

Time Atomism and Ash'arite Origins for  
Cartesian Occasionalism Revisited

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## Introduction

In gauging the contributions of Asian thinkers to the making of modern “Western” philosophy and science, one often encounters the difficulty of establishing a direct influence. Arun Bala and George Gheverghese Joseph (2007) have termed this “the transmission problem”. One can establish a precedence, as well as a strong probability that an influence occurred, without being able to find concrete evidence for it. In the face of this difficulty (which appears to occur quite generally in the history of thought) I suggest here that the influence of earlier thinkers does not always occur through one person reading others' work and becoming persuaded by their arguments, but by people in given epistemic situations being constrained by certain historically and socially conditioned trends of thought—for which constraining and conditioned trends of thought I coin the term “epistemic vectors”—and opportunistically availing themselves of kindred views from other traditions.

As a case in point, I will examine here the claim that the doctrine of Occasionalism arose in seventeenth century Europe as a result of an influence from Islamic theology. In particular, the Ash'arite school of *kalām* presented occasionalism as a corollary of *time atomism*, and since to many scholars the seventeenth century occasionalism of Cartesian thinkers such as De la Forge and Cordemoy has appeared as a direct corollary of the atomism of time attributed to Descartes in his *Meditations*, Ash'arite time atomism is often cited as the likely source of Cartesian Occasionalism. It has also been suggested that this idea of time atoms is foreign to Greek thought, and accordingly may well be an indication of influence on Arab thinkers in turn by the Buddhist sect of the Sautrāntikas of Northern India of the second or first century BC.

These claims are directly relevant to the focus of this conference because of the centrality of Cartesianism to the scientific revolution of seventeenth century. In particular, Descartes's way of conceiving the world as constituted by its instantaneous state, reducing forces to the tendencies to move possessed by bodies at each instant, is arguably one of the crucial moments in the establishment of modern physics, since in its further development in the hands of Newton and Leibniz it paves the way for the concept of

instantaneous velocity and the creation of the calculus. The idea that these moments are discrete time atoms, moreover, and not point-like modalities in the continuum, is of great topical relevance: time atomism is very much a live issue in the context of modern theories of Quantum Gravity, and has been suggested both in the context of the String Theoretic and Loop Quantum Gravity approaches.<sup>1</sup>

For various reasons, though, both these historical claims of influence—that of the Sautrāntikas on the Mutakallimim (also called Mûtakallimûn, the *kalām* theologians), and the influence of *kalām* doctrines on Descartes—are quite contentious, most particularly because of the lack of the type of hard corroborating evidence required to establish a direct influence. I shall take a more nuanced stand, and try to articulate the epistemic vectors that may nevertheless have led to some of these apparent influences of Asian thought on ideas at the epicentre of the scientific revolution in seventeenth century Europe.

### *Kalam*, the Sautrāntikas and Time Atomism

Inspired by various passages in the *Koran* which seem to reserve almost all power for God alone, the Islamic theologian al-Ash'arī (873-935 CE) and his followers claimed that there is no real causation in the world save God's. Thus, strictly speaking al-Ash'arī never caused his pen to write those austere words: rather, God created al-Ash'arī's will to write them and his power to move his pen, and simultaneously caused the motion of his hand and pen, the flowing of the ink, and the absorption of the ink into the paper.<sup>2</sup> Neither al-Ash'arī himself, nor his hand, nor the pen can thus be said to *act*, nor to cause any further effects in the other things. The presence of the idea in al-Ash'arī's mind simply provided God with the *occasion* to simultaneously bring about the moving of his hand and quill, and the other concomitant effects. In the same way, it is not the dye that causes the cloth to become black: all causal power is God's alone.

This is the doctrine of *Occasionalism*, a subterranean doctrine that has resurfaced many times in the history of thought, though not always under that name, and certainly not always in the knowledge that it had been proposed before. The classic statement of it was given in the seventeenth century by Nicolas Malebranche: "there is only one true cause because there is only one true God; ...the nature or power of each thing is nothing but the will of God; ... all natural causes are not *true* causes but only the *occasional*

causes of natural effects" (Malebranche 1997, p. 448). Now the Ash'arites presented it as a corollary of the *atomism of time*: as Sorabji reports it,

[T]he Ash'arites held that every time-atom God creates an entirely new set of accidental properties, although they may be accidents of the same kind as before. If he omits to create new accidents, the substance which bore them will cease to exist. This shows why the blackness which we think is introduced into the cloth by the dye must in fact be created and re-created every time-atom by God. (Sorabji 1983, p. 297)

The universe, according to the Ash'arites, is comprised of an indeterminate number of indivisible, homogeneous particles, themselves unextended and devoid of magnitude (*kam*). When these atoms are combined, bodies result. Opinions differed as to how many atoms this would take: according to Ash'arī, some of the atomists preceding him had held that a body (or possibly two bodies) arise from the combining of two atoms. "Abu I-Hudhayl, however, argued that a body required a minimum of six atoms, corresponding to the six planes of a solid" (Fakhry 1958, p. 36). But a body does not have its accidents—colour, taste, contact, motion, rest and the like—as a whole; rather they are possessed by its constituent atoms individually. Moreover, these atoms are not everlasting, like those of the Greeks, but last no longer than the accidents adhering in them. Most of the Mûtakallimûn, reports Fakhry, held that "the atom cannot endure for two instants of time" (Proposition 6 of Maimonides' account), since duration (*baqđ*) itself can no more exist beyond an instant than can any other accident (Fakhry 1958, 27). Fakhry cites Al-Bâqilânî (d. 1013) as defining an accident as "that which cannot endure ... but perishes in the second instant of its coming-to-be"—a definition for which he finds a scriptural basis in the Koran (8: 67 and 46: 24) which speaks of the 'transient things' of this world (*a'rad*). Thus when a garment has been dyed red, God recreates its constituent atoms with the accident red in each successive time atom of the garment's subsequent existence. But "there would be nothing to prevent Him from creating in it the accident yellow or the accident black" (30). He does not do so, not because this is impossible, but simply because

