

# KABBALAH and SCIENCE

The article, “Kabbalah, Science and the Creation of the Universe,” by Nathan Aviezer (fall 2004), presents a novel comparison between kabbalah and superstring theory. However, the premise underlying the quest for compatibility between kabbalah and an unproven hypothesis is tenuous at best. Moreover, as any student of the philosophy or history of science can readily testify, the endeavor itself is fraught with danger.

On the one hand, the Talmud mandates the study and mastery of science as “a mitzvah ... to calculate astronomical events” (*Shabbat* 75a). The context clearly indicates that this includes not only astronomy but natural science in general, a conclusion corroborated by Rabbeinu Bachya ibn Pakuda, Rabbeinu Bachya ben Asher, Maharal and the Vilna Gaon, among many others. Major rabbinical authorities throughout the generations—including Rabbeinu Bachya ibn Pakuda, Rambam, Rabbi Menachem ben Shlomo Hameiri, Rabbeinu Bachya ben Asher, Rema, Maharal, Rabbi Yom Tov Lipmann Heller, Rabbi Yaakov Emden, the Vilna Gaon and his students and Rabbi Samson Raphael Hirsch—have continually and emphatically upheld the need to study science as a religious obligation.

Yet, on the other hand, this in no way presumes that we can discover science through the Torah—let alone discern a correspondence between currently popular hypotheses and the timeless spiritual truths of the Torah. While the Midrash repeatedly stresses that the Torah is the blueprint of the universe, numerous sources also establish that that level of Torah is utterly transcendent and inaccessible to us. By crass analogy, a car user’s manual is necessarily a reflection of the car’s blueprint but teaches the layperson nothing about the technicalities of automotive design. Likewise (*lehavdil*), the level at which Torah is revealed to us is not as its blueprint but as terrestrial instruction to earthly man on how to live in this world. This is a limitation of our worldly existence, not a limitation of our Torah. Although it is essentially the same book, the heavenly Torah, through which God created this world, cannot be grasped from within this world, even in principle.

Thus, the Midrash can distinguish between “Torah,” which does not exist at all “among the nations,” and “wisdom,” pertaining to the world, which manifestly does (*Eichah Rabbah* 2:13). In the latter domain, the Gemara concludes a presentation of scientific disputes between “scholars of Yisrael” and “scholars of the nations” with Rabbi Yehudah Hanasi’s assessment that “their words appear more reasonable than our words” (*Pesachim* 94b). An alternative version of the passage—quoted by Rambam, Rabbi Avraham ben Rambam and Rabbi Yitzchak Arama—concludes even more explicitly: “The scholars of the nations of the world *vanquished* the scholars of Yisrael.” Possession and mastery of our Torah granted us no advantage in this contest.

Particularly regarding Creation and the nature of the universe, the Midrash concludes:

*To relate the power of the work of Creation to humanity and make it known to them is impossible; therefore, Scripture concealed, “In the beginning, God created,” et cetera* (Bereishit 1:1) (*Midrash Shenei Ketuvim*, quoted by Rambam, in his preface to *Moreh Nevuchim*, and Ramban, in his commentary on Bereishit 1:1).

The Torah’s description of Genesis, apart from the crucial ethical and spiritual lessons it contains, is a “screen”: Rather than displaying the “real” story, it conceals it. Therefore, the Talmud warns: “One who pridefully says, ‘I am expounding the work of Creation,’ thinks that he is lauding but is only disdaining” (*Yerushalmi Chaggigah* 2:1 [8a]). On manifold levels, our classic commentators repudiate such facile interpretations of Creation. While the penultimate *mishnah* of *Avot* teaches us, “Delve into the Torah again and again, for *everything* is in it,” Rashi comments that “*everything* is in it” in the sense “that *everything that you desire* you will find in it.” There are transcendent matters, outside the domain of that which one ought to desire in this world. Everything relevant to one’s life in this world, which one *rightfully* desires, can be found through the Torah’s guidance. However, reading our Torah—exoterically or esoterically—as a science book is folly.

