

Parallel Thinking: Science, Torah, and Cognitive Dissonance

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Driven by hunger, a fox tried to reach some grapes hanging high on the vine but was unable to, although he leaped with all his strength. As he went away, the fox remarked, "Oh, you aren't even ripe yet! I don't need any sour grapes."

AESOP'S FABLES

PARALLEL THINKING

The American Jazz age author F. Scott Fitzgerald famously wrote that "the test of a first-rate intelligence is the ability to hold two opposed ideas in mind at the same time and still retain the ability to function."¹ Twenty-six years later, the social psychologist Leon Festinger proposed the theory of cognitive dissonance, suggesting that the human mind has an inner drive to harmonize all personal beliefs, philosophies, and modes of behaviour when confronted with the cold truth of external, independent, and objectively verifiable evidence. Festinger's theory is that the psychological pain of cognitive dissonance compels us to seek

1. *The Crack-Up*, ed. Edmund Wilson (New Directions, 1945), 69.

ways of restoring the balance in our minds while maintaining the integrity of our belief system or justifying our behaviour. The theory has become an accepted part of normative psychology, but in the light of modern scientific discovery it is particularly germane to those groups who continue to profess religious beliefs.

Indeed, Festinger's original work focused on monitoring the beliefs of members of an eschatological cult called 'the Seekers'. Chicago housewife and group leader Dorothy Martin claimed to have received messages in her home from alien beings from the planet Clarion via psychographic writing and claimed that a UFO landing was imminent. Only believers would be saved from the destruction of the world.² Many followers gave up their jobs and sold their possessions in preparation for the impending doom.

When Martin's predicted day of reckoning failed to materialize, she claimed that the world had been spared because her followers had spread the "force of good and light" throughout the world.³ Instead of abandoning their discredited beliefs, cult members strengthened them and began an even more aggressive campaign of proselytizing. Such behaviour highlights the fact that when reality hits hard, believers are often unwilling to surrender their tightly held convictions. They would prefer to dogmatically advance the most absurd doctrines in order to buttress their beliefs, rather than entertain the possibility of simply being wrong.

Nevertheless, cognitive dissonance is not only reserved for radical cults and lunatics. Part of being human is to have a set of morals, convictions, and beliefs which are open to scrutiny and dispute. Yet simply forgoing the ideals by which one lives in the light of a challenge to them leaves each of us vulnerable to never having a fixed set of principles or philosophies to guide us. How are we to function if we are constantly questioning ourselves or waiting for incontrovertible proof of everything we consciously accept as true? This is especially germane to religious beliefs as worldwide more than eight in ten people identify with a religious group.⁴

While some would delight in seeing religious adherents abandoning their faith in favour of a more rational, scientific explanation of the world, the healthiest approach to challenges against one's beliefs is not abandonment of them, but to keep an open mind and begin a journey of rigorously honest, impartial, and unprejudiced enquiry.

2. Leon Festinger et al., *When Prophecy Fails* (1956).

3. Ibid. 169.

4. Pew Research Religion and Public Life Project, "The Global Religious Landscape" (18 Dec. 2012), <http://www.pewforum.org/2012/12/18/global-religious-landscape-exec/>.

At first, all options must be open. The internal struggle between conflicting ideas then evolves into an adventure of scrutinizing premises, hypotheses, and suppositions in order to determine the truth. It is as much the process of investigation, together with the conclusions drawn, which ultimately yields a better understanding and appreciation of both sides of the debate.

Perhaps this is what F. Scott Fitzgerald meant; a first-rate intelligence would look to hold on to opposing ideas in parallel while making an unbiased and honest evaluation of that which is plausible and that which is patently not. This is the basis for 'parallel thinking'.

THE NATURE OF FAITH

It has been reported that the dogmatic reinforcement of religious beliefs plays a central role in strengthening those convictions when confronted with scientific scrutiny.⁵ For observant Jews, belief in God and the divine origin of the Torah forms an axiomatic and incontrovertible part of their being. Notwithstanding the obvious differences between established religion and New Age cults, when it comes to faith there appear to be few qualitative differences between Dorothy Martin's followers and an observant Jew. Do members of organized and established religions not appear to non-believers to have the same cultish adherence to faith as Martin's UFO cult? On the contrary, the only difference between established religions and more recent cults appears to be of age rather than quality.