God has decreed as a matter of habit that the succession of accidents shall correspond to a certain pattern; so that the colour black, e. g., shall not appear in the garment unless it is brought into contact with a black dye, [and] that it shall [not] be followed, upon its instantaneous cessation, by any save the colour black. But it is clear that God, who is the ultimate agent, could alter this course of habit freely. (Fakhry 1958, 30)

Now this view is extremely reminiscent of Malebranche's doctrine. And coupled with the fact that Descartes' upholding of the thesis of the equivalence of conservation with divine recreation has been widely taken to commit him to temporal atomism, this has led many to see an Islamic origin for Cartesian Occasionalism. This is well summarized by Sorabji:

Maimonides reports further corollaries of this view: things do not have essential natures of their own, since it is God who creates all their properties. Again, things have no tendency of their own to persist—it is this which most of all would encourage a sense of precariousness. The doctrine that our continuation requires that God re-create us from moment to moment is repeated in Descartes, and from there it influenced the seventeenth-century occasionalists. The best known of them, Malebranche, agreed that all causation involves creation... (Sorabji 1983, pp. 297-8)

But I will defer treatment of the question of Descartes and Cartesian Occasionalism to the next section. First I want to discuss the second of the claimed influences mentioned above, concerning the origins of Islamic atomism itself. For as several authors have pointed out, the atomism of the Mutakallimim seems quite different from that of the ancient Greeks in several respects. Most scholars agree that Leucippus was motivated to introduce atoms to answer the Eleatics' devastating critiques of plurality and change: the atoms have most of the qualities of the Parmenidean One or Being, except that they are many and different, and move in the void (Non-being). Leucippus, Democritus and Epicurus explained phenomenal qualities and their changes in terms of atomic shapes, sizes, motions and re-arrangements. As Otto Pretzl argued in 1930, the role of the atoms of the early Greek atomists was to function as the permanent substances underlying change. The *kalâm* atoms, by contrast, are point-like and lacking in extension, indeterminate in number, and

simply possess phenomenal qualities like colour and taste, rather than reductively explaining them. But what is most striking in the contrast is the instantaneousness of the atoms of the Mutakallimim, the fact that they do not endure longer than an instant. Far from constituting what is constant underlying phenomenal change, they are not themselves substantial, but ephemeral.

These differences have led commentators to argue that Islamic atomism is too dissimilar from the Greeks' to have been inherited from them directly. In particular, Otto Pretzl suggested that it had travelled via the Gnostics (1931)<sup>3</sup>; and D. B. MacDonald (1927) speculated that the idea of time atoms probably arose as a Muslim heresy in the dark centuries immediately after the death of the prophet, and that it might be an indication of influence on the Arab thinkers from the Buddhist sect of the Sautrāntikas of the second or first century BC. The Sautrāntikas (more properly, Saṃkrāntikas, and probably identical with the Dārṣṭāntikas) are a somewhat obscure Buddhist sect about which little is known definitively. What is known is that they were active in the first or second century BCE, that they proposed a theory of "point-atoms" or events (*dharmas*) that had a merely momentary existence.<sup>4</sup> This is taken up by later Indian Buddhist philosophers such as Dharmakīrti and Dignāga, who also considered atoms to be point-atoms, durationless events. The brunt of this argument for Indian influence, however, is the lack of any Greek theory combining temporal and material atomism in the same way as the Ash'arite atomic theory. Similarly, in his *History of Islamic Philosophy*, Majid Fakhry writes of the Muslim atomic theory that "it is noteworthy that some of its important divergences from Greek antecedents, such as the atomic nature of time, space and accidents, the perishability of atoms and accidents, appear to reflect an Indian influence" (Fakhry 2004, p. 35).

Such an influence is by no means impossible, but it is very difficult to establish. Certainly, the Arabs were open to learning from the Indians: as Fakhry reports, "one of the earliest works to be translated into Arabic was an Indian astronomical treatise, the *Siddhanta* of Brahmagupta, which in the Arabic version of al-Fazari played an important role in the development of Islamic astronomy" (Fakhry 2004, p. 33). But he is forced to concede that, concerning "the more philosophical elements in Indian thought that might have influenced the Arabs, we are at once struck by their relative scarcity or triviality when compared to the rich

stream of ideas that came from Greece" (34). Certain figures who are known to have had substantial engagement with the philosophy of the Indians, such as al-Bîrunî (d. 1048) and al-Râzî (d. ca. 925), came too late to be credited with the origination of Islamic atomism. But there is a report that the great Islamic philosopher, al-Kindî (805-873) had transcribed "an anonymous treatise on the *Religious Beliefs of the Indians*, which was in circulation among the Arabs by the end of the eighth century" (Fakhry 2004, 33). And by this time Indian atomic theory was well established: "The two Buddhist sects of Vaibhashika and Sautrāntika, the two Brahmin sects of Nyaya and Vaishashika, as well as the Jaina sect, had evolved by the fifth century an atomic theory, apparently independent of the Greek ..." (35). As Arun Bala has argued,

These schools were quite influential at the time the Arab-Muslims emerged as the dominant power after their conquest of the Sassanian Empire, and their views must have been discussed at the centres of learning at Jundishapur, where scholars from the Hellenic and Indian worlds met. Arabic theologians might have found such views attractive because Indian atomic views were closely linked with religious traditions such as Hinduism, Buddhism and Jainism—and did not have the association with atheism they had in the Hellenistic world. ... Moreover, the association with religious thought also produced other similarities between Indian and Arabic atomism—*kalam* atomism did not deny the existence of minds independent of matter, belief in an afterlife, the need for spiritual cultivation, or the possibility of communion with a transcendent reality. (Bala 2006, pp. 112-113)

