Is the Universe One or Many?

By Scott Alexander

At the end of Maimonides' account of the first three Muslim arguments for the incorporeality of God (Guide 1:76), he makes an eye-catching statement. Referring to their portrayal of the cosmos as composed of atoms, and not, as he thought, one indivisible organism, he responds in disgust: "...in man's imagination the substance of the *heavens may be torn or rent asunder*" (*ha-shamaim sovel ha-kria v'ha-bkia /* אלמסא יקבל אלאנכֻראק ואלאנשקאק).

Maimonides makes statements like this to signal the existence of a problematic, what I call a Maimonidean knot, the sublime tangle where you pull the strings forever, learning much, but never untying.

He had believed, with Aristotle, that the heavens were made of the fifth element, sometimes called quintessence or aether. This element was completely unlike the four sublunar elements, earth air fire and water. Indeed, that was the very nature of the fifth element, its unlikeness. Unlike the terrestrial elements, the fifth element was one continuous indivisible body in circular motion. It could never be "torn or rent asunder."

Maimonides saw the universe as a single ensouled organism (Guide 1:71). This helped him to solve the question of how the many come from one God. God only creates one thing, this living organism, the universe.

But this unlikeness of the cosmic aether split the universe. By contrast, his opponents, the Muslim theologians (the Kalām) unified the universe by making the cosmos of the same atomic substance as our earth. Maimonides' objection was that, unlike the divisible terrestrial things, the sphere was one whole coherent indivisible body which could not be cut up into atomic parts. The price he paid for the coherence of the sphere was its unlikeness to anything on earth.

The Kalām achieved their unity by reviving the old rejected pre-Socratic atomism of Democritus and Epicurus. In that conception there were only two things, atoms and chance, in which chance brought atoms together through random collisions, not God. Maimonides did not need to remind his rabbinic audience of the atheist implications of the Epicurean atomic doctrine ("Apikoros").

Maimonides' critique of Kalām atomism was that they sought to make the hidden heavens like the revealed earth. They could not know what the heavens were made of. Their atomism was a mere projection of their imagination, not of reason. It was, he scoffed, as though the "the substance of dung" were the same as "the substance of the sun." He regarded this as absurd.

It wasn't just that the Aristotelian cosmos was made of two different classes of element. All substances in Aristotelian physics were also conceptually divisible into matter and form. Once again, the Kalām deployed atomism as a battering ram against this Aristotelianism division by replacing it with one atomic structure. And again, Maimonides argued that by ignoring the hidden structures of things, the Kalām imposed their knowledge of the revealed on the concealed, committing the fundamental sin of the imagination.

Before Maimonides' time it is important that R. Saadia Gaon (882-942) had, like the Kalām, rejected the existence of a fifth element (*The Book of Beliefs and Opinions*, *Emunot v'Deot*, Yale, 1976, Rosenblatt translation, 70 – 72, 1:3, eighth theory). R. Saadia was close to being "Jewish Kalām," at least with respect to the early Mutazila Kalām, but without accepting atomism. R. Saadia returned to the pre-Socratics in his own way by resuscitating the elemental fire of Anaximander (c. 625 BCE – c. 545 BCE) and Empedocles (c. 495 BCE – c. 435 BCE) as the matter of the heavenly sphere.

How seriously R. Saadia took this is debatable, since his only declared purpose in making the point was to argue against a version of Neoplatonism in which "the heavens are the makers of the bodies" and against the claim that those heavens were a "fifth thing." According to those Neoplatonic thinkers, the world emanates from a special kind of eternal heavenly matter that is unlike terrestrial matter. Since R. Saadia was the great exponent of divine creation *ex nihilo*, he needed to disprove any competitors of that theory. He did this by rejecting the existence of a separate creative fifth element altogether. The celestial sphere was made of fire, and this fire was no different from the element of fire that God had created on earth.