Three hundred and fifty years after the beginning of the Enlightenment, the triumph of rational, evidence-based scientific investigation in explaining the physical world should not be underestimated. Scientists have been successful in drawing back the veil from reality, revealing the most remarkable secrets from the intricate inner workings of matter to the mechanics of the cosmos. In this time, our understanding of the world has accelerated at an astonishing rate.

By implication, such success suggests that beliefs which seemingly contradict the scientific view of the world, and in addition require faith due to a lack of evidence, or because there can be no evidence, should be consigned to the dustbin of a pre-Enlightenment age of archaic, obsolete convictions together with geocentricism, flat Earth theory, and fairies at the bottom of the garden. To a scientist engaged in evidence-based research, an abstract, nebulous concept such as 'faith' appears to be in complete opposition to the philosophy of science with its rigorous demands for proof. If so, it is understandable that scientists would

5. Azim F. Shariff et al., "The Devil's Advocate: Secular Arguments Diminish both Implicit and Explicit Religious Belief", *Journal of Cognition and Culture*, 8 (2008), 417-23.

discount even the possibility of the existence of God or that the Torah is divine before any analysis of a potential conflict between science and religion has even begun. Disappointingly, whenever scientists indulge in entering the debate, they seem compelled to strictly adhere to the premise that God could not possibly exist⁶ or that God and religion must have been invented to explain the world.⁷

If we are to endeavour to fulfil F. Scott Fitzgerald's ideal of a first-rate intelligence and hold two opposing ideas at the same time, we must initially assume that both positions, in this case the scientific and biblical accounts of reality, are equally valid until we find evidence to the contrary. This may be a difficult step for a scientist to take, but failing to do so is probably triggered by erroneously subscribing to an intractable dogma of reductionist materialism, a philosophy which appears to pervade all current scientific thinking.⁸

To accomplish this point, whereby both sides of the debate begin on an equal footing, is indeed a momentous achievement in itself. It is the prerequisite of true dialogue. However, it is only half the battle. It sounds simple, but before we can engage in any sort of debate or even begin to ask the right questions about the conflict between science and Torah, we must make sure that we properly understand both the scientific position and the depth and intricacy of what the Torah is teaching mankind.⁹ If we fail to grasp the complexity of either side, or worse, still prejudice either position through ignorance, misinformation, or our erroneously predetermined assumptions, we will inevitably poison the exchange of ideas with falsehood, thus ruining the opportunity for greater understanding. Those who claim fidelity to the truth must be prepared to accept it in humility and recognize that it may be larger than their own minds.

In contrast, those who enter the debate soaked in their own prejudice may attain personal satisfaction at verifying their preconceived position but their offerings will contribute nothing to a greater understanding of the issues at hand. This is what our sages meant when they stated that an argument for the sake of Heaven will endure and bring us towards the truth, whereas an argument that is not for the sake of Heaven will not.¹⁰ Much of the current discussion around

6. Martin Rees, *Just Six Numbers: The Deep Forces that Shape the Universe* (Phoenix, 2001), 166.

7. Richard Dawkins, *The God Delusion* (Black Swan, 2007), 57.

8. John N. Gray, "The Limits of Materialism", broadcast on BBC Radio 4, "Points of View", on 5 May 2013.

9. This principle was pointed out by Rabbi Shaya Karlinsky, Dean of Darche Noam Institutions (Shapell College of Jewish Studies/Yeshivat Darche Noam).

10. Mishna, Pirkei Avot 5:17; cf. commentary by Rabbi Ovadiah of Bartenura ad loc.

science and Torah falls into the latter category, with both sides being guilty of corrupting the debate.

EVOLUTION AND THE AGE OF THE UNIVERSE

The two most contentious issues between science and Torah are Darwin's theory of evolution with its modern upgrade known as Neo-Darwinism, together with the scientific view that the universe is approximately 13.75 billion years old with the Earth forming around 4.5 billion years ago. Both would seemingly contradict the biblical account of creation; evolution explains the origin and diversity of life on the planet, which has developed without the need for a guiding Creator. Life developed over billions of years, not the six days spoken about in Genesis and, in addition, according to an analysis of the generations listed in the Torah and books of the prophets, there have only been around 6,000 years since the beginning of time.

