

GUIDE 2:8 MAIMONIDES REJECTS THE MUSIC OF THE SPHERES

Overview

Before the great paradigm shift of the sixteenth century's Copernican revolution from a geocentric cosmos of surrounding spheres to a heliocentric system of planets, there was a prior cosmological revolution from ancient pre-Aristotelian views. Maimonides addressed this ancient paradigm shift, specifically in the context of the Biblical and Pythagorean portrayals of the heavens, by focusing on one peculiar problem which unlocked the constellation of issues that confront religion in its eternal duet with science, the problem of the "music" of the spheres.

OPINION VS. KNOWLEDGE

"One of the ancient opinions that were widespread among the philosophers and the general run of people consists in the belief that the motion of the spheres produces very fearful and mighty sounds." (Guide 2:8, Pines trans., p. 267.)

It is a conceit of the philosophers that the task of philosophy is the replacement of opinion about the nature of things with the knowledge of those things (Leo Strauss, *What Is Political Philosophy?* p. 11, Free Press, Glencoe Illinois). Maimonides similarly contrasted the *opinion* of the crowd with true knowledge concerning the things of religion.

Maimonides had expressed this in Arabic terminology as the problem of *taqlīd*, the uncritical adoption of traditional opinion in religion. It meant the acceptance of doctrinal authority without questioning its scriptural basis or rationale (See my chapter-essay on Guide 1:33). *Taqlīd* could also mean that those who had not studied those fundamental roots *must* follow the guidance of those who had. *Taqlīd* demanded literalism *bi lā kayfa*, "without asking how," especially regarding *Qur'anic* anthropomorphism. Something like this occurred even among Rabbis, who were criticized by R. Bakhya Ibn Pakuda (1040 CE), writing in Arabic well before Maimonides' time:

"I asked one of those who are thought to be Torah scholars some of the questions on the science of the inner life...and he answered me that [relying on] tradition can substitute for independent thought in all these matters."

This suggests some rabbinic acceptance of *taqlīd*, in its strongest version. R. Bakhya rejected this:

"My answer to him was that this is acceptable only in the case of ...children and uneducated men (*khasrei ha-daat*, limited intellect) who, because of limited perception and comprehension, cannot reason on their own. But whoever has the intellectual capacity to verify what he receives [from tradition] and yet is prevented from doing so by his own laziness, or because he takes lightly God's commandments and Torah, he will be punished for this and held accountable for negligence." (*Hovot ha-Levavot, Duties of the Heart*, trans., by Daniel Haberman, Feldheim, 1996, vol. 1, p. 25; *cf.*, Maimonides' similar statement in Guide 1:33)

What is striking about Maimonides' opening passage in our chapter, Guide of the Perplexed 2:8, is that he pointedly *includes* the philosophers with the uncritical herd who accept the "...ancient opinion... that the motion of the spheres produces very fearful and mighty sounds."

The opinion of the crowds and the philosophers about the loud and terrifying sounds of the heavenly bodies was reflected in the thought of the rabbis of the Talmud and Midrash. The rabbis did not, however, embrace the Pythagoreans' ascription of musical qualities to these cacophonies (*kikua* in R. Ibn Tibbon's onomatopoeic translation). Maimonides comments, "This belief (in the loud sounds of the planets) is also widespread in our nation; thus, our Sages describe the greatness of the sound produced by the sun in the daily circuit in its orbit." He had in mind Talmud, *Yoma* 20b:

"Rabbi Levi (3rd generation *Amora*, c.290 – c.320 CE) said: Why is a person's voice not heard during the day in the same manner that it is during the night? It is due to the fact that the sound of the *sphere of the sun* (*galgal khama*) traversing the sky generates noise like the noise generated by a carpenter sawing cedars, and that noise drowns out other sounds.... Were it not for the sound of the sphere of the sun, the sound of the bustle of the crowds of Rome would be heard throughout the world; and were it not for the sound of the bustle of the crowds of Rome, the sound of the sun's sphere would be heard throughout the world. And the Sages taught: Three sounds travel from the end of the world to its other end: The sound of the sphere of the sun, and the sound of the bustle of the crowds of Rome, and the sound of the soul at the moment that it leaves the body, which should be audible throughout the world."

(Trans., R. Adin Steinsaltz, Koren, from *Sefaria. Parallel text: Midrash Bereshit Rabba* 6:7. Note that Rabbi Levi used the vocabulary of spheres, the *galgalim*, inappositely, for he plainly meant that this "sphere" was a *firmament in or around* which the sun moves. See below, and Mishneh Torah, *Ysodei* 3:1 where Maimonides collapsed the distinction. *My italics throughout this chapter-essay.*)

ARISTOTLE REJECTS THE MUSIC

These theories of the sounds of the heavenly bodies, both of the Rabbis and of the Pythagoreans, were rejected by Aristotle as well as Maimonides. An underlying cosmological dispute was behind their argument. Maimonides explained:

"You should not find it blameworthy that the opinion of Aristotle disagrees with that of the Sages, may their memory be blessed, as to this point. For this opinion, I mean to say the one according to which the heavenly bodies produce sounds, is consequent upon their belief in a *fixed sphere and in stars that return.*"

(Pines trans., notes its source: Talmud, *Pesakhim* 94b, where Rabbi Yehuda ha-Nasi held that the stars rotate independently of any sphere, which was rejected by R. Akha bar Yaakov. Aristotle: *loc. cit.*)

Aristotle argued that we don't hear the sounds because there are no sounds. The planets could not produce sound since they do not move: they are *fixed* to their respective spheres. Since the spheres surround and move with each other, they do not generate the mutual friction that produces sound. The fact of heavenly silence was itself *proof* for his paradigm of a universe of rotating concentric crystalline spheres. He wrote:

Schema huius præmissæ diuisionis Sphærarum .