For R. Saadia and for the Kalām, the fundamental division does not occur within the universe, but only between the universe and its Creator. In the Kalām version there are only two things, God and the atoms He continually creates, while for R. Saadia those two things are God and the single universal substance underlying the four elements that God created.

Maimonides, of course, was also a creationist. He did not accept the eternity of the heavens (See *Maimonides on the Origin of the World*, Kenneth Seeskin, 2007, Northwestern University, where Professor Seeskin torpedoes the contrary view of many modern Straussian commentators). The deep dynamic structure of things was, for Maimonides, the interaction of potentiality and limit (as expressed through matter and form), as it was for Plato and Aristotle.

It was precisely those Maimonidean/Aristotelian divisions between aether and earth, and between matter and form, that Maimonides' greatest critic, R. Hasdai Crescas (1340-1411), sought to remove. Without explicitly accepting either the Anaximandrean or the Democritean solutions, he directed his corrosive attack against this divide in the heart of the world.

Was R. Crescas able to overcome the problematic of a split universe?

The best way to begin to answer that question is by reviewing the findings of Harry Austryn Wolfson's *Crescas' Critique of Aristotle* (Harvard 1929). I consider it the great achievement of 20th century American philosophy. In that work, Wolfson displayed the spectrum of medieval and late ancient religious philosophy through the medium of Crescas' difficult work *Or Adonai* ("*The Light of the Lord*").

Or Adonai was itself a critique of the 26 propositions of Aristotelian science with which Maimonides' introduced the second volume of *The Guide of the Perplexed*. Wolfson had applauded Maimonides' propositions, saying that "within the limited range of 26 propositions he contrived to summarize in compact and pithy form the main doctrines of Aristotle, which, supplemented by some from Avicenna, formed the premises upon which are built his proofs for the existence, unity and incorporeality of God."

Crescas used Maimonides' summation as his target for the destruction of the Aristotelian worldview. He used Aristotelian arguments to defeat Aristotle. This attack doomed scholasticism. Wolfson argued that Crescas' impact on early Renaissance scientific thought was decisive.

Wolfson concluded his encyclopedic labors in *Crescas' Critique of Aristotle* with an incisive essay on the achievements of Crescas. I will look at some selections from Wolfson's essay to grasp the problematic opened up by Maimonides' remark that "...in man's imagination the substance of the heavens may be *torn or rent asunder.*"

Though I appreciate the force of Wolfson's logic, I do not concur with him, as I will explain. When Wolfson wrote the book he was not aware that he himself stood on the cusp of a scientific revolution, which would make some of his core conclusions obsolete.

Wolfson begins with a broad statement that takes in the whole of philosophic development from the pre-Socratics through the Copernican revolution (page 118):

> "We thus now get a clear view of Crescas' conception of the universe—an infinite space within which are floating an infinite number of worlds. It is perhaps not altogether a new conception. It had been adumbrated by certain Greek philosophers such as the Atomists, and before them by many others up to Anaximander, all of whom believed in the existence of innumerable worlds in an infinite void. But it is exactly these views of ancient Greek philosophers which about two centuries after Crescas were revived by [Giordano] Bruno and through him were introduced into modern thought. There is, however, the following difference between Bruno and Crescas. Bruno's worlds are

> Copernican worlds, whereas the worlds of Crescas, for the lack of any statement by him to the contrary, are still Ptolemaic worlds, with stationary earths at the centre, enclosed by a number of concentric spheres."

The Ptolemaic worldview, which lasted up until the time of Copernicus and Giordano Bruno (1548-1600), was subscribed to by most of the medievals, including Maimonides. That universe had earth at its center while the heavens, with their sun, revolved the earth. Crescas retained that sphere, but released its outer boundary, allowing it to coexist with innumerable other systems centered on their respective earths.