Furthermore, given the inescapable limitations of the scientific method, reading “into” the Torah a scientific hypothesis, however attractive, is ill-conceived and even reckless. Modern science is an attempt to elucidate quantifiable physical phenomena rationally and mechanistically. Considering the bounds of human reasoning and mechanistic explanations, we must concede that even when the paradigm works it can never presume to discover “truth” per se in any absolute or transcendent manner. Moreover, the empirical approach of experimental science is inherently limited inasmuch as, even ideally, we can never conduct every possible experiment or observe every possible case (since they are infinite in number). Therefore, scientists necessarily base their hypotheses—tentative attempts to account *generally* for finite sets of *particular* observations—upon *induction* (the inference of general principles from particular facts or instances), which can never provide rigorous proof: Since examining all possibilities is impossible, no matter how frequently any hypothesis is “confirmed,” it remains unproven. To quote Einstein, “As far as the laws of mathematics refer to reality, they are not certain; and, as far as they are certain, they do not refer to reality.” The scientific method can help us distinguish the plausible from the implausible. But it can never determine what the truth is. That question perforce remains outside the realm of science.

Conceptually, this realization underlay David Hume’s famous observation that any statement of putative causation is inexorably predicated upon not a priori reasoning but simply upon past experience. Since we can only observe “customary conjunction” (i.e., correlation) but can never definitively establish causality, the ultimate causes of natural phenomena must remain scientifically unknowable. Historically, this conclusion has been manifest repeatedly, as one hypothesis supersedes a hitherto universally accepted, successful one, only to give way in turn to another, in the relentless and endless evolution of modern science. As Thomas S. Kuhn (and many others) amply demonstrated, the historical development of scientific understanding is predominantly through such destructive succession rather than mere accumulation of knowledge and theories. (See especially Kuhn’s “The Nature and Necessity of Scientific Revolutions,” *The Structure of Scientific Revolutions*, [Chicago, 1970]). Every scientific paradigm is provisional by definition. Furthermore, each—while predicated upon inescapably subjective criteria—dictates its own distinct worldview. Consequently, Kuhn concludes, “We may ... have to relinquish the notion, explicit or implicit, that changes of paradigm carry scientists and those who learn from them closer and closer to the truth” (“Progress through Revolutions,” loc. cit., 170).

Fixating on one particular hypothesis—however elegant—in this continuum is quaint at best; anchoring eter-

nal Torah truths to such shifting sands is quite another matter. Note that while many theorists have *postulated* ten or eleven dimensions of space-time to resolve certain fairly abstract mathematical difficulties in reconciling quantum mechanics with general relativity, this postulate presently has not a shred of experimental support and may never even be testable. Describing it as a “discovery,” which implies some direct empirical basis, is misleading and tendentious. Claiming that “*the universe must be ten dimensional*” is historically naive and philosophically groundless. Arguably, when hundreds of years ago misguided attempts were made to wed Jewish metaphysics with Aristotelian, geocentric cosmology (the number ten featured prominently there as well), the latter seemed better corroborated than ten dimensions are today.

“Wisdom” never really contradicts Torah. Since both spring from the same Source—God, Who gave us Torah and the world—there can be no true conflict between them. As Rabbi Yehudah HaLevi exclaims, “God forbid that any matter of Torah contradict the testimony of direct observation or that which has been proven by logic!” (*Kuzari* 1:67). And “God forbid that we believe in that which is impossible or that which the intellect rejects and regards as impossible!” (*ibid.*, 1:89). A conflict between the Torah we study and the world we observe would necessitate viewing the Torah as divorced from our sense of reality—a totally unacceptable conclusion for Judaism. Contradictions are possible (perhaps even inevitable) only when wisdom or Torah or both are misconstrued. For example, when logic is spuriously applied to intrinsically non-rational issues, or when scientific models are manipulated as the putative basis of moral values (or their negation), wisdom has overstepped its bounds. Similarly—as affirmed by such recent authorities as Rabbi Hirsch, Rabbi Avraham Yitzchak HaKohen Kook, Rabbi Joseph H. Hertz and Rabbi Eliyahu Eliezer Dessler—when our terrestrial Torah is purported to be readable as a blueprint for (or refutation of) current scientific hypotheses, Torah has been perverted.

I thank Rabbi Chaim Eisen, who has taught the above ideas for years. Most of this letter was excerpted, with his permission, from his published and unpublished writings.

**Howard Shapiro**  
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Professor Aviezer presents the following analysis: 1. Kabbalah states that the Creator of the universe manifested His guidance through ten *sefirot*, only three of which are observable to man; 2. String theory states that we live in a ten-dimensional universe of which only three dimensions are observable to man; 3. Ergo, there is a correspondence between the kabbalistic description of the universe and the scientific one. As a professor of chemistry and a former president of the Association of Orthodox Jewish Scientists, I have been involved in discussions of the interface of science and religion for over forty years. It is my contention that

this analysis, on the one hand, is a misrepresentation of the scientific facts, and, on the other hand, can lead to serious theological repercussions.