All of this is undeniable. Nevertheless, the case for influence rests very heavily on the features of Islamic atomism that are alleged to have no correlates in Greek philosophy, in particular, time atomism. On this score, however, these arguments for an Indian influence on *kalām* are seriously weakened by Richard Sorabji's detailed analysis of the many parallels between the positions of the ancient Greeks and the points in the debates between Abû I-Hudhayl (died 841), his nephew Nazzām (died c. 846), and Dirār (died 815 or earlier). For according to Sorabji, too much attention has been paid by thinkers like Fakhry to the Presocratic atomists in the Hellenic tradition, and too little attention has been paid to later atomisms, such as that of Diodorus Cronus, to Epicurus's theory of the minimal parts within atoms, and again to the views

of Xenocrates, and late Neoplatonist theories such as Damascius's theory of infinitely divisible leaps of motion. Once these views are taken into account, some vivid and detailed points of comparison can be established between the views of the earliest Islamic atomists and corresponding Greek views. For example, Nazzām, like Diodorus and Damascius, advocated infinitely divisible leaps ((Sorabji 1983, pp. 386-397). And Dirār can be seen to be following the Neoplatonist view that sensible individuals are bundles of properties, properties they refer to as *accidents*, and also as following Epicurus in his attack on the Anaxagorean theory of latency maintained by Nazzām (Sorabji 1983, pp. 296). More importantly for our concerns here, Sorabji finds in Diodorus “an argument that the present must be a time atom” (p. 371), and in Epicurus the view that there are minimal times which can be successive without touching (p. 371). As he reports, Epicurus's theory is described by his follower, the atomist Demetrius, as positing “something like this”: “The thing happens whenever, from the place where this one emerged, the neighbouring one will follow at once at the next (*hexes*) time, which is a minimal time.” (Sorabji 1983, p. 371; word ordering slightly altered.)

Thus according to Sorabji's analysis there are indeed Greek counterparts to the Islamic time-atoms reported by Maimonides and upheld by Islamic thinkers such as Abû I-Hudhayl. Indeed, after a detailed analysis of the points of correspondence, Sorabji finds the controversy over atomism between Nazzām and I-Hudhayl “full of Greek resonances” (p. 398). As for the fact that the Ash'arites do not use atoms to explain the physical world, this is no less true of Diodorus. And even regarding the unextended atoms of I-Hudhayl, Sorabji is able to allude to the possibility of a Greek source, with Wolfson's identification of an extant ninth- or tenth-century Arabic work which misrepresents Democritus's spherical atoms as points.<sup>5</sup>

Still, Sorabji does “not regard the presence of Greek influence as *excluding* Indian” (Sorabji 1983, p. 399), and cites the example of the Indian atomist Kanade, founder of the Nyaya-Vaisesika school, whose *floruit* is dated by some scholars as around 100 CE. Kanade, according to Sorabji, uses the same argument that is found in earlier Greek thought, namely that without atoms, the large and the small would be equally big, on account of the infinity of the parts of something that is infinitely divisible. This also occurs later in *kalām* writings, but, fascinatingly, with the same illustration that Kanade gives, of the mountain and the

mustard seed (p. 399). Especially suggestive of a three-way influence is Kanade's claim, reported by Sorabji (p. 396), that six is the minimum number of atoms needed to produce magnitude. For this occurs in Abû I-Hudhayl, who reasons "that the surrounding atoms can be arranged above and below, in front and behind, to the right and the left" (p. 396). This argument is found in Aristotle as a correction to Democritus's view that there are just four differences of position.<sup>6</sup> All of this seems to indicate that much more work needs to be done on the detailed correspondences between the arguments of the various schools extant in the ninth and tenth centuries. It is by no means unlikely that the Muslim philosophers could have learnt of the Indian atomic theories, and made use of them where it suited their purposes. The earlier forms of Islamic atomism of the ninth century seem indebted to Greek ideas, although this does not belittle the Mutakallimim's own original contributions, and by no means excludes influence from Jainist, Buddhist and Hindu sources; and the Indian atomisms themselves may well have been influenced by Greek ideas in their turn, despite the skepticism of Indian historians of philosophy.

On the other hand, we can also say that, even if time atomism was not alien to Greek philosophy, it is in certain schools in Indian philosophy where this is systematically tied to theses concerning the instantaneity of the existence of atoms and their accidents. And even though al-Râzî's study of Indian thought came too late for it to be a factor in the origination of Islamic atomism, it was not too late to have contributed to his contemporary al-Ash'arî's fusing of atomism with occasionalism. If al-Ash'arî were familiar with the complete ephemerality of the point-atoms of the Sautrântikas, that is a factor that would have had a definite appeal in an atomist context where it is above all necessary to show how all things depend on God as cause. Even here, though, it seems to me that some caution is necessary. For this Buddhist sect's universe is fragmentary: all that exist for them are point-atoms, each becoming manifest as it is individually experienced on different occasions; but there is nothing in this universe corresponding to Aristotle's *το νυν*, a world-wide instant that can be experienced by everyone existing at the same time. Strictly speaking, in fact, both time atomism and the idea of discrete world states following one another are alien to the Buddhists' philosophy of dependent origination. But the idea of the world at an instant is implicit in the time atomism of both Epicurus and Diodorus, coming as they do after Aristotle. And Al-Ash'arî's occasionalism, like the

occasionalism of the later Cartesian thinkers, appeals to time-slices, instantaneous world-states, not spatially isolated momentary fragments.