Such stark differences highlight the fact that to attempt to live with both science and Torah and accept the veracity of both appears to be fraught with the greatest cognitive dissonance of all. Most would understandably react by shunning either science or religion in favour of the other; for every scientist who derides the idea of faith, there are dozens of religious devotees who attain cognitive bliss by questioning the basis for scientific propositions such as the theory of evolution or the age of the universe. Yet such behaviour creates the false dichotomy we have had to endure which has forced many to take sides unnecessarily. Such an approach is anti-intellectual and demeaning to the more enlightened among us who sense a greater complexity to the world.

Many religious adherents do not understand science sufficiently to realize that it cannot be rebuffed with the usual mantras of "evolution is just a theory" or "scientists change their mind all the time". Both of these claims require a response, not only because they should be addressed, but because doing so will give us a greater understanding of the nature of science.

In a scientific context the word 'theory' does not imply uncertainty but rather "a supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained".¹¹ Then there is the question of 'proof'. Those engaged in arguments between science and religion often fail to recognize the many types and levels of evidence, verification, and substantiation which are all given the label of 'proof'.

The only type of scientific proof which is absolute is a mathematical proof. For example, Pythagoras' theory states that for a right-angle triangle,

11. *Oxford English Dictionary*.

the square of the hypotenuse is equal to the sum of the square of the other two sides. There are a variety of irrefutable proofs that clearly show this to be an incontrovertible fact. It is quite simply the truth. When one moves into the realm of experimental science, proof takes on a statistical character. The efficacy of a drug must be tested against a control group given a placebo. Since it is impossible to test the entire human population, a sample group must be taken. Analysis of the results will determine with some degree of certainty whether the drug works or not. This is what I call scientific proof. It is not the same in nature as a mathematical proof, but is backed by repeatable results, which are the hallmark of good science.

Evolution is a complex set of ideas, many of which are directly observable, provable, and repeatable in the laboratory. Some aspects of evolution cannot be observed directly as they are historical or happen over long periods of time. They can nevertheless be reasonably inferred from the evidence at hand.¹² This evidence is not the same as proof in a mathematical sense but it certainly forms the basis for a reasonable and rational position. Coupled with the fact that evolution is applied practically in many areas of scientific research and development, it cannot be dismissed as being “just a theory”. Similarly, in a court of law the prosecution is not required to prove the guilt of a suspect without doubt, but beyond reasonable doubt.

Other attacks against science claim that since scientific theories change when new evidence comes to light, they are unreliable;¹³ only religion, which is based on the ageless, unchanging word of God, can claim to be true.¹⁴ Unlike religion, science is by definition not dogmatic and welcomes change in light of new evidence. This does not mean that every scientific concept remains in a state of flux. The nature of evidence-based analysis is that when the evidence begins to stack up and results can be repeated and verified, it is reasonable to say that the theory holds true.

12. For example, it is impossible to look back in time and observe speciation, but it may be inferred from homologous similarities between species (such as bone structure), the fossil record, vestigial structures, and embryology.

13. The example most often given is that of the shift from steady state theory, which stated that the universe had always existed, to the big bang. Steady state theory was held by most scientists until the evidence came to light of an expanding universe (through Edwin Hubble's observation of red shift), leading to the big bang theory, which implied to many religious adherents the confirmation of the idea that the universe was created.

14. Rabbi Menachem Mendel Schneersohn, *Mind Over Matter: The Lubavitcher Rebbe on Science, Technology and Medicine* (Shamir, 2004), 13.

Nevertheless, in the interests of being even-handed, it would be remiss to neglect the glaring mistakes made by scientists when they venture into the debate tightly grasping the premise that religion has it wrong. Many famous science writers are also vehement secularists and lobby for a range of atheist philosophies in the arenas of education, politics, and society at large. Most are not trained in theology or philosophy and are often ill equipped to tackle to subtleties of either.¹⁵

When I was a young child I used to believe that thunder was caused by rainclouds bumping into one another. I also believed that Rice Krispies were responsible for causing freckles. Thankfully, my knowledge of science has developed and I am now enlightened enough to know that thunder is caused by the rapid expansion of air following a lightning strike and that freckles are caused by concentrations of melanin, not breakfast cereal.

No one would be content to trust in their child-like explanations of scientific phenomena, so why are so many people satisfied to believe their child-like comprehension of the Bible?

