see the origin of life as a gap in the history of the universe due to a primary causal act of God. In this case, an appeal to divine action, intentions, and so forth could be a legitimate form of *scientific* explanation.

Thirdly, these features of living systems could lend some confirmation to the hypothesis that life was, indeed, the result of a miraculous act of God. Such claims would be defeasible (i.e., they could be shown false given more data), but this is irrelevant, since all scientific theories are (in principle) defeasible. Yet they are often well enough attested to be rationally accepted. In these three ways - scientific discovery, scientific explanation that is a form of personal explanation, and scientific confirmation - gaps in the causal

fabric derived from theological models of primary causal divine agency regarding some natural phenomenon could enter into scientific methodology.³²

Conclusion

In this article, I have not had the space to defend libertarian agency for human or divine (primary causal) action, though I obviously think such a defense is possible. Fortunately, such a defense is not needed for my purposes here. I have tried to show that the claim that miracles are in principle outside the bounds of science is one embedded in a backdrop that includes a complementarian, methodological, naturalist view of science and reality, along with a compatibilist view of human and divine action in the natural world (outside salvation history). This, in turn, has lead many to reject any version of a theistic explanation for gaps because, among other things, the backdrop just mentioned denies that such gaps exist.

Whether miracles are outside the bounds of science, then, depends in part on one's model of divine agency...

By contrast, I do not limit the use of theistic science to the employment of explanations that appeal to direct, primary causal acts of God. Nevertheless, if such acts have occurred in certain cases, and if libertarian agency is a good model for depicting such actions, then there will be gaps in the causal fabric that can enter scientific practice. Whether miracles are outside the bounds of science, then, depends in part on one's model of divine agency which, in turn, can be understood from an analogy with human action. Complementarians may, unfortunately, reject libertarian agency, but even if they do, I hope to have made clear why some of us who accept this model believe that miracles can, in fact, be part of scientific practice.

Notes

¹Michael Ruse, *Darwinism Defended* (Addison-Wesley, 1982), 322.

²Ibid.

³Nothing honorific is meant by the term "theistic science." More precisely, it is not meant to imply that methodological naturalists are not solid Christian theists. The term is currently being used to label a view bearing a family resemblance to the definition I offer here. No emotional connotations should be derived from the label.

⁴It has been argued that Proposition 1 assumes that we know God has directly acted in the world from insights about what a creator would do and that we should, instead, exhaust

every possible natural process for God's activity before concluding we have a primary cause. Three things are wrong with this suggestion. First, any statement of a theory or research program contains assertions in the indicative mood, and such propositions do not imply anything whatever about commitment to the truth of those propositions or the epistemic strength of such commitment. One can use a theory to explore the natural world even if one wishes to falsify the theory. The presence of 1 does not imply that anyone holds the assumption in question, much less that someone knows it to be true. Second, even if one believes proposition 1 to be true, why can't this believe rest, in part, on prior theological or philosophical arguments. I see no reason to think that one must exhaust every possible naturalistic explanation before one is justified in believing 1. Even in science, a theory can receive some initial epistemic support from so-called non-empirical factors (elegance, simplicity, internal clarity, harmony with external conceptual problems), so such a prior commitment does not violate the nature of science. Third, many advocates of theistic science believe that we have, in fact, exhausted enough naturalistic possibilities to justify the defeasible commitment to a primary causal divine act for things like the origin of life or human beings.

⁵Richard Bube has complained that my characterization of complementarity is confused and is actually a description of what he calls compartmentalization. See his *Putting It All Together* (Lanham, MD: University Press of America, 1995), 168. Cf. chapters 6 and 10. For Bube, compartmentalization treats science and theology as different descriptions about different kinds of things with no common ground or possibility of conflict. Complementarity views science and theology as different descriptions of the same reality. Unfortunately, Bube is simply wrong in this complaint toward my position. What he calls compartmentalization is close to what I call the "two realms" view of integration and my description of complementarity is an accurate one. The source of Bube's confusion is revealing. I claim that the complementarity view eschews interaction between science and theology and Bube says that it embraces such interaction. However, Bube equivocates on what "interaction" means in this context. For me, it is "epistemic" interaction, roughly the same description of the same reality that can be in conflict or concord to varying degrees of strength. For Bube, interaction amounts to taking two different (non-interacting in my sense) perspectives and forming them into a whole. For example, a completely scientific description of the origin of life in natural terms could be described in theological terms as God's activity in bringing life into being. It is clear that his notion of interaction is not the one I deny in explicating complementarity. Moreover, my use of interaction is crucial in understanding the significance for scientific methodology of gaps in the natural causal fabric due to libertarian agency and primary causal activity on God's part.