Thus if we were to make a tentative list of the moments of thought that are crucial to *kalām*, this notion of a world-wide instant would be among them. This is an example of what I have called an 'epistemic vector'. A much more crucial constraint on their thinking, of course, is the fundamental Islamic tenet of the total dependence of the created world on God, something that is quite absent from the Buddhist philosophical approach. The same goes for the concomitant denial that there is, strictly speaking, any agent at all save for God. In al-Ghazâlî this becomes much more pronounced with the critique of essences or natures, and the undermining of the idea that there is a necessary relation between cause and effect. But these are somewhat later elaborations of the Ash'arite view by al-Ghazâlî in his *Destruction of the Philosophers (Tahāfut al-Falāsifa)*, a vigorous defence of *kalām* against Peripatetic-based philosophy like Avicenna's (Ibn Sīnā, 980–1037), and a work that would itself gain fame as the target of Averroës' rejoinders on behalf of Aristotelianism. So if we restrict our consideration to the earlier period of *kalām*, and to Ash'arī's formulation of the doctrine, some of the crucial moments or epistemic vectors which issue in the doctrine could tentatively be listed as follows:

1. The absolute omnipotence of God, and the absolute dependence of creatures on him for their existence.
2. The denial that there is any creative or causal agent apart from God.
3. The supposition that the world exists in a succession of world-wide instants.
4. The supposition that everything that exists consists of atoms and their accidents.

In this context, the Mutakallimim would have had the resources to formulate their philosophy without having to go beyond the borders of Islamic theological doctrine and their criticisms of Greek views. In particular, as Sorabji points out, the identification of *το νῦν* (instants) with partless times is found in Diodorus Cronus, and partless times are also to be found in Epicurus. (Sorabji 1983, pp. 371-77) But a

familiarity with the views of the early Buddhists, in particular, that all atoms and their accidents are utterly ephemeral, would certainly have emboldened them in explicitly identifying instants as time atoms, leading fairly naturally to

5. The thesis that atoms and their accidents do not endure longer than an instant.

But actually it is not necessary to resolve the question of the origin of Islamic Atomism in order to understand the origins of occasionalism. For it is possible that occasionalism, while certainly fortified in al-Ash'arī's philosophy by time atomism, is not necessarily consequent on it. This seems to be the case also with respect to Cartesianism. For several scholars, myself included, have contested the attribution of a time atomism to Descartes, even though it can be found clearly advocated by two of his occasionalist followers, Louis de la Forge and Gerould Cordemoy. But the fact that time atomism is absent from the philosophy of Nicolas Malebranche, perhaps the most influential of the Cartesian Occasionalists, certainly requires us to think again about the relationship of occasionalism to time atomism. So let me turn now to the origins of Cartesian occasionalism and the question of the influence on it of *kaldm*.

### **Augustine and the Origins of Cartesian Occasionalism**

It is beyond question that for the first several hundred years of its existence, Islamic philosophy was so interwoven with what we like to call Western philosophy that the latter would have been quite different without it. Certainly, there's no more question about the huge influence on medieval philosophy of the writings of Avicenna and Averroës than there is about the fact that those thinkers were responding to Aristotle and the Greeks as well as al-Ghazâlî, and were at the same time a major source of knowledge of those doctrines for the Christian West. The doctrines of the Mutakallimim were certainly known in Europe, not least on account of Maimonides' summary, and their influence on the doctrines of the likes of Gerard of Odo and Nicolas d'Autrecourt have been established in some detail.<sup>7</sup> So the doctrines of the Mutakallimim (either through Maimonides or refracted through other authors, such as the so-called Zenonists) would certainly have been available to Descartes, as well as to his followers, as potential influences on their own thought. But it may well be questioned whether internal evidence supports an

explicit indebtedness of Descartes or Malebranche to the *kalām* philosophy, as opposed to something more nuanced: in the case of Malebranche, a pushing of his views in the same occasionalist direction as the Ash'arites by certain doctrinal certitudes they had in common, quite independent of the question of time atomism. Majid Fakhry puts his finger on one of them, right at the beginning of his introduction to his (1958). After acknowledging the well known origin of Malebranche's occasionalism in his attempt to solve the inherent difficulties of Cartesian mind-body interaction (and, he might have added, body-body interaction too), he adds:

But it is not sufficiently recognized that his notion of God's direct role in activity is directly affiliated to St. Augustine and his 'theology of grace'. Even a cursory perusal of Malebranche's major work *Recherche de la Vérité* is sufficient to show the extent of St. Augustine's influence on his thought. In point of method, perhaps, the Cartesian influence predominates; but the theological inspiration, which determined the shape of his occasionalism, is unmistakably Augustinian. As a matter of fact, Islamic occasionalism, as we are going to see, is inspired by precisely the same Augustinian motive, namely, the vindication of the absolute omnipotence and sovereignty of God and the utter powerlessness of the creature without Him. (Fakhry 1958, p. 9)

Indeed, substantial light can be thrown on occasionalism and its origins by reference to the thought of St. Augustine, Bishop of Hippo (354-430). There are two points to be made in this connection, as Sorabji has observed. First, Augustine is explicitly acknowledged by Malebranche as a source of inspiration for his occasionalism.<sup>8</sup> Second, Augustine is not himself an occasionalist, even though he restricts all creative and causal power so that it ultimately resides in God (Sorabji 1983, p. 302). This is because he does not deny that created souls have within them the power to act, but insists that in doing so "they do not create, but only make use of the forces supplied by God to bring forth what he has already created" (p. 302). As we shall see, Augustine locates these forces in the *seminal reasons* in created beings, provided by God at Creation, a doctrine deriving from and synthesizing prior doctrines of Stoic and Neoplatonic origin. This device allows him to make room for secondary causes without denying that all such causes depend

completely on God. Augustine does not allow that *bodies* can be agents in this sense, however, and here Sorabji identifies a third current of thought in addition to the doctrinal constraint common to both Christian and Islamic theology that “God is the only creator”, and Augustine’s seminal reasons: this is the Platonic doctrine that bodies are causally inefficacious in the sense that, although they can transmit motion by bodily collisions, they are incapable of *originating* motion—or, as Sorabji writes more colloquially: “only *souls*, not *bodies*, can originate motion; bodies merely transmit motion by banging into each other.”<sup>9</sup>

This extremely influential doctrine, whose force resounds down through the centuries, can be identified as one of the main sources for later occasionalist ideas in Christian thought, if not also Islamic theology too. It appears to have been upheld by the great majority of seventeenth century thinkers, including not only Descartes and the occasionalists, but More, Newton, Leibniz, Berkeley<sup>10</sup> and many others.