Aristotle: rotating spheres with stars and planets affixed. (*Cosmographia*, Peter Appian, Antwerp, 1539, Pub. Dom., Wikimedia)

“It is clear that the theory that the movement of the stars produces a harmony, i.e. that the sounds they make are concordant, in spite of the grace and originality with which it has been stated, is nevertheless untrue.... But, as we said before, melodious and poetical as the theory is, it cannot be a true account of the facts. There is not only the absurdity of our hearing nothing, the ground of which they try to remove, but also the fact that no effect other than sensitive is produced upon us. Excessive noises, we know, *shatter* the solid bodies even of inanimate things: the noise of thunder, for instance, splits rocks and the strongest of bodies. But if the moving bodies are so great, and the sound which penetrates to us is proportionate to their size, that sound must reach us in an intensity many times that of thunder, and the force of its action must be immense. Indeed, the reason why we do not hear and also show in our bodies the effects of violent force, is easily given: it is that *there is no noise*. But not only is the explanation evident; it is also a *corroboration* of the truth of the views we have advanced...Bodies which are themselves in motion, produce noise and friction: but those which are *attached or fixed* to a moving body, as *the parts to a ship*, can no more create noise, than a ship on a river moving with the stream.... But sound is only caused when a *moving body* is enclosed in an *unmoved body*, and *cannot be caused by one enclosed in, and continuous with, a moving body, which creates no friction*.... Since, therefore, this effect is evidently not produced [since there is no noise], it follows that none of them can move with the motion either of animate nature or of constraint [forced motion]. *It is as though nature had foreseen the result*, that if their movement were other than it is, nothing on this earth could maintain its character [since everything would be shattered]. That the stars are [attached to their moving sphere] and are not self-moved, has now been explained.”

(Aristotle, *De Coelo*, 2:9:290b11-291a25, J. L. Stocks trans., cf. Plato, “The myth of Er,” *Republic* 617c – 617d.)

THE RABBIS CONCEDE TO ARISTOTLE

Maimonides wrote that “You should not find it *blameworthy* (*mozer b'eineikha*, Jud.Ar.: ולא תסחשנע) that the opinion of Aristotle disagrees with that of the [rabbinic] sages.” This is strong language. R. Even-Shmuel explained:

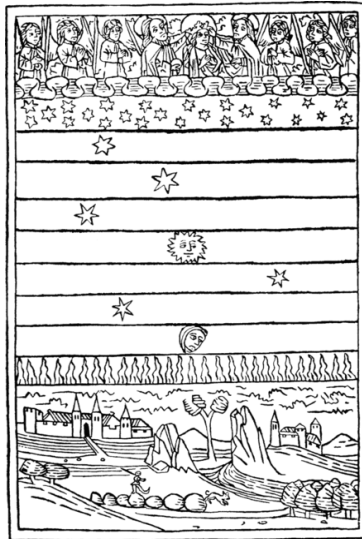
“It should not be strange to you (*tamuah b'eineikha*) that, precisely on this point, Aristotle’s opinion differs from that of the Rabbis, inasmuch as in *all* other details concerning the spheres his opinion agreed with their opinion.” (R. Even-Shmuel, *ad loc.*, III:129, my trans.)

R. Even-Shmuel strayed beyond the text. He meant by his note to call attention to prior chapters in Volume II of the Guide, especially the *Introduction* to Volume II, read together with Guide 2:2, 2:4, and 2:5, as support for his contention that in “all” other details concerning the spheres Aristotle’s opinion agreed with the Rabbis’ opinion. In those chapters, however, the most that Maimonides tried to show was that the Aristotelian theory of a geocentric universe surrounded by concentric living and intelligent spheres was *consistent* with views expressed in the Talmud and Midrash.

Nonetheless, why, on the specific issue of the music of the spheres did they radically disagree? Why did the rabbis think that the hurtling planets made loud and terrifying noises, while Aristotle insisted that the lack of such noise was proof of his spherical cosmology? In other words, if they agreed with Aristotle, as Maimonides claimed, that the motion of the universe was due to the action of intelligent spheres rotating the earth, why did they disagree with him on this specific point?

The answer is that Maimonides introduced the issue of planetary motion here for the first time. Up until now Maimonides had not discussed whether the rabbis had accepted Aristotle’s underlying doctrine that the spheres moved and the planets were stationary.

(No prior direct discussion of planetary motion before Guide 2:8: There was no discussion of the spheres in the 26 Propositions of the *Introduction* to Vol. II of the Guide. The proof for their motion in Guide 2:1 is an exposition of the *Aristotelian* theory, not the *rabbinic* reaction to it. In Guide 2:4 and 2:6, where he discussed the separate intellects and the souls of the spheres, he only argued that what Aristotle called the *separate intellects* the rabbis called *angels*. It was not until Guide 2:5 that he said that Jewish tradition aligned with the Aristotelian doctrine of the spheres as conscious agents. But he did not discuss the *motion* of the planets anywhere before our chapter.)



The sun, planets, angels and the firmament. Woodcut dated 1475. Pub. Dom. Wikimedia

Ancient rabbinic cosmology. The rabbis had a different system. In the language of the Torah and of the rabbis, the heavens were a “firmament.” The firmament was *firm*, i.e., fixed, and the planets, including the sun, moved independently in and around those heavens. The firmament was described as a “dome,” a *kippah*, and not a “sphere.” Their cosmos was, therefore, hemispherical, not spherical (Simon-Shoshan, see note *below*). Even when the rabbis began to call the dome a “sphere,” they still regarded it as a fixed firmament.