A recent article in *The New York Times* noted that at a conference devoted to exploring string theory, “string theorists admitted that after 20 years they still did not know how to test string theory or even what it meant.” One of the basic tenets of modern science is that something must be testable. If one cannot devise a reproducible experiment to prove a principle, then that principle is based on belief and is not “scientific.” In fact, this is one of science’s main objections to religious belief—since religious belief is not testable, its tenets have no credibility. Consequently, string theory is more of a religion than a science!

The use of contemporary scientific facts and theories to corroborate religious beliefs and principles is not unique to Professor Aviezer. As long ago as 1858, Chaim Zelig Slonimsky, an Orthodox author, wrote a book in which he attempted to prove religious belief by invoking the Law of Conservation of Matter. In his day this principle was at the cutting edge of the developing field of chemistry. However, from our vantage point nearly 150 years later, his arguments are not very convincing. While religious beliefs are eternal, who knows what scientific theories will be in vogue 150 years from now?

What is implied by “proving” that there is consistency between scientific principles and those of the Torah? Does the reader, knowingly or not, come to base his belief in religion on the fact that there is “scientific proof” that the religious teachings are correct? Does this “proof” make religion any more acceptable? If so, what happens—as is often the case—when the scientific theory is modified or turns out to be incorrect? Does the failure of science to corroborate religious beliefs mean that the latter are no longer correct?

Kabbalah has evoked a great deal of contemporary interest. However, to try and “prove” a connection between kabbalah and science by using string theory, whose fundamental basis is widely contested, is inappropriate and can lead some astray.

**Reuben Rudman**  
Jerusalem

### **Professor Aviezer responds**

Although formally the letters by Mr. Shapiro and Professor Rudman relate to my article on kabbalah and science, in truth, their critical scythe cuts a much wider swath. They excoriate the entire enterprise of Torah and science—a course “fraught with danger,” which “can lead to serious theological repercussions.” The attempt to find harmony and consistency between the findings of modern science and passages in the Torah is anathema to them.

Their criticisms are threefold: 1. Both claim that today’s accepted theories will undoubtedly be relegated to tomorrow’s dung heap—“inescapable limitations of the sci-

entific method,” and “who knows what scientific theories will be in vogue 150 years from now?” 2. Mr. Shapiro also claims that one can never really understand the meaning of the Torah verses regarding Creation, because “Rather than displaying the ‘real’ story, [the Torah] conceals it.” 3. Professor Rudman claims that string theory is not testable and is thus “more of a religion than a science.”

The refutation of these criticisms is as follows:

1. *Are scientific theories reliable?*

Don't all scientific theories eventually become discarded and replaced by new paradigms? Mr. Shapiro mentions the geocentric theory of the solar system. This theory was universally believed for nearly 1,500 years until it was shown by Copernicus and Galileo to be totally false and then replaced by the very different heliocentric theory. Isn't this the fate of all scientific theories?

The facts are quite otherwise. Every competent scientist can distinguish between the more speculative theories and those that are firmly anchored by a vast array of scientific evidence. The latter have an excellent record for longevity. For example, since their inception nearly a century ago, the theory of relativity and quantum theory have enjoyed unqualified success in explaining hundreds of diverse phenomena.

The excellent track record of well-established scientific theories was emphasized by Nobel laureate Steven Weinberg (*Dreams of a Final Theory* [New York, 1993], 102):

*One can imagine a category of experiments that refute well-accepted scientific theories that have become part of the standard consensus of physicists. Under this category, there are no examples whatsoever in the past hundred years.*

Since not a *single* well-established scientific theory has been refuted within the past hundred years, we can feel confident about the future.

But what about the geocentric

theory of the solar system? Wasn't that scientific theory accepted as correct for nearly 1,500 years before being discarded?

The answer is “no!” The geocentric theory was not a scientific theory at all; it was *pure theology*, unsupported by any scientific evidence. The religious beliefs of the Church demanded that man's place must be at the center of the universe and that planetary orbits must be circular because God's heavens must behave in the ideal manner. When circular orbits failed to explain the planetary data, additional circles, called epicycles, were added. Eventually, eighty epicycles were postulated. Finally, in the early seventeenth century, the newly invented telescope confirmed the first scientific theory of planetary motion—the heliocentric solar system and elliptical planetary orbits—a scientific theory that has survived unscathed to this day.