Understandably, those who read of six days of creation and stories of Adam and Eve in the Garden of Eden, who ate from a forbidden tree after being duped by a talking snake, would assume that this book is an absurd set of peculiar fairy tales made by bronze-age man to try and explain the world around him. Those who have read the Bible but have failed to engage in a thorough analysis of the original text will miss the subtle messages it seeks to teach, which are rarely, if ever, of a scientific nature. Over the course of Jewish history, our sages and commentators have understood the Torah's account of creation in a far less infantile way and many of them have not been motivated by a need to reconcile the Torah's account of creation with science. While some might cry foul at these attempts at apologetics, it is important to note that many were often writing well before modern scientific understanding.

15. Steve Jones, *The Serpent's Promise* (Little, Brown, 2013). Professor Jones predicates his book on a range of erroneous biblical assertions. One specific example is that, while mentioning the medieval biblical commentator Rashi as a biological ancestor to a vast number of Jews today (p. 28), he assumes, like many, that the first chapter of Genesis gives a chronological account of creation (see p. 84, where he writes that "Genesis has a different view for the Lord commanded 'Let the earth bring forth grass' even before he created the Sun"). He fails to note that Rashi himself asserts that the Torah was not making any such assertion (see Rashi on Gen. 1:1, s.v. *bereshit bara*; cf. n. 22 below; see also Mary Midgley, *The Solitary Self: Darwin and the Selfish Gene* (Heretics, 2010), where she points out the philosophical flaws in Richard Dawkins's *magnum opus*, *The Selfish Gene*.

The creation process itself is not seen by our commentators as a series of new creations, but rather as a natural process which is divinely driven. Indeed, all natural processes are considered to be driven by God.¹⁶ Even the idea of common ancestry is not necessarily anathema to the Torah's account of creation as understood by our commentaries. Similarity between the species was recognized by Jewish philosophers as early as the eleventh century.¹⁷ Others noted that the creation process was gradual,¹⁸ while, even more astonishingly, the idea that man evolved from animals was understood from the text of the Torah as early as the sixteenth century.¹⁹ Both man and animals were created from "the ground", implying that we share the same physical matter.²⁰ Only man was given a God-like soul, which is understood to reflect our ability to have free choice through a higher level of consciousness than that of the animals.²¹ Yet other commentators who predate modern science note that the creation story cannot be relating a chronological or scientific account of the formation of the world and the creatures and plants on it because the order does not make sense.²² For those literalists

16. Ps. 104; Midrash Rabba, Gen. 10:6; Rabbi Samson Rafael Hirsch, "The Educational Value of Judaism", in *Collected Writings*, vii. 261–2; Maimonides, *Guide of the Perplexed* 2:48.

17. Rabbeinu Bahya ben Joseph ibn Pakuda, *Hovot HaLevavot, Shaar HaYihud* 1:7.

18. Rabbi Meir Leibush ben Yehiel Mikhel Wisser (known as Malbim), commentary on Gen. 1:20.

19. Rabbi Obadiah ben Jacob Sforno on Gen. 1:26.

20. Compare Gen. 2:7 with 2:19.

21. Gen. 2:7. The significance of God breathing into Adam a *nishmat hayim* (living soul) is that it gave Adam a uniquely human quality. Humans appear to be physically similar to other animals and have the same animalistic tendencies that all animals possess, such as the drive to eat, reproduce, and survive. Nevertheless, the Torah teaches us that we were given a unique connection to God which transforms the paradigmatic human (Adam) from being mere animal hominid to being a *nefesh haya* (a living being). This is translated by Onkelos into Aramaic as *ruah memallela* (a speaking spirit). This does not imply that Adam was the first human to speak, but rather relates to a much deeper function. In Jewish thought the human soul contains three components: the *nefesh*, *ruah*, and *neshama*. The *nefesh* is the lowest part found in all animals and is associated with the animalistic urges mentioned earlier. The *neshama* (related to the *nishmat hayim*, living soul, in the verse) is the highest part and may be associated with higher consciousness and free will. Free will does not simply mean the ability to choose, but the ability to make moral choices with conscious intent which can override and resist animalistic tendencies. It is this that makes us uniquely human. The *ruah* connects those two parts. Therefore a *ruah memallela* is a *ruah* which acts as a conduit for communication between the higher consciousness (*