The main conduit, of course, was Neoplatonism, where the doctrine was expanded by Plotinus to encompass not only human souls, but also the Intellect and the One, as the only true agents. Naturally, the appeal of such a doctrine to Christian theologians was considerable, and it can be found soon after the time of Plotinus (c. 205-260 CE) in the writings of Augustine. For combining the idea that only God and souls can act, with the Christian doctrine that God is the only creator, Augustine argues that parents, farmers, builders and so forth do not create, but simply bring out what God has already created. He cites a passage from St. Paul (I *Corinthians* 3: 6-7): “I planted, Apollos watered, but God gave the growth. So neither he who plants nor he who waters is anything, but only God who gives the growth.” (Sorabji 1983, p. 303)

As Sorabji mentions, Augustine exploits this Biblical passage to introduce his doctrine of *seminal reasons*. These are the seeds planted in matter at Creation from which all natural kinds unfold over the course of history, containing the reasons for all the subsequent characteristic behaviour of each living thing. God has created all these seminal reasons in things at the very beginning: the unfolding of the natural kinds through history is God’s “giving the growth” to them. Although God creates new souls, he is the one who unites them to their bodies. There is nothing in the bodies that they interact with, however, that they actually create. In fact, Augustine argues, the lack of creative power of created beings cuts deeper. For

without God's continually sustaining created things in existence through every instant of their duration, all of nature would lapse into non-existence:

If the Creator's virtue were at any time to be missing from the created things which are to be governed, at once their species would go missing, and the whole of nature would collapse. For it is not like the case of a builder of houses who goes away once he has built, but whose work stands, even though he is missing and goes away. The world could not last like this for the duration of an eyeblink if God were to withdraw his governance from it.<sup>11</sup>

This is the doctrine that conservation of existing things is equivalent to God's continually creating them, the doctrine of continuous creation. As we shall see presently, this assumes a significant role in Cartesianism. As Sorabji observes, the comparison with the architect is repeated by Malebranche in his *Dialogues on Metaphysics* [*Entretiens sur la métaphysique*]. When Aristes suggests that in order for the world to be annihilated, it is not enough that God should no longer will it to exist, but that he would have to positively will it to cease to exist, Theodore replies:

You are not thinking, Aristes. You are making creatures independent. You judge God and His works by the works of men, men who are provided nature and do not make it. Your house subsists although your architect is dead. This is because its foundations are solid and it has no connection with the life of the person who built it. It depends on him in no way. But the ground of our being depends essentially on the Creator. Though the arrangement of certain stones depends in a sense on man's will in consequence of the action of natural causes, the product is not so dependent. But, as the universe is derived from nothing, it depends to such an extent on the universal Cause that, if God ceased to conserve it, it would necessarily revert to nothing. (Malebranche 1992, p. 228)

Commenting on this juxtaposition of passages, Sorabji writes that what Malebranche "adds, and what is missing so far as I know from Augustine, is the idea that continuation depends on continuous re-creation" (Sorabji 1983, p. 304). But there is no talk of re-creation here at all: indeed, the exchange between Aristes

and Theodore follows a passage in which Theodore makes it clear that the continued existence of the world is due to God's *continuous* willing that it should exist:

God wills that there be a world. His will is all-powerful, and so the world is made. Let God no longer will that there be a world, and it is thereby annihilated. For the world certainly depends on the volitions of the Creator. If the world subsists, it is because God continues to will that the world exist. On the part of God, the conservation of creatures is simply their continued creation. I say, on the part of God who acts. For on the part of creatures, there appears to be a difference, since, in creation, they pass from nothing to being whereas, in conservation they continue to be. But, in reality, creation does not pass away because, in God, conservation and creation are one and the same volition which consequently is followed by the same effects. (Malebranche 1992, p. 228)

Here Malebranche precisely denies any alternation of creation and annihilation. This is the crucial contrast with Islamic occasionalism, where nothing endures beyond a single time atom, not even duration itself. But what Malebranche's occasionalism has in common with that of al-Ghazālī, and where they differ from Augustine, is in the denial that created things have either natures or causal powers of any sort. Al-Ghazālī (perhaps also influenced by the ideas of the Greek Skeptics) argues that there is no necessary connection between the contact of a piece of cotton with fire and its burning: God could create either one without the other, but chooses not to. Malebranche agrees: the appearance of natures, and of necessary connections between cause and effect, are simply reflections of God's habits in willing things in similar ways. There are, of course, many differences as well as similarities between the views of Malebranche and al-Ghazālī, as was to be expected. But I do not want to dwell on these. My point is that the continuous creation doctrine does not presuppose time atomism; and while it is compatible with occasionalism, as in the case of Malebranche, it does not require it, as evidenced by the case of Augustine. This is of crucial importance for understanding the views of Descartes, who, as we shall see, acts as a crucial bridge between Augustine and Malebranche. And this in turn is of the utmost relevance to the origins of modern science, (the topic of this conference) to which I now turn.