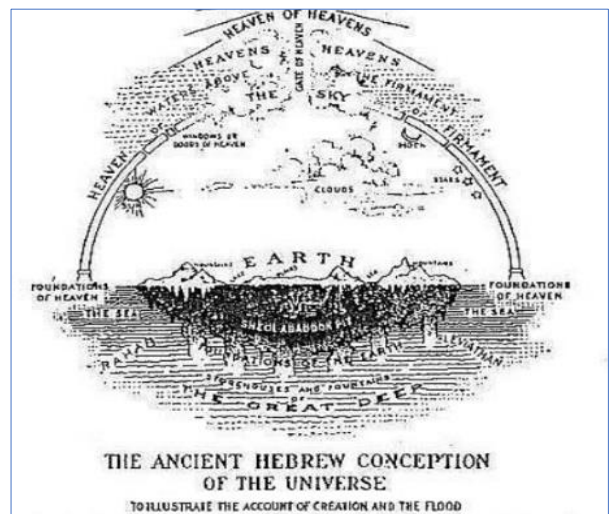
Maimonides explained the Rabbis’ view: “For this opinion, I mean to say the one according to which the heavenly bodies produce sounds, is consequent upon the belief in a *fixed sphere and in stars that return.*” This “fixed sphere” was the firmament.

The rabbis and the Pythagorean philosophers believed that the planetary bodies must make loud noises due to the friction produced by their size and speed *within* or *around* the fixed sphere/dome. This was due to their shared doctrinal commitment to the idea that the planets are self-moving.

What happened next was noteworthy. The rabbis *convert* to the view of the Aristotelian astronomers in *Pesakhim* 94b. Maimonides describes what happened:

“The theory of the music of the spheres is connected with the theory of the motion of the stars in a fixed sphere, and our Sages have, in this astronomical question, abandoned their own theory in favor of the theory of others [i.e., the Aristotelians, that the spheres rotate and the stars are fixed]. Thus, it is distinctly stated, ‘*The wise men of other nations have defeated the wise men of Israel.*’ It is quite right that our Sages have abandoned their own theory.”

Maimonides attributed this concession to the rabbis’ intellectual integrity: they recognized that in matters of science proof reigns supreme over traditional opinion:



The Rabbinic Dome cosmology. (George Robinson, 1913) Pub. Dom., Wikimedia

“This is correct. For everyone who argues in speculative matters (*ha-devarim ha-iyunim*, Jud. Ar.: אלנטיארייה / אלאמור) does this according to the conclusions to which he was led by his speculation. Hence the conclusion whose demonstration (i.e., proof, *ha-hokhakra* / בררהאנה) is correct is believed (*sh'nitkayima* / יעתקד / belief).” (Pines trans.)

(“**Speculative matters**” and “**proof**,” see, respectively, Efros, *Philosophical Terms in the Moreh Nebukim*, 94 and 70. On **יעתקד-itikad**, “**belief**,” see explanation in my chapter-essay to Guide 1:50, where I wrote that *itikad* “Is the judgment the mind makes on information obtained from good sources. Essentially, it is properly justified assent.” **Firmament**: Heb. *Rakia*, See Klein, *Comp. Etym. Dict. of the Heb. Lang.*, s.v., “beaten out...flattened,” became Latin *Firmamentum* in the *Vulgate*, a calque of Greek στερεώμα/*steréōma* in the *Septuagint*-a solid or firm structure [*Wikipedia*]. It was like a *dome*: an opaque metallic or screenlike structure, perhaps 4 *mil* thick, about 2 miles. **See**: *Pesakhim* 94b. Also see: *The Sun’s Path at Night: The Sixteenth-Century Transformation in Rabbinic Attitudes to the Talmud’s Babylonian Cosmology*, R. Natan Slifkin, 2012, rationalistjudaism.com. This is a useful survey, but the Talmudic cosmology was not “Babylonian.” See also “The Heavens Proclaim the Glory of God—A Study in Rabbinic Cosmology,” Moshe Simon-Shoshan, 2008, 67-96, at *Academia.edu*; and, generally, Kuhn, *Copernican Revolution*, Cambridge, 1957, Ch. 1. Maimonides eliminated the distinction between the *firmament* and the *sphere*, see *Mishneh Torah*, *Ysodei*, 3:1. **Variant Text in Pesakhim 94b**: Our contemporary text of this Talmudic passage does *not* reflect Maimonides’ reading ‘*The wise men of other nations have defeated the wise men of Israel.*’ This was discussed at length by the modern commentators R. Kafih, note 8, and R. Even-Shmuel, note 4, *ad loc*. However, since the ancient commentators, Rabbis Shem Tov, Efodi, Crescas and Narboni as well as authorities like Rabbeinu Tam [Yakov ben Meir, 1100-1171] all found Maimonides’ version of the passage unremarkable, I take it that they used the same text that Maimonides used. See Slifkin, *loc.cit.*, for the major Rabbinic figures who accepted Rambam’s *girsā*. **The Cosmological Debate**: R. Yehuda ha-Nasi had argued in *Pesakhim* 94b that the failure to find the constellation *Ursa Major* in the southern hemisphere or *Scorpio* in the northern hemisphere shows that they moved independently of their respective spheres [cf. Homer’s *Odyssey*, 5:273-5: *Ursa Major* “Ever circles where it is...and never bathes in ocean’s waves,” and see Kuhn, *ibid.*, p. 6]. R. Yehuda’s argument was that since the general motion of the heavens along the ecliptic *inclined across* the equator [at a 23° angle], it follows that *if* those stars were affixed to a *moving* sphere they should have been seen *outside* their usual hemisphere. The fact that they were never seen outside of their hemisphere meant they must move independently: this supported the Rabbinic hypothesis of a fixed heavenly dome with moving planets. Rejecting this, R. Akha bar Yaakov explained that the small size of the sphere carrying those particular stars resulted in their moving in a comparatively *small* circle, *i.e.*, an epicyclic sphere, always in position with respect to the equator, apparently vindicating the moving sphere hypothesis of the gentile philosophers. See Friedlander note 6, *ad loc*. They also argued, in *Pesakhim* 94b, over the path of the sun, whether it went above or below the sphere/dome. Rabbi Yehuda ha-Nasi, representing the rabbis, conceded that the Hellenic sphere hypothesis was more accurate than the model of the sun moving independently around or through a fixed dome. Slifkin, *ibid.*, surveys the plethora of rabbinic opinions generated by these twinned debates down to the eighteenth century culminating with the Vilna Gaon, 1720-1797).