Wolfson continues:

> "Another important point on which Crescas differs from Aristotle is what may be described as the principle of the continuity and homogeneity of nature. In Aristotle's conception of the universe, despite his assumption of an interconnection between the various parts of the universe and a continuity of motion running throughout its parts, there was still a certain break and discontinuity and heterogeneity in nature. This break occurs at the juncture of the translunar and the sublunar parts of the universe, and as a result of it nature becomes divided into two distinct realms."

When he says that Aristotle assumed a "continuity of motion" and an "interconnection between the various parts of the universe" he refers to the notion expressed powerfully by Maimonides that the universe is one living organism (Guide 1:72). But this medieval worldview was split by the duality that kept breaking through that unity. If that unity were broken, then the One created more than one thing, in violation of the rule that from what is one and simple only one thing comes, *ab uno simplici non est nisi unum.* Wolfson explains the meaning of this break in the cosmos:

> "The break is of a twofold kind. In the first place, there is a difference in the nature of the motions which respectively characterize the sublunar and the translunar bodies. The rectilinear motion of the sublunar elements is described as natural, being brought about by certain centrifugal and centripetal forces which act upon the four elements and bring about their refluxes to their natural places. In the translunar elements, however, the motion, which is circular, is described as voluntary and appetitive, being brought about by a [119] principle of motion inherent within the celestial bodies, acting upon them from within after the manner of a soul."

Wolfson is talking about the theory of the *proper places* of the elements. The basic nature of all things is their motion, and the motion of the four terrestrial elements, earth air fire and water, is their direct return to their proper places ("refluxes") whenever they have become dislodged.

Earth, at the center, is the heaviest of elements, so that whenever it becomes dislodged from its place it must return directly to that center, in as straight a downward path as possible. This same rule of motion must be followed by the next lightest sphere, water, moving to its place, then the sphere of air, and, uppermost, the sphere of fire. Their natural movement to their proper places is always a vertical movement, although winds, waves, volcanoes, and the motion of the heavenly spheres constantly oppose this vertical elemental motion.

The heavens are different. We never see the heavenly beings move in a vertical path, but always in circular motion. That is because they are always in their proper place, the place of their rotation.

All things in the Aristotelian/Ptolemaic universe must move in these two natural movements, vertical and circular. The key to their difference is the cause of their separate motions. The heavens move because they are ensouled. They turn because they seek to return to their maker, but being physical, they never can. The terrestrial elements, by contrast, have no soul and no form of life.

> "In the second place, there is a difference in what may be called the ultimate constitution of the sublunar and translunar elements. The four elements out of which the sublunar bodies are constituted are fundamentally different, according to Aristotle, from the aether which constitutes the heavenly bodies. While there may be some question as to whether Aristotle regarded the aether as a fifth element, it is certain that he regarded it as totally different from the sublunar elements. The former is constant, incorruptible and eternal; the latter are changeable, corruptible and transient."

Thus Wolfson's second break in the unified cosmos is the different composition of the terrestrial and heavenly elements. The Aristotelian heavens will always be the same while the earthly things never stay the same. He continues:

> "....Logically, the break which these two differences between the sublunar and translunar bodies have produced within Aristotle's universe is analogous to the break which would have been produced in our conception of the universe, if we had assumed that the law of gravitation operates in one part of the universe but not in another and that the ultimate constitution of the matter of the terrestrial bodies is intrinsically different from that of the celestial bodies."

And so, the problem is stated. But notice the assumption Wolfson made about the nature of our modern view of the universe, which seems to imply that there is only one law of attraction, and does not yet recognize that the late 19th century's static view of the universe was itself

disintegrating. Soon the physicists would seek some way to unify their four new unruly forces: gravity, electromagnetism, the atomic "strong" force and the subatomic "weak" force.

> Now, this discontinuity and heterogeneity in nature is eliminated by Crescas. As over against Aristotle's distinction between the nature of the circular motion of the heavens and the rectilinear motion of the sublunar bodies, Crescas argues that such a distinction does not exist, but that the motion of both [120] celestial and terrestrial bodies is what may be described as *natural*. While this view, as we have shown, is not altogether original with Crescas, still his repeated emphasis of it is of the utmost importance, for it was not until astronomers had rid themselves, as did Crescas, of the Aristotelian principle that the motion of celestial bodies was unlike that which prevails on earth that any real progress could be made in the proper understanding of celestial mechanics.