### Descartes's Instantaneism

One of the most outstanding contributions that René Descartes made to modern science was the idea of an *instantaneous state of motion*. This he had already conceived in 1629-33 when he wrote his first treatise on physics, *Le Monde (The World)*, but after the Church's censure of Galileo that year, he decided that it would be unwise to risk publishing so explicitly Copernican a treatise. So he contented himself with publishing essays on Optics, Metereology and Geometry instead, and his ideas about the physics of motion made their public debut somewhat later in his *Principles of Philosophy* of 1644. In *The World* Descartes had appealed to the principle that "each individual part of matter continues always to be in the same state so long as collision with others does not force it to change that state"—a relatively uncontroversial conservative principle—but then insisted on regarding *motion* as a state. This is ostensibly paradoxical: a state is something that does not change, whereas a motion is the paradigm example of a change. Nevertheless, Descartes persisted, arguing that the school philosophers' ideas of motion (motion with respect to form, motion with respect to heat, motion with respect to quantity) were far more obscure than the geometrical notion he was advocating. In the *Principles* this argument is abandoned in favour of the following terse formulation:

*The first law of nature: each and every thing, in so far as it can, always continues in the same state; and thus what is once in motion will always continue to move.* (AT VIII A, 62; Descartes 1988, I, p. 240)

This is recognizably similar to Newton's famous First Law of Motion, which should not be too surprising since, as modern scholarship has established, Descartes's laws as stated in the *Principles* were indeed the source for Newton's own. The correspondence with Newton's Law of Inertia is even clearer when Descartes's first law is supplemented with his second:

*The second law of nature: all motion is in itself rectilinear; and hence any body moving in a circle always tends to move away from the centre of the circle which it describes.* (AT VIII A, 63; Descartes 1988, I, p. 241)

For here we have a decisive improvement over Galileo's idea of inertial motion, which he conceived as motion parallel to the surface of the Earth. Descartes, by contrast, realized that there was no circular inertia, only rectilinear inertia: even when a body is moving in a circle, "each of its parts individually tends always to keep moving along a straight line"—the tangent to the curve—so that "the action of these parts —i.e. the tendency they have to move—is different from their motion" (*World*: Descartes 1988, I, p. 96.) This is a momentous step, for it enables Descartes to give a completely different kind of analysis of motion. Instead of trying to understand the dynamics of the motion of a slingshot by looking at the motion over time, Descartes's idea was to look instead at the balance of the instantaneous tendencies at an instant: since the normal motion of the stone would be in a straight line, the circular motion produces a centrifugal force, and this is balanced by the action of the sling, which can be felt as a tension in the cord. Thus a curved path over time is broken down into a sequence of "freeze frames" in which all motions are rectilinear. This corresponds closely to Descartes's method in his *Geometry*, where complicated curves can be analysed in terms of the relations of  $x$ 's and  $y$ 's, where the  $x$ 's and  $y$ 's stand for straight line segments. (It is also an instance of the more general method announced in the *Discourse on the Method* of 1637, of breaking down any problem into simpler elements first, before proceeding to a solution.)

These notions—that instantaneous motion is a state, that motion is in itself rectilinear, and that forces can be reduced to instantaneous actions—constitute what I see to be the decisive foundational contributions Descartes makes to natural philosophy. They are not to be found in his predecessor, Isaac Beeckman, from whom he derives so much of his analysis of motion, including the law of inertia, as I have argued elsewhere (Arthur 2007). Particularly interesting with regard to the contrast with Beeckman (although I do not have the space to detail this here) is Descartes's condescension towards his former mentor's time atomism, and especially with his inability properly to treat the continuity of motion mathematically. Descartes, as I have also argued elsewhere (Arthur 1988), even if he is indifferent on the question of the composition of the continuum, is committed to the continuity of God's action, as is evident in the justification he gives for his second law, the third rule in *The World*:

It depends on God's conserving each thing by a continuous action, and consequently on his conserving it not as it may have been some time earlier, but precisely as it is at the very instant that he conserves it. So it is that of all motions, only motion in a straight line is entirely simple and has a nature which may be wholly grasped in an instant. For in order to conceive such motion it suffices to think that a body is in the process of moving in a certain direction, and that this is the case at each determinable instant during the time it is moving. By contrast, in order to conceive circular motion, or any other possible motion, it is necessary to consider at least two of its instants, or rather two of its parts, and the relation between them... Note that I am not saying that rectilinear motion occurs in an instant, but only that everything required to produce it is present in bodies at each instant which might be determined while they are moving ...

According to this rule, then, it must be said that God alone is the author of all motions in the world in so far as they exist and in so far as they are rectilinear; but it is the various dispositions of matter which render them irregular and curved. Likewise, the theologians teach us that God is the author of all our actions, in so far as they exist and insofar as they have some goodness, but it is the various dispositions of our wills that can render them evil. (AT XI, 44-46; transl. Descartes 1988, I, pp. 96-97, with slight revisions)

Moreover, Descartes argues in both his *Monde* and the *Principles*, if we understand God to be perfect in such a way that he is not only immutable in himself, but also in such a way that he always acts in an utterly constant and immutable manner, God's being the primary cause of motion also implies a certain conservation law:

*God is the primary cause of motion; and he always preserves the same quantity of motion in the universe.*  
 ... Thus God imparted various motions to the parts of matter when he first created them, and he now preserves all this matter in the same way, and by the same process that he originally created it; and it follows from what we have said that this fact alone makes it most reasonable to think that

God likewise always preserves the same quantity of motion in matter. (AT VIII A, 62; Descartes 1988, I, p. 240)

Thus was born the first conservation law of modern physics, one which was rapidly developed into the law of conservation of momentum by Wren, Wallis, Huygens, and Mariotte soon after Descartes's death, a development completed later by Newton, but which also led, more gradually, to the idea of conservation of energy. The capital point I wish to make here is that the unlikely basis for this fecund idea, as the above passage makes clear, is the idea that *God's conserving matter by a given force is not really distinct from his creating it with the same force at every single instant*: conservation, in short, is nothing but continuous creation

That idea had already been spelled out by Descartes in his *Meditations* of 1641, when it was published in Latin along with six sets of objections from leading philosophers of the time. The most prolix of these was by Gassendi—almost a line-by-line commentary. Indeed, Gassendi's objections were so voluminous that Descartes instructed his editor to leave them out (advice that was not obeyed), and Gassendi's replies to Descartes's replies grew into another large book. The passage in the Third Meditation and the ensuing exchange between Descartes and Gassendi, is worth repeating:

I do not escape the force of these arguments by supposing that I have always existed as I do now, as if it followed from this that there was no need to look for any author of my existence. For since every lifetime can be divided into countless parts, each of which in no way depends on the others, it does not follow from my having existed a short while ago that I must exist now, unless there is some cause which creates me as it were again at this moment—that is, conserves me. For it is quite clear to anyone who attentively considers the nature of time that the same force and action is plainly needed to conserve any thing at each moment it endures as would be needed to create it anew if it did not yet exist. Thus the fact that there is only a conceptual distinction between conservation and creation is another of those things that are made evident by the natural light.<sup>12</sup>

To this Gassendi objected that the parts of a subject's duration, being merely external, make no difference to its creation or conservation. Further, he objected to Descartes that his existence is contingent from one

moment to another “not because a cause is required to create you anew, but because there is no guarantee that there is not some cause present within you which might destroy you, or that you do not have some infirmity within you which would finally result in your demise.”<sup>13</sup>

This last objection contains the kernel of Gassendi's difference of opinion with Descartes, and it is surely the original of the words that Malebranche puts in the mouth of Aristes: while Gassendi regards it as necessary for every existent to have a cause which brings it into existence, he does not see it as needing any cause to keep it in existence. Once a substance is created, then (to use Gassendi's metaphor) the waters of time flow past it until some further cause takes it out of existence. To this Descartes replies:

When you deny that we *continually need the influence* [literally, “inflow”] *of the first cause for our conservation*, you are denying a thing which all the Metaphysicians affirm as self-evident, but which the uneducated often fail to think of, because they attend only to causes of *coming to be* [*secundum fieri*], but not to those of *being* [*secundum esse*]. Thus an architect is the cause of a house and the father of his child only in the sense of being the causes of their coming into being; and hence, once the work is completed it can remain in existence quite apart from the cause in this sense. But the sun is the cause of the light which it emits, and God is the cause of created things, not only *secundum fieri*, but also *secundum esse*, and so he must always influence [*literally*, “flow into”] the effect in the same way in order for it to be conserved.

And this is clearly demonstrated by what I explained about the independence of the parts of time, which you try in vain to evade by proposing “the necessity of the sequence which exists among the parts of time” *considered in the abstract*. It is not this that is at issue here, but rather the time or duration of the enduring thing, and you will not deny that the individual moments of this time could be separated from those next to them, that is, that the enduring thing could at any single moment cease to exist.<sup>14</sup>

Here Descartes makes clear the extent to which his doctrine of continuous creation is indebted to Augustine, not only using the latter's example of the architect, but even his terminology. Nevertheless, like

Augustine, although he attributes all true creative activity to God, he does not go so far as to deny actions to souls (as the above quotation from *The World* concerning the dispositions of our wills indicates); and although God is the primary cause, Descartes does not deny real secondary causes, such as the collisions of surrounding material bodies that prevent a body from following its God-given inertial motion. Thus he is no more an Occasionalist than Augustine. But by the same token, since Descartes is just as committed as Augustine is to God's *continuous* creative action, and thus to the continuous existence and duration of created things, it cannot be said that his instantaneism commits him to the existence of time atoms any more than Augustine's claim that the world would not last for an eyeblink without God's governance commits him to that view.

## Conclusion

I have now run out of space to make any further remarks about the origins of Cartesian occasionalism, so I will try to be brief. We have seen that Descartes's bodies, like Augustine's, have a continuous duration for as long as God chooses to continuously create them. We have also seen that for Descartes a body's motion does not consist in its simply being in one place at one instant, and another at a subsequent instant, as it would on a time-atomistic rendering: a body in motion is distinguished by its instantaneous state of motion, with a corresponding force of motion, its action, *conatus*, or tendency to move. But we have also seen that it is God who supplies this action directly, by the force of his sustaining the body in its state of existence. For a Cartesian body consists only in extension, and there is nothing in the nature of a body as an extended thing to support such a force. Therein lies a tension in Cartesian philosophy. For on the one hand, Descartes is a vociferous opponent of substantial forms, and so he would have no commerce with Augustine's seminal reasons in things. In fact, his analysis of the essence of bodies as consisting in pure extension means that he upholds the Platonic thesis of the passivity of bodies in a particularly severe form. On the other, however, he appears not to have denied secondary causes in the form of bodily collisions, nor the ability of mind-body complexes to initiate motion, despite his accentuation of the causal inertness of bodies. But this was taken up by his occasionalist followers did deny secondary causes. Louis de la Forge (1632-1666) and Claude Clerselier (1632-1666) argued that, given the passivity of matter, the only cause of the

communication of motion among bodies consistent with Cartesian principles is God himself. Although these two still allowed a role for finite minds, Geraud de Cordemoy (1626-1684) extended this line of reasoning to all finite substances, arguing that since God is the only source of action in bodies, force must be identified with the action of his will—and created souls, remember, on the Augustinian view, “do not create, but only make use of the forces supplied by God to bring forth what he has already created”. No longer, however, can these forces in bodies be identified with substantial forms or seminal principles. Malebranche built on these arguments, and supplemented them with arguments of the nominalists against the intelligibility of the a necessary connection between cause and effect. Here we have a full doctrine of occasionalism, with plenty of parallels with that of al-Ghazālī. But Malebranche does not adopt time atomism in order to arrive at his view. Instead he adapts Augustine to Cartesianism by dispensing with the latter’s seminal reasons and substantial forms; and then following his fellow Cartesians in their insistence that since force in bodies is reduced to God’s will, there is no other cause but this.

So although Malebranche’s thought is constrained by the some of the same epistemic vectors as the Ash’arites’, his conclusions are reached as a consequence of the Augustinian-Cartesian doctrine of continuous creation, together with the extreme Cartesian interpretation of the passivity of bodies and the origin of forces in the will of God. From these premises it follows—without having to assume time atomism—that there is no necessary connection between the state of the world at one instant and its states at subsequent instants. But even if, as appears to be the case, *kalām* is not an immediate source for Cartesianism, the whole European tradition is nonetheless inseparable from the Islamic, just as the Islamic was not isolated from the Indian, so that occasionalism is well characterized by Arun Bala’s phrase as originating in a “dialogue of civilizations”.