WHO WAS RIGHT, AND WHY?

What came of this theoretical blow-up? Who was right about the sounds of the spheres?

Aristotle was right for the wrong reasons, and the original opinion of the Tannaitic Rabbis was wrong for the right reasons.

After accepting Aristotle’s view the Rabbis’ opinion (including Maimonides’ opinion) was, like Aristotle’s, right for the wrong reasons.

The entire episode is a cautionary tale about the entanglement of religion in scientific paradigm shifts. No one came out looking good. I will explain below.

(Paradigm shift: See Thomas Kuhn, *The Structure of Scientific Revolutions*, Chicago, 1962, and *The Copernican Revolution*.)

THE COLLAPSE OF THE PTOLEMAIC/ARISTOTELIAN SPHERES AND THE CONSEQUENCES FOR JUDAISM

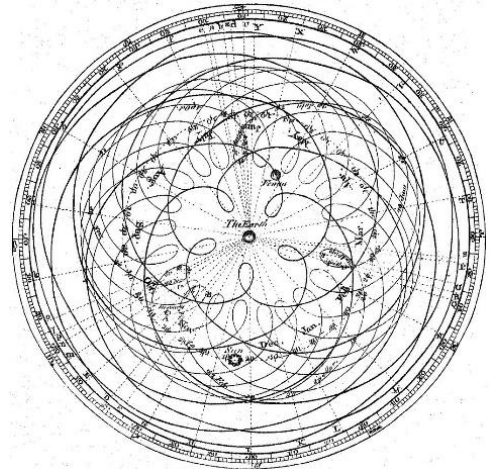
Aristotle was right that we do not hear the sounds of the heavenly bodies or the “music of the spheres,” because there are no sounds and there is no music. He attributed this silence to his cosmology of a geocentric universe of silently rotating concentric spheres. But he was wrong.

Since the 16th century we have known that there are no such spheres, and this fact has been confirmed through extensive astronomical observation and our own travels in outer space.

(Copernicus wrote his famous volume, *De Revolutionibus*, in 1543, which began the revolution in thought. Using some of those ideas, Tycho Brahe, 1546-1601, first disproved the existence of spheres, followed by Kepler’s proofs that Mars moved as a planet, not due to a sphere. See Kuhn, *Copernican Revolution*, 206, 212).

Thomas Kuhn eloquently explained why these ideas were held for so long:

“The (Copernican) Revolution was an incredibly long time coming. For almost 1800 years, from the time of Apollonius and Hipparchus until the birth of Copernicus, the conception of compounded circular orbits within an earth-centered universe dominated every technically developed attack upon the problem of the planets, and there were a great many such attacks before Copernicus. Despite its slight but recognized inaccuracy and *its striking lack of economy...*, the developed Ptolemaic system had an immense lifespan, and the longevity of this magnificent but clearly imperfect system poses a pair of closely related puzzles: How did the theory gain so tight a grip upon the imagination of the astronomers? And once gained, how was the psychological grip of this traditional approach to a traditional problem released? Or to put the same question more directly: why was the Copernican Revolution so delayed? And how did it come to pass at all?... A scientist must believe in his system before he will trust it as a guide to fruitful investigations of the *unknown*.... But the scientist pays a price for this commitment to a particular alternative: he may make mistakes. A single observation incompatible with his theory demonstrates that he has been employing the wrong theory all along. His conceptual scheme must then be abandoned and replaced. That, in outline, is the logical structure of the scientific revolution.... (Nonetheless) as we have already begun to discover, observation is never *absolutely* incompatible with the conceptual scheme.... (Thus) the emphasis on logical incompatibility disguises an essential problem.... How can a conceptual scheme that one generation admiringly describes as subtle, flexible, and complex become for a later generation merely obscure, ambiguous and cumbersome?... A conviction of this sort is difficult to break, particularly once it has been embodied in the practice of a whole generation of astronomers who transmit it to their successors through their teaching and writing. This is the bandwagon effect in the realm of scientific ideas.... (The geocentric spheres) provided a fruitful guide to the solution of problems outside as well as inside astronomy. By the end of the fourth century BCE, it had been applied [by the Greeks] not only to the problem of the



The Aristotelian/Ptolemaic “Striking lack of economy...” (James Ferguson, 1710-1776, Pub. Dom. [Wikimedia](#))

planets but also to terrestrial problems like the fall of a leaf and the flight of an arrow, and to spiritual problems like the relation of man to his gods.... The astronomer could no longer upset (this universe) without overturning physics and religion as well.” (*The Copernican Revolution*, 74-77)

And so, when Rabbi Akha bar Yaakov (3d generation *Amora*, c. 290 – c. 320 CE) used the spherical paradigm to “defeat the wise men of Israel” (in Maimonides’ version of *Pesakhim* 94b), and when R. Yehuda ha-Nasi conceded the point, they committed the wise men of Israel to a paradigm *that had no basis in fact*. And, similarly, Maimonides confirmed this now entrenched error in Jewish thought.