Wolfson had said that in the Aristotelian theory the motion of the spheres was "voluntary and appetitive," in the sense that the ensouled spheres willed their own motion, out of an unfulfillable desire to physically approach God. Therefore, they rotate in place, but entirely of their own volition. Crescas rejects this theory, and substitutes the more plausible suggestion that the motion of the sphere is "natural," i.e., from its own elemental composition.

With respect to the heavens, R. Saadia shared Crescas' desire for a single field theory. When Saadia argued that the heavenly matter is fire, rather than aether, he had said that

> "...the natural motion of fire itself is circular. The proof is the motion of the heaven, which is pure fire, as is clearly proved to us by the perceptible heat of the sun. As for this apparently upward motion of the fire, that is entirely accidental, its purpose being to enable the fire to emerge from the sphere of the air. Once, however, it has emerged from the sphere of the air and reached its own source, it resumes its circular motion."

Leaving aside the antique quality of Saadia's speculative cosmology, we find that, like Crescas, he sought a cosmological theory of natural unity, in which the heavens would no longer be an ensouled power against God.

Crescas also rejected the theory that the interaction of matter and form produced substances.

> "Then he also denies that there is any distinction between the matter of the celestial spheres and the matter of the sublunar elements, insisting that *they are both alike, that in both cases matter is tridimensionality and has actual existence without having its actuality conferred upon it by form* (my emph., throughout). By this Crescas does away with what is the essential characteristic of Aristotle's theory of matter and form, though he retains Aristotle's vocabulary. Furthermore, in his discussion of this question we get

> a glimpse of the historical development of the view, which ultimately resulted in the identification of matter with extension in the philosophy of Spinoza."

By breaking from Aristotle's system of generation and corruption caused by the interplay matter and form, Crescas returned to repressed aspects of pre-Socratic thought. But this return of the repressed opened religious philosophy to pantheistic destruction in Spinoza. It was a break which a more mature Wolfson would come to deplore. He continues:

> "Historically, in Greek philosophy, the rival of Aristotle's theory of matter and form was Atomism. In modern philosophy, too, the emancipation from Aristotle's theory of matter and form was a gradual movement in the direction of atomism, which was ultimately established experimentally by Dalton [1766 – 1844]. Crescas' criticism of Aristotle, on the face of it, would seem to be outside this movement. He does not directly espouse the atomistic theory, although this theory was known in philosophic Hebrew literature through the Moslem Kalām and an allusion to it is found in Crescas himself. All he does, it would seem, is only [121] to modify the accepted interpretation of Aristotle's theory of matter and form. Still if we look closely into Crescas' reasoning we shall find that underlying it is really an attempt to revive Atomism. For the atom is distinguished from the Aristotelian matter not only by its indivisiblity but also—and this is of greater importance —by the actuality of its existence."

"Actuality" in opposition to potentiality. In Aristotle's theory of the generation and corruption of all things, matter always moves from its natural state of pure potentiality towards actual existence. Three elements are necessary for change to occur: the original state of *potency*, the *privation* met with in matter not yet formed, and the ultimate state of *actuality* when form replaces this privation. This tripartite opposition is inherently unstable and this instability causes the constant cycle of change in all things. The actual/potential distinction is one more Aristotelian division that Crescas chafed at, according to Wolfson.

> "As a result of this latter characteristic of the atom [i.e., its actuality], all the forms that the atom may assume are considered by the Atomists as being only what Aristotle would call accidents. The essential fact, therefore, about atomism, as a view opposed to Aristotle's theory of matter and form, is not that it does away with the infinite divisibility of matter but rather that it does away with the potentiality of matter and consequently also with form as a principle of actualization."