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## References

- R. T. W. Arthur. "Continuous Creation, Continuous Time: A Refutation of the Alleged Discontinuity of Cartesian Time". *Journal for the History of Philosophy* **26**, no. 3 (July 1988): 349-375.
- R. T. W. Arthur. "Beeckman, Descartes and the Force of Motion". *Journal for the History of Philosophy*, **45**, no. 1 (January, 2007): 1-28.
- Arun Bala and George Gheverghese Joseph. "Indigenous knowledge and western science: the possibility of dialogue". *Race and Class* **49** (2007): 39-61
- Arun Bala. *The Dialogue of Civilizations in the Birth of Modern Science*. New York/Basingstoke: Palgrave Macmillan, 2006.
- Cliff Burgess and Fernando Quevedo. "The Great Cosmic Roller-Coaster Ride". *Scientific American*, (November 2007): 52-59.
- René Descartes. *Oeuvres De Descartes*, 11 vols. Ed. Charles Adam and Paul Tannery. Paris: Librairie Philosophique J. Vrin, 1983.
- René Descartes. *The Philosophical Writings Of Descartes*, 3 vols. Translated by John Cottingham, Robert Stoothoff, and Dugald Murdoch. Cambridge: Cambridge University Press, 1988.
- Fakhry, Majid. *Islamic Occasionalism and its Critique by Averröes and Aquinas*. London: George Allen and Unwin, 1958.
- Majid Fakhry. *A History of Islamic Philosophy*. 3<sup>rd</sup> edition. (1<sup>st</sup> edition 1970). New York/Chichester: Columbia University Press, 2004.
- Abū Hāmid al-Ghazālī. *The Incoherence of the Philosophers (Tahāfut al-falāsifa)*, trans. Marmura, Povo. Utah: Brigham Young University Press, 2002.
- Damien Keown. "Sautrāntika". *A Dictionary of Buddhism*. *Encyclopedia.com*. (2004; accessed 10 Apr. 2009) <<http://www.encyclopedia.com>>.

Sukjae Lee. "Occasionalism." *Stanford Encyclopedia of Philosophy* (2008):

<<http://plato.stanford.edu/entries/occasionalism/>>

D. B. MacDonald. "Continuous re-creation and atomic time in Muslim scholastic theology." *Isis* **9** (1927):

326-44.

Nicolas Malebranche. *Selections*. Ed. Steven Nadler. Indianapolis: Hackett Publishing Company, 1992.

Nicolas Malebranche. *The Search for Truth and Elucidations of the Search for Truth, (De la recherche de la vérité,*

1674–75). Trans. Lennon and Olscamp. Cambridge: Cambridge University Press, 1997.

Steven Nadler. "Cordemoy and Occasionalism," *Journal of the History of Philosophy* **43** (2005): 37-54.

Lee Smolin. "Atoms of Space and Time". *Scientific American*. (January 2004): 66-75.

Richard Sorabji. *Time, Creation and the Continuum: Theories in Antiquity and the Early Middle Ages*. Ithaca, N.Y.:

Cornell University Press, 1983.

Harry Wolfson. "Nicolaus of Autrecourt and Ghazali's Argument Against Causality", *Speculum*, 44 (1969):

234–38.

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<sup>1</sup> For approachable accounts, see (Burgess and Quevedo 2007), and (Smolin 2004), resp.

<sup>2</sup> This example was given by Maimonides (1135-1204) in his exposition of *kalam*, and, according to (Sorabji 1983, p. 279) a variant of it had appeared earlier in the writing of the Ash'arite theologian al- Ghazālī (1058-1111). The example of the dye is Maimonides'.

<sup>3</sup> Cf. Sorabji's discussion in (Sorabji 1983, p. 386).

<sup>4</sup> According to the Encyclopedia Britannica, 2009, the Sautrāntikas also held that there is nonetheless "a transmigrating substratum of consciousness that contains within it seeds of goodness that are in every person."

<sup>5</sup> (Sorabji 1983, p. 397). The reference is to Isaac Israeli, *de Elementis*, p. 8a, ll. 11-14; cf. (Wolfson 1976, pp. 472-86).

<sup>6</sup> (Sorabji 1983, p. 396): Aristotle *Physics* 1.5, 188a22-26, 3.5, 205b32-33.

<sup>7</sup> See (Wolfson 1969, pp. 234-8), who claims that Autrecourt was well acquainted with the ideas of al-Ghazālī; this issue among others is discussed in the general account of Occasionalism given in (Lee 2008).

<sup>8</sup> In the *Search for Truth* Malebranche appeals, in preference to Aristotle, to Augustine, “that great saint [who] recognized that the body cannot act upon the soul, and that nothing can be above the soul, except God” (VI, 2, iii, OC 2: p. 310); (Malebranche 1997, 446-7).

<sup>9</sup> (Sorabji 1983, p. 305): he cites *Phaedrus* 245c-246a, *Laws* 896a-897b.

<sup>10</sup> The passivity of bodies, in fact, was one of George Berkeley's main premises in denying them any mind-independent existence.

<sup>11</sup> Augustine, *de Gen. ad Lit.* 4.12.22; quoted from (Sorabji 1983, pp. 303-304).

<sup>12</sup> Descartes, *Meditations* 3: AT VII, pp. 48-49; my translation: cf. (Descartes 1988, II, §33).

<sup>13</sup> Gassendi, in Descartes, *Objections and Replies*: AT VII, p. 301; my translation: cf. (Descartes 1988, II, pp. 209-210).

<sup>14</sup> Descartes, *Objections and Replies*: AT VII, pp. 369-70; my translation: cf. (Descartes 1988, II, pp. 254-55) and (Arthur 1988, p. 362).