His case was by no means unusual. The Rabbis took an interest in astronomy since it was needed for calendrical computation, especially the need to determine the new moon. And they wanted to remain up to date in astronomy. Rabbi Gamaliel (1st C. CE) owned some sort of telescope (*Eruvin* 43b). Ptolemy’s *Almagest* (2d C. CE), a massive work of Hellenic astronomy, prevailed over Western astronomy for 1400 years, and Jews were crucial to the translation project that popularized Ptolemaic cosmology in the Middle Ages. Jews employed in the Toledo School of Translators, as well as the famous Tibbonide family of translators in France, translated ancient and modern astronomical documents into Hebrew and Latin from Arabic, including from ancient Greek works, helping to create the “Renaissance of the Twelfth Century.” Maimonides testified that he studied with famous astronomers in Andalusia (*Guide* 2:9). Many Rabbis published commentaries on the *Almagest*, beginning as early as the 13th century. A shortened version of the *Almagest* was written by R. Hayim Vital (1542-1620) well after Copernicus. Jews also compiled astronomical tables based on the Hellenic paradigm, some of which Maimonides relied on as did R. Yehuda ha-Levi (12th C.) and R. Abraham Ibn Ezra (1092-1167). R. Levi ben Gershom (*Ralbag*, 1288-1344) compiled astronomical tables based on ancient sources, but still within the spherical paradigm. He was the first to write a description of the *Jacob’s Staff*, a predecessor of the sextant, invented by Jacob ben Makir, a Tibbonide. Rabbi Yom Tov Lipmann Heller (*Tosefot Yom Tov*, 1579-1654) argued that every Jew from youth had a duty to study astronomy. “A dozen Hebrew works on astronomy were composed in Poland between 1550 and 1648” (Slifkin, p. 30, 40; David Fishman, “R. Moshe Isserles and the Study of Science Among Polish Rabbis,” *Science in Context*, 10:4, 12/97, 574).

We can well imagine the catastrophic effect of the Copernican Revolution on these layers of Jewish thought, especially as we can identify major Maimonideans and other rabbinic figures who opposed it even after Copernicus. Thus Kuhn: “The astronomer may on occasion *destroy*, for reasons lying entirely within his specialty, a worldview that had previously made the universe meaningful for the members of a whole civilization, specialist and nonspecialist alike” (*Copernican Revolution*, p. 7).

Cabalistic Spheres. Based on all of this, the sudden growth of published Jewish mysticism in the thirteenth century (Gershom Scholem, *Major Trends in Jewish Mysticism*, Schocken, 1946, lectures four and five) appears in a new light. Far from a retreat into obscurantism, Cabala saved Jewish thought from its over-identification with the going scientific model.

Just observe the linguistic change in this era, where the word for “spheres,” *Sefirot*, loses identification with astronomy and becomes the stages of the manifestation of divine thought. J.H. Chayes, in “Spheres, *Sefirot*, and the Imaginal Astronomical Discourse of Classical Kabbalah,” wrote:

“Gershom Scholem famously insisted that ‘the term *sefirah* is not connected with the Greek ‘sphere,’ but as early as the *Sefer ha-Bahir* it is related to the Hebrew *sappir* (‘sapphire’), for it is ‘the radiance of God which is like that of the sapphire.’ Even if Scholem’s etymology is correct, the astronomical association is not so easily avoided—as the spheres were understood to be made of the transparent crystalline substance known as sapphire.”

He writes, in conclusion:

“For kabbalists, if not for philologists, the *sefirot*-spheres connection was always crystalline-clear.”



From Isaac Myer: *Qabbalah: The Philosophical Writings of Solomon Ben Yehuda Ibn Gabirol*, 1888, Pub. Dom.

(J.H. Chayes in *Harvard Theological Review*, 4/08/2020, online at *Academia.edu*, with copious ancient illustrations. See Klein’s *Dictionary*, 454: “from Gk. *sphaira* = ball, globe, sphere;” and Idel, *Kabbalah, New Perspectives*, ch. 6. Maimonides instead used the term *galgalim* for sphere in *Mishneh Torah*. For Maimonides’ views on the sapphire image, see my chapter-essays on Guide 1:5, 1:9, 1:43, and 1:70).

Debatable etymology aside, in the Jewish mind these *Sefirot* displaced the spheres. That helps explain why Judaism survived the great Copernican paradigm shift to a solar-centric sphere-free universe. The transformation to the cabalistic perspective was epitomized in the new orientation of major thirteenth century Maimonideans. R. Avraham Abulafia (1240 – after 1292) deemed himself a disciple and promoter of Maimonidean thought. His *ecstatic* Cabala was, in his mind, the working out of the implications of Maimonides’ thought. Similarly, R. Moshe De Leon (c. 1240 – 1305), a close reader of the Guide, the publisher of the *Zohar*, became, by contrast, a *theosophic* Cabalist. (Scholem, *Kabbalah*, s.v. De Leon and Abulafia). While we do not know what level of discomfort any of these figures felt with the paradigm of the spheres at this stage of its history, we do know that already in Maimonides’ Guide we start to see in Jewish thought criticism of core aspects of that cosmology (see, esp., Guide 2:24).

Why No Music? Aristotle and his many followers were wrong to make celestial silence a vindication for their doctrine of the spheres.

But, even so, since we now know that the planets move as planets, why don’t we hear their heavenly music?

Aristotle was right to attribute the production of noise to *friction*: “Sound is caused when a moving body is enclosed in an unmoved body, and cannot be caused by one enclosed in, and continuous with, a moving body which creates no friction.”