What about Newton's theory of mechanics? Wasn't it overturned by the relativity theory in 1905 and overturned again by quantum mechanics in 1926?

Not at all! Newtonian mechanics was generalized by these theories and shown to be the correct limiting form for low velocities (a thousand miles per second is slow in this context!) and for large masses (a speck of dust weighing a trillionth of a gram is a large mass in this context!). Newton's theory is so accurate within its wide regime of validity that to this day every student of physics learns Newtonian mechanics.

2. *Is it possible to understand the Torah verses?* Is Mr. Shapiro correct in stating that because of man's limited intellect, the “Torah is utterly transcendent and inaccessible to us,” especially regarding Creation?

Those of us occupied with Torah and science are not discussing “transcendent” matters at all. We make simple assertions about the meaning of Torah verses. For example, we assert that the first verse in the Torah states that the universe began through an act of creation by God.

Ramban's view (commentary on Bereishit 1:1) is that one is obligated to understand the first verse of the Torah in its simple literal meaning, and one who does not do so is guilty of heresy. Similarly, Rambam devotes an entire chapter in his treatise on Torah thought (*Moreh Nevuchim* 2, ch. 25) to discussing the first chapter of Bereishit, emphasizing that "one is obligated to attempt to understand this chapter in its literal meaning and to compare the Torah text with current knowledge."

There is one point on which Mr. Shapiro and I can agree. He devotes a significant portion of his letter to dismissing the idea that one can learn science from the Torah. Of course, he is right. However, I never even hinted at this possibility in my article.

3. *Is string theory testable?* Professor Rudman claims that string theory is not testable and thus is not really a scientific theory at all. He refers to string theory as "more of a religion than a science."

This criticism has been a source of considerable annoyance to the many Nobel Prize winners and professors in the world's most prestigious universities and research institutions who have devoted their careers to studying string theory. An article in *Physics Today* (February 1997, pp. 40-42) debunks the false claim of the non-testability of string theory. The article, entitled "String Theory is Testable," features the following subtitle: "Many believe that string theory cannot be tested. That belief is a myth." The author goes on to write: "Here I want to dispel that myth, and describe some of the many ways in which string theory is testable."

Outstanding scientists emphasize that "string theory allows us to address many basic questions previously out of reach ... unifying different areas, such as collider physics, inflation, dark matter, quark masses, neutrino masses and more" (*Science* [11 February 2005]: 851).

It is for these reasons that two large international conferences on string theory took place last year in the United States, with another such conference scheduled this year in Germany. Surely all these famous scientists are not wasting their lives studying "a principle based on belief, that is not scientific."

Thus, it is clear that all three criticisms have no basis in fact. Let me now turn to the subject of Jewish education, specifically, the educational aspects of the enterprise of Torah and science.

Our colleges and universities are filled with Jewish young men and women whose teachers and peers ridicule the Torah as a collection of primitive myths, declaring that Genesis is quite similar to the Babylonian creation story and that it was derived from it. They dismiss the Torah as having been utterly disproved by modern science. Jewish students are bombarded with questions, such as: How can you believe that the universe was suddenly created from nothing? Do you really believe the Nobel Prize winners

who formulated the modern theory of evolution are all wrong, and that the entire animal kingdom was created by God? How is it possible that people used to live for nearly 1,000 years and bear children at the age of 500? Can it be that the extensive fossil evidence confirming the existence of prehistoric man is all fictitious? How can you believe that the first man was created by God only 6,000 years ago, followed by the first woman created by God from Adam's rib, and that both lived in the magical Garden of Eden? How can the world be only 6,000 years old when extensive scientific evidence proves a multibillion-year-old universe? The list goes on and on.

As one who has extensive experience in this field, let me assure the reader that for the Jew whose spirit is deeply troubled by these many seeming contradictions between Torah and science, it is insufficient to simply say, as Mr. Shapiro suggests, "Don't worry, there is no true conflict." When these challenges to Torah are hurled daily by peers whom the Jew admires and respects, and no satisfactory rational answers are forthcoming, doubt sets in and *emunah* (faith) begins to crumble. The troubled Jew has the right to receive rational explanations to his questions and not be put off by philosophical assurances that everything is really all right. Ignoring these cries for help from the anguished Jewish soul is indeed "a course fraught with danger." **JA**