⁶See J. P. Moreland, ed., *The Creation Hypothesis* (Downers Grove, IL: InterVarsity Press, 1994), chapters 1, 2; "Creation Science and Methodological Naturalism," in *Man and Creation*, ed. by Michael Bauman (Hillsdale, MI: Hillsdale College Press, 1993), 105-139; *Christianity and the Nature of Science* (Grand Rapids: Baker, 1989), chapters 1, 6; "Conceptual Problems and the Scientific Status of Creation Science," *Perspectives on Science and Christian Faith* 46 (March 1994): 2-13.

⁷See D. M. Mackay, *The Clock Work Image* (Downers Grove: InterVarsity Press, 1974); *Human Science & Human Dignity* (Downers Grove: InterVarsity Press, 1979), 26-56.

⁸See A. R. Peacocke, *Creation and the World of Science* (Oxford: Clarendon Press, 1979), 112-46; *God and the New Biology* (San Francisco: Harper & Row, 1986).

⁹ See Richard Bube, *The Human Quest* (Waco: Word Books, 1971), 26-35, 134-59; Richard Bube, ed., *The Encounter Between Christianity and Science* (Grand Rapids: Eerdmans, 1968), 17-108; *Putting It All Together*, Chapter 10.

¹⁰ See Howard J. Van Till, "The Character of Contemporary Natural Science," in *Portraits of Creation*, ed. by Howard J. Van Till, Robert E. Snow, John H. Stek, and Davis A. Young (Grand Rapids: Eerdmans, 1990), 126-65; Howard J. Van Till, Davis A. Young, Clarence Menninga, *Science Held Hostage* (Downers Grove: InterVarsity Press, 1988); Howard J. Van Till, "Categorical Complementarity and the Creationomic," *JACS* 37 (September 1985): 149-57.

¹¹ Paul de Vries, "Naturalism in the Natural Sciences: A Christian Perspective," *Christian Scholar's Review* 15 (1986): 388-96.

¹²David G. Myers, *The Human Puzzle* (New York: Harper & Row, 1978), 3-22, 45-90, 201-31.

¹³Howard J. Van Till has complained that my description of methodological naturalism treats it as a scientific strategy that begins with philosophical naturalism, strips away all reference to atheistic metaphysics, and leaves room only for methodological rules that proscribe consideration of divine action. According to Van Till, this is a caricature. See "Special Creationism in Designers Clothing: A Response to *The Creation Hypothesis* in *Perspectives on Science and Christian Faith*. 47 (June 1995): 126-27. It should be clear, however, that I have done no such thing. I acknowledge that Van Till and others distinguish philosophical from methodological naturalism. The point is that for Van Till theological notions like primary causal acts of God do not play a role *within* the methodology of science. If Van Till thinks that this is a caricature, then he needs to point out where this description is wrong and state where theological concepts have a role within scientific methodology in his view.

¹⁴Advocates of the complementarity view differ in the details here and, in some cases, appear to be confused. Early on Peacocke advocated what is called type type identity physicalism regarding the mental, Bube seems to embrace property dualism, and Mackay appears to conflate a double aspect, a type type identity, and a functionalist view of the mind/body problem. On Mackay, see *Human Science & Human Dignity*, 26-34.

¹⁵See J. Kim, "Supervenience," in *Handbook of Metaphysics and Ontology*, ed. by Hans Burkhardt, Barry Smith (Munich: Philosophia Verlag, 1991): II, 877-879.

¹⁶For more on this see Richard Connell, *Substance and Modern Science*, (Notre Dame: University of Notre Dame Press, 1988). There are other uses of the term "substance" that I shall not consider here because they are not relevant to the line of critique I am developing. It should be pointed out, however, that the classic definition of substance is not an arbitrary construction of philosophers' fancy. It is rooted in reality as Connell's book points out.

¹⁷There are also significant implications of the property-thing view for end of life ethics. See J. P. Moreland, "Humanness, Personhood, and the Right to Die," *Faith and Philosophy* Jan. 1995): 95-112; J. P. Moreland, Stan Wallace, "Aquinas, Locke and Descartes on the Human Person and End-of-Life Ethics," *International Philosophical Quarterly*35 (Sept. 1995): 319-30.