Aristotle referred here to his doctrine of “*partial motion*,” which Maimonides summarized in his Proposition IV (from the *Introduction* to Volume 2 of the Guide), “Partial motion is like a nail in a boat: the nail moves with the boat. When the whole moves every part moves.” Thus, since the stars are fixed in the Aristotelian stellar sphere, their movement is only “partial motion” as they are borne silently across the sky. In Aristotle’s words:

“Bodies which are themselves in motion, produce noise and friction: but those which are attached or fixed to a moving body, as the parts to a ship, can no more create noise, than a ship on a river moving with the stream. By the same argument one might say it would be absurd that on a large vessel the motion of mast and poop should make a great noise, and the like might be said of the movement of the vessel itself [carried by the moving ocean]. But sound... *cannot be caused by a body enclosed in, and continuous with, a moving body*, and creating no friction.” (Aristotle, *De Coelo*, 2:9:291a10-16)

While all this is true, the application of his doctrine of partial motion to the cosmology of the spheres is hopelessly false. All that can be salvaged is the attribution of noise to friction. The reason that we do not hear planetary bodies whizzing through space, despite their great size and speed, is because space is a nearly frictionless environment.

Moreover, even if those motions produced some slight noise, at our great distance from those bodies we could not hear it. The moon is 239,000 miles from the earth, a staggering number compared to the Earth’s diameter, which is only 7926 miles. No matter how much noise the crowds make in Rome, Beijing, or, for that matter, in the next town over from you, you would not hear it.

That is why Aristotle, Maimonides, and the rabbis who adopted the cosmology of the rotating spheres were *right* that there was neither celestial cacophony nor music, but were, nonetheless, *wrong* to ascribe that silence to the “partial motion” of the spheres.

Why was Rabbi Levi’s account of the sun’s clamorous journey *wrong* for the *right* reasons? The Rabbinic *explanation* that we *should* hear the sun because of the friction of its moving body was correct. The Rabbis could not have known that the environment of space was largely frictionless.

Nonetheless, by accepting Aristotle’s sphereology, they lurched to the wrong explanation.

Some 16th century rabbis criticized this turn. R. Yosef Delmedigo was explicit in his critique:

“And, by the life of my head—the Sages of Israel did not act appropriately, when they abandoned their opinion with regard to the sphere being fixed and the constellations revolving, and accepted the opinion of the gentiles. For in our time, most scholars have *disqualified that which they accepted, and have adopted that which they negated...*” (the *Yashar m’Kandia*, 1591-1655, *Sefer Elim*, Odessa, 1867, p. 87, trans. R. Slifkin, *loc. cit.*)

R. David Gans (*Tzemakh Dovid*, 1541–1613), putting aside his own opposition to the newly minted Copernican system, testified that both Tycho Brahe and Johannes Kepler *told* him that the Rabbis were right in the first place when they rejected the moving spheres in favor of the moving planets and should never have conceded to the gentiles.

(*Amar li lo yafei asu khokhamim sh’hodu l’khokhmei ha-umot al davar sheker. Nekhmad v’Naim* 1:25:15b, online image at *Otzar haChochma*. R. Gans was a fascinating figure, a post-Copernican who *remained an adherent of the Ptolemaic system*, despite studying with Copernicus’ successors Tycho and Kepler at their Prague Observatory for three years. R. Gans derided the Copernican system as being essentially Pythagorean. The Prague Observatory was commissioned and established by Rudolph II, Holy Roman Emperor from 1576 to 1612 to house the observations of Tycho, Kepler and their associates. At Kepler’s request R. Gans worked there on the translation of the 13th Century astronomical *Alphonsine Tables* from Hebrew to German, which were used by Kepler in his production of the *Rudolphine Tables*.)

THE RABBINIC COMMITMENT TO TRUTH

How could the rabbis justify abandoning a cosmological account based on divine inspiration in favor of doctrines of the Hellenic school of astronomy? Maimonides' terse final statement in our chapter provides that justification:

“For everyone who argues in speculative matters does this according to the conclusions to which he was led by his speculation. Hence the conclusion whose demonstration is correct is believed.”

In other words, the rabbis were non-dogmatic, in that they accepted proof despite its conflict with tradition. One source for this approach was the Mishnaic tractate *Pirkei Avot*, “*Chapters of the Fathers*,” composed in the third century CE. *Pirkei Avot* 5:7 taught “A wise man ... is not hasty to answer; He asks what is relevant, and he answers to the point; And he speaks of the first point first, and of the last point last; And concerning that which he has not heard, he says: I have not heard; *And he concedes to the truth (modei al ha emet)*,” (trans. Joshua Kulp). Maimonides wrote a commentary on the tractate, where he addressed this teaching:

“The wise man is not stubborn, but when he hears the truth, he concedes to it - and even about that which he is able to refute and to disagree with and to misconstrue, he does not want to do it - and this is his saying, *and he concedes to the truth*....And all of these are the opposite with the unformed person, since he is not complete - as we have explained - and he has not reached this level.” (*Perush al ha-Mishnah, Avot, ad loc.*, trans. Sefaria Community)

Similarly, *Pirkei Avot* 4:1 has the *Tanna* Ben Zoma (1st-2d Centuries, CE) say: “Who is wise? The one who learns from every person, as it is said: *From all who taught me have I gained understanding* (Psalms 119:99).” This is reflected in the previously quoted statement by R. Bakhya ibn Pakuda, “Whoever has the intellectual capacity to verify what he receives from tradition and yet is prevented from doing so by his own laziness, or because he takes lightly God’s commandments and Torah, will be punished for this and held accountable for negligence.”