Here Wolfson refers to an entirely different distinction in physics. This is the classification of all things into substance and accident. A substance is anything that exists through itself. The accidents are the semi-stable and unstable manifestations and characteristics of a substance.

That I remain who I am is due to my *substantial* existence. My hair color and length are *accidents*.

The critical point is that the substance and its accidents are *actual*, because they have no *potential* aspect. The atomists that Wolfson refers to, which include the Muslim Kalām theologians, sought to substitute substance and accident for matter and form. The result, of course, was to deprive things of their natural dynamism. This was not displeasing to the Kalām, which sought to eliminate any power, such as nature, which appeared to be external to Allah. Wolfson continues:

> "That this was considered the essential fact about atomism [its actuality] is attested by the various restatements of the atomistic theory, which have come down to us from Maimonides and others [especially in his attacks on the Kalām]. Now, this is exactly what Crescas has done to matter. He has deprived it of its potentiality. He has made it to have actual existence. He has thus also abolished form as a principle of actualization. Form, therefore, becomes only an accident. Crescas himself was aware of these far-reaching consequences of his view, but wishing to retain the Aristotelian vocabulary he argues that form, though no longer a principle of actualization and hence only an accident, may still retain its Aristotelian name, because of some other differences that may be discovered between it and all the other accidents."

Wolfson concludes [p. 127]:

> "In a larger sense, we may see in Crescas' critique of Aristotle the fluctuation of the human mind at the point when it began to realize that reason, which had once helped man to understand nature, to free himself from superstition and to raise his desultory observations to some kind of unity and wholeness, had itself in the system of Aristotle gone off into the wilds of speculation and built up an artificial structure entirely divorced from nature. A new way of returning to nature was sought, but none was as yet to be found. Crescas had passed the stage when man condemned reason; he had reached the stage when man began to doubt reason, but he had not yet entered upon that stage when man learned to control reason by facts."

On the whole, it is hard to disagree with this conclusion. But had Enlightenment atomism, the new Epicureanism, really rubbished Aristotle's form/matter physics?

Even as Wolfson wrote this, the ground was shifting beneath him. Just as Crescas balanced on a paradigm shift, so Wolfson was similarly unaware of the latest scientific revolution. But when the paradigm shifts we look back at the prior conventional wisdom as musty antique. (*The Structure of Scientific Revolutions*, Thomas Kuhn, Chicago, 1962).

We know, because Wolfson tells us, that he completed the *Crescas* book, including the critical manuscript of *Or Adonai*, with its apparatus, its English translation, the encyclopedic commentary, and his book length essay, in 1918. It was his doctoral dissertation at Harvard, where he went on to become America's first and longest-serving professor of Judaica. He was unable to secure a publisher, however, until 1927, and the book did not see the light of day until 1929.

A lot happened in those years to the theory of atomism, which Wolfson had said was "established experimentally by Dalton" over 100 years before.

In 1900, Max Planck proposed the quantum theory, by which energy consists of individual units called *quanta*. In 1915, Einstein published the general theory of relativity, which examined how gravity changes light, and how mass distorts space. In 1924, electrons were shown to behave as waves as well as particles. Quantum mechanics was founded by Werner Heisenberg as "matrix mechanics" in 1925, and by Erwin Schrödinger as "wave mechanics" in 1925.

The result was the destruction of the paradigm of calculable interactions of atomic bodies, since these theories introduced uncertainty and probability in our understanding. The paradigm has shifted again with the introduction of string theory.

What, after all this, becomes of the Aristotelian/Maimonidean theory of matter and form, potentiality and actuality? Werner Heisenberg framed the situation well. He wrote that atoms were "not as real" as we had been led to think.