¹⁸Mackay, *Human Science & Human Dignity*, 28.

¹⁹David Charles, Kathleen Lennon, eds., *Reduction, Explanation, and Realism* (Oxford: Clarendon, 1992), 3-4.

²⁰Jaegwon Kim, "Mental Causation in Searle's Biological Naturalism," *Philosophy and Phenomenological Research* 55(March 1995): 185-6.

²¹I set aside debates about the exact nature of secondary causality (e.g. disputes over occasionalism and alternative accounts) because the distinction between primary and secondary causality will still be functionally and epistemologically significant irrespective of the exact nature of the metaphysical account of the difference between them because whatever else one wants to say here, secondary causality will be God's usual way of acting and the laws of nature will be regular and normal here (regardless of whether they are deterministic or probabilistic) and primary causality will be God's unusual way of acting that could be epistemically detected due to the contrast in this type of action compared to the regular, usual sequences of events that constitute secondary causality.

²²Howard J. Van Till, "When Faith and Reason Cooperate," *Christian Scholar's Review*20 (September 1991): 42.

²³cf. J. P. Moreland, *The Creation Hypothesis*,59-60.

²⁴Some libertarians allow for the existence of free acts that are not done for any reason at all, e.g., freely moving my hand back and forth or looking at one thing and then another (where these acts are not caused by, say, a nervous twitch or a sudden noise). Spontaneity is the name for non-rational, bare exercises of free will. But there libertarians agree with the fact that a crucial class of human actions are those done for certain reasons, so there is still an important area of debate between libertarians and compatibilists about the role of reason in free choices. Liberty is the name for this class of cases of free will.

²⁵Michael Kellman, "Science and Free Will," *First Things* May 1994): 5.

²⁶Richard Bube claims that a scientific description is deterministic if it can predict a future state from a present one and chance if it can only predict the probability of a future state. See *Putting It All Together*, 22-26. Moreover, such descriptions must be one or the other. Now Bube thinks that these observations raise a paradox about human responsibility. Such responsibility is hard to square with determinism (how can I be responsible if determined) yet it also seems to require determinism (how can a responsible choice exist without being described in a definite cause [the basis of the choice] and effect [the result of the choice] sequence). On the other hand, responsibility is hard to harmonize with chance which seems to be required for responsible action yet chance is utterly random. Bube's solution to the problem is simply to assert without adequate justification that scientific descriptions of determinism or chance do not entail determinism or meaninglessness as world views and that the two types of descriptions can be complementary. However, if these descriptions are true, then anything else we would say at a different level of description could not contradict what is said at the scientific level. I think Bube misses this point because his definitions of determinism and chance are epistemological and not ontological. Unfortunately, epistemological definitions confuse the real issues of freedom and responsibility. For example, epistemological determinism in Bube's sense is neither necessary nor sufficient for ontological determinism. Moreover, Bube fails to see that the real issue is the nature of agency and that libertarian freedom is a third (and more adequate) option that renders his dilemma incomplete.

²⁷Peacocke, *Creation and the World of Science*, 132.

²⁸John Searle, *Minds, Brains, and Science* Cambridge, MA: Harvard University Press, 1984), 98.

²⁹David Papineau, *Philosophical Naturalism* Oxford: Blackwell Publishers, 1993), 16.

³⁰Jaegwon Kim, "Mental Causation and Two Conceptions of Mental Properties," unpublished paper delivered at the Eastern Divisional Meeting of the American Philosophical Association, Winter 1993, 21.

³¹Robert Larmer, "Mind-Body Interaction and the conservation of Energy," *International Philosophical Quarterly*, 26 (Sept. 1986): 277-85.

³²When it comes to miraculous actions by God, Richard Bube admits that no scientific descriptions can be given of such acts. See *Putting It All Together*. 25-26, 65-70. Now this would seem to require a libertarian view of such acts; otherwise, they would have complementary scientific descriptions. Yet Bube claims that such miraculous acts cannot figure into scientific practice. Why? Because in such acts, there is no scientific mechanism available for scientific description and, therefore, primary causal miracles are not susceptible to scientific investigation. It should now be obvious what is wrong with this claim: Scientific investigation does not limit itself to *descriptions*, and a primary causal act of God could figure into scientific methodology in the three ways mentioned above, even though such acts themselves cannot be given a scientific description.