The Talmud, *Shabbat* 75A, suggests that this is true even if we must gain such wisdom from Gentiles. Thus, calendrical calculation is so important that a rabbinic expert must not set aside his Hellenic astronomical knowledge out of fear of its pagan origin. Maimonides wrote his *Responsa* 61 expanding the point:

“Question: Where the Talmud says, ‘*Someone who knows how to compute cosmic cycles and planetary courses but does not make these computations, one may hold no discussion with him....of him Scripture says, ‘They regard not the work of the Lord, neither have they considered the operation of His hands.’*’ (*Shabbat* 75a, quoting Isa. 5:12). How should we think about this? Does it make a difference whether we should consider that this is or is not a commandment? [This question was prompted by the term “commandment”/*mitzvah* in the following passage: ‘How do we know that one is *commanded* to compute cosmic cycles and planetary courses?’].

Answer: When it said, ‘*Someone who knows how to compute cosmic cycles and planetary courses*,’ this would include knowledge of astronomy, intercalation, and mathematics, in all of their details. And when it said, ‘*Someone who knows... but does not make these computations*,’ it referred to someone who has the ability to do so. These disciplines are keys of wisdom, and the text indicates someone who knows their axioms and does not put them to

use to make these computations. The question is, in such a case, what would be the benefit of this knowledge? Already Rabbi Meir in the *Baraita* proclaimed: ‘*Contemplate God’s works through which you can recognize He who spoke and the world came to be.*’ (My trans.)

Maimonides meant that he was prepared to give the Talmud’s limited authorization of Hellenic learning a broad reading. We are to “contemplate God’s works” in earthy nature and the heavenly cosmos. If we fail, we have lost an opportunity to acknowledge divine power.

Maimonides also wrote, in Guide 1:76, of the need to seek truth over dogma: “If you wish to go in search of truth, cast aside your passions, your tradition, and your fondness of things you have been accustomed to cherish, if you wish to guard yourself against error.” R. Shem Tov provided an expansive interpretation to Maimonides’ statement:

“Maimonides demanded that...you seek truth, abandoning passionate desires, especially desires for those things you considered great when you grew up. For there is nothing so injurious as that to which we have become accustomed. The seeker should not turn to received opinion, for it is easy to accept, requiring no thought. You should have no inclination but to know truth *qua* truth, inclining neither to passion nor to opinions merely accepted from childhood.” (My trans. of R. Shem Tov’s *comm.* on Guide chapter 1:76, *ad loc.*, 133a-133b.)

This is exactly what Rambam ruled in Mishneh Torah, *H. Kiddush haKhodesh* 17:24:

“The rationales for all these [astronomical/calendrical] calculations, and the reasons why this number is added, and why that subtraction is made, and how all these concepts are known, and the proofs for each of these principles are [the subject] of the wisdom of astronomy and geometry, concerning which the Greeks wrote many books. These texts are presently in the hands of the sages. The texts written by the Sages of Israel, in the age of the prophets from the tribe of Yissachar, have *not* been transmitted to us. *Nevertheless, since these concepts can be proven in an unshakable manner, leaving no room for question, the identity of the author; be he a prophet or a gentile, is of no concern.* For a matter whose rationale has been revealed and has proven truthful in an unshakable manner, we do not rely on [the personal authority of] the individual who made these statements or taught these concepts, but on the proofs he presented and the reasons he made known.” (R. Touger trans.)

Follow the Science? This translation from the Mishneh Torah above is by Rabbi Eliyahu Touger, who registered his discomfort with the results of Maimonides’ “follow the science” prescription in his *note* to this passage:

“The context of this commentary is not a proper place for a full discussion of the Rambam's perspective on the supposed conflicts between science and the Torah. It must be noted, however, that the statements made here, emphasizing the importance of the empirical evidence of science, should not be interpreted by us as indicating that *the perspective science adopts at any given time* should be accepted in place of the Torah’s teachings.”

Maimonides was not insensitive to such concerns. He adopted an arms-length attitude toward the legacies of Hellenic and Arabic astronomy in Guide 2:24:

“Consider, therefore, how many difficulties arise if we accept the theory which Aristotle expounds in *Physics*. . . . these difficulties do not concern the astronomer: *for he does not profess* to tell us the existing properties of the spheres, but only to suggest, whether correctly or not, a theory in which the motion of the stars is circular and uniform, and yet in agreement with our observation. But of the things in the heavens man *knows nothing* except a few mathematical calculations, and you see how far these go. I say in the words of the poet, *The heavens are the Lord’s, but the earth He hath given to the sons of man* (Ps. cxv. 16); that is to say, God alone has a perfect and true knowledge of the heavens, their nature, their essence, their form, their motions, and their causes; but He gave man power to know the things which are under the heavens: here is man’s world, here is his home, into which he has been placed, and of which he is himself a portion. This is in reality the truth. For the facts which we require in proving the existence of heavenly beings are withheld from us: the heavens are too far from us, and too exalted in place and rank. Man’s faculties are too deficient to comprehend even the general proof the heavens contain for the existence of Him who set them in motion. It is in fact ignorance or a kind of madness to weary our minds with finding out things which are beyond our reach, without having the means of approaching them. We must content ourselves with that which is within our reach, and that which cannot be approached by logical inference let us leave to Him who has been endowed with that great and divine influence, . . . This is all I can say on this question; another person may perhaps be able to establish by proof what appears doubtful to me. It is on account of my great love of truth that I have shown my embarrassment in these matters and *I have not heard, nor do I know that any of these theories have been established by proof.*”

KLI KHEMDA

R. Narboni (R. Moshe ben Joshua, c. 1300-c. 1362), commenting on the last sentences of our chapter, asserted that the rabbis have an especially positive attitude toward the demonstration of proof, in those areas that could be reached by proof:

“As Rambam wrote here: “‘Everyone who argues in speculative matters does this according to the conclusions to which he was led by his speculation,’ *because proof is speech that is uniquely appreciated by the sages (ki ha-mofet hu ha-dibur ha-miyukhad etzel ha-khakhmim)*,” (My trans from R. Narboni’s comm, 28a, *ad loc.*)

R. Shem Tov derived sublime illumination from R. Narboni’s statement, expanding it in an unexpected direction:

“The gifts of prophecy are not superior (to those of scholarship in the realm of scholarship), because, in this regard, the scholar is superior to the prophet, as scholars do not find anything useful other than what has been validated by another [scholar’s] proof. You should recognize that this dictum of Maimonides is more precious than any other “desirable instrument,” *kli khemda*, from which will be clarified many things for those who desire to attain *pardes* (Paradise).” (my trans., *ad loc.*, 25a)

The reference to the *Kli Khemda* comes from *Pirkei Avot* 3:14: “Especially beloved are men for it was made known to them that *the desirable instrument, the kli khemda, with which the world had been created, was given to them*” The passage in *Avot* begins:

“(R. Akiva) used to say: Beloved is man for he was created in the image of God. Especially beloved is he for it was made known to him that he had been created in the image of God, as it is said: *for in the image of God He made man* (Genesis 9:6). Beloved are Israel in that a *precious vessel*, the *kli khemda*, was given to them. Especially beloved are they for it was made known to them that the *desirable instrument*, the *kli khemda*, with which the world had been created, was given to them.”

R. Shem Tov meant that the *Kli Khemda* is the Active Intellect, the *sekhel ha-poel*, the state that men achieve when they actualize their potential knowledge concerning the things of religion. Their potential knowledge, including raw opinion, was located in their Potential Intellect, the *sekhel ha-koakh* (See my chapter-essay on Guide 1:68). Rabbi Shem Tov wants us to think back to the first chapter in the Guide, where Maimonides established that the Active Intellect is the link between man and God. Man achieves his Active Intellect when he replaces mere opinion with truth, and truth is truth no matter whether it is contemplated on earth or in heaven.

Rabbi Narboni let us know that this is the direction that we should pursue by dropping hints. He began his commentary on Guide 2:8 in this way:

“Maimonides (at Guide 2:10) confirmed the reality of the Separate Intellects as one of the four causes of the movements of the sphere, comparing them to the four wings of the *Khayot*. That is, the ancient doctrine of the sounds of the spheres was introduced in the accounts of the prophets of the *Maaseh Merkava* as the *sound of the wings* of the *Khayot*.”

By this deeply coded statement Rabbi Narboni refers to Ezekiel: “And I heard the *sound* of their wings like the *sound* of many waters, like the sound of God,” (1:24) “And the *sound* of the cherubim’s wings... as the voice of God Almighty when He speaketh.” (10:5). He also meant to point us to Maimonides’ announcement of universal four-ness in Guide 2:10:

“It is likewise possible that the arrangement of the universe should be as follows. The spheres are four, the elements moved by the spheres are four; and the forces proceeding from the spheres into that which exists in general are four, as we have made clear. Similarly, the causes of every motion belonging to the sphere are four: 1) the shape of the sphere — I mean to say its sphericity; 2) its soul; and 3) its intellect through which it has conceptions, as we have explained; and 4) the Separate Intellect, which is its beloved. *Understand this well.*” (Pines trans., p. 271. See my account in Guide 1:70, “*Merkava* and the Revelation of Four-Ness”)

By now we should recognize that when Maimonides makes gnomic statements like “Understand this well,” he points us in the direction of the mystical subjects of *Maaseh Bereshit* and *Maaseh Merkava*, those subjects which the second Mishnah in *Hagigah* ruled could not be taught openly in public. We should, therefore, expect that his treatment of such issues would be presented in coded language. Maimonides in Guide 2:10 explained each of those four causes of spherical motion, but we will just look at his explanation of the last one, the *Separate Intellect*. The Separate Intellect, the *sekhel ha-nivdal* of the living spheres, corresponds to our own Active Intellect:

“There must also indubitably be something inciting to motion, namely, a conceiving and a *desire* for that which has been conceived, as we have mentioned. This can only come about through an intellect... Thus, there must indubitably be a certain Being of which a conception is made and for which there is *desire*, as we have explained.

“There must be some cause for the motion of the spheres, and as it does not consist in the fear of that which is injurious, or the desire of that which is profitable [*i.e.*, injury and profit do not concern the spheres], it must be found in the notion which the spheres form of a *certain Being*, and in the *desire* [*eros*] to approach that *Being*. This formation of a notion demands, in the first place, that the spheres possess *intellect*; it demands further that something exists which corresponds to that notion [of the desired Being], and which the spheres *desire* to approach.” (Guide 2:10, Pines trans., p. 271)

In other words, the love that the sphere has for its Separate Intellect and that the Separate Intellect has for God impels its sphere’s motion of rotation.

For R. Narboni, the sound of the four wings was the prophet Ezekiel’s symbolic key to the four causes of heavenly motion, in particular, to the motion impelled by the erotic attraction of the Separate Intellect to the Divine Intellect, producing an angelic sound sensed by the divinely inspired. When the rabbis accepted the doctrine of the living spheres they grasped the *kli khemda*, *i.e.*, the *eros* of the spheres’ Separate Intellect toward God in the *macrocosm*, towards which our Active Intellect’s yearning corresponds in the *microcosm* (see my chapter-essay on Guide 1:72).

It is in Jewish mysticism, in the Sefirotic doctrines of the Cabala, that Judaism was able to maintain its orientation to the motion of that intellectual *eros* without sacrificing it on the altar of the doctrine of *corporeal* spheres, the scientific/philosophical idolatry of the ancient world.

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