> "In the experiments about atomic events we have to do with things and facts, with phenomena that are just as real as any phenomena in daily life. But atoms and the elementary particles themselves are *not as real*; they form a world of potentialities or possibilities rather than one of the things or facts...The probability wave of Bohr, Kramers, Slater...means a tendency *for* something. It's a quantitative version of the old concept of '*potentia*' from Aristotle's philosophy. It introduces something standing in the middle, between the idea of an event and the actual event, a strange kind of physical reality just in the middle between possibility and reality.' (p.41). And: 'If we compare this situation with the Aristotelian concepts of matter and form, we can say that the matter of Aristotle, which is mere '*potentia*,' should be compared to our concept of energy, which gets into 'actuality' by means of the form, when the elementary particle is created," (*Physics and Philosophy* , New York, 1958, 1999, pp. 134, 160).

Against this dynamic Aristotelian potentialism, Maimonides' critics had defended the static actuality of Kalām atomism. They removed the potentiality from matter, reducing it to a single

type of material extension. This encouraged the successes of science up to just before the era of quantum mechanics. Werner Heisenberg shows us that in the quantum physics era we have reached the limits of this reductionism.

Since Wolfson thought it necessary to compare *ad absurdum* the Aristotelian cosmos to our modern universe by the metaphor of two different forms of gravitation, I will try to voice the Maimonidean form/matter opposition to atomism also in metaphor, but of a social/political kind.

The atomic universe of only God and atoms resembles the brutal unity achieved by socialisms emerging in Germany, Russia and China in Wolfson's time. There were also only two things, the party chief and everyone else, the atomized "masses."

Political pluralism in unity, like Maimonides' pluralism in a single universal organism, is more stable, more humane, and a better reflection of the way things really are.

Once again, we find that Maimonides turns out to be more right than his multitude of critics.

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There is one more point to bear in mind. In his summary statement, Wolfson articulated a theory of history. He had said: "A new way of returning to nature was sought, but none was as yet to be found. Crescas had passed the stage when man condemned reason; he had reached the stage when man began to doubt reason, but he had not yet entered upon that stage when man learned to control reason by facts."

Wolfson was still a very young man when he wrote this. He was imbued with certain evolutionary and historicist doctrines flowing from the 19th century concern with social Darwinism, ultimately stemming from Hegel. But in his actual confrontation with the texts of medieval religious philosophy as well as his experience of philosophy's 20th century crisis, he turned away from this approach. In his preface to the essay collection *Religious Philosophy*: *a Group of Essays* (Harvard 1961), he wrote the following:

> "If we are to follow the *conventional method* of dividing philosophy into ancient, medieval, and modern, then medieval philosophy is to be defined as that system of thought which flourished between Greek pagan philosophy, which knew not of Scripture, and that body of philosophic writings which ever since the 17th century has tried to free itself from the influence of Scripture. Medieval philosophy so *defined* was founded by Philo." (Wolfson's emphasis)

Wolfson wrote this paragraph as a protest against the historicist Hegelian notion implied in those time divisions. For the mature Wolfson, that Philonic scriptural medieval philosophy was superior just because it had freed itself from paganism. That era brought us to philosophy's pinnacle.

In Wolfson's later writing, Maimonides becomes far more important for religious philosophy than R. Crescas and R. Yehuda HaLevi. When he was younger he still partook of that suspicion of Maimonides' Guide that he had absorbed at school in the Slobodka Yeshiva. He had written his first major essay on R. HaLevi's superiority to Maimonides in 1912. He had come to discount that essay, which, according to his editor Isadore Twersky, "he used to refer to fondly as an 'undergraduate essay.'" His return to the texts themselves inevitably brought him back to the Philonic philosophy, and to Maimonides' Guide.

(Twersky, page VII, Editors' Forward, Volume II of his collection of Wolfson's essays, *Studies in the History of Philosophy and Religion,* Harvard 1977. See, on all of this, the excellent *Philosophers and Scholars, Wolfson, Guttman, and Strauss on the History of Jewish Philosophy*, by Jonathan Cohen 2007, Lexington books, the entire section on Wolfson but particularly pages 32, 78 and 79.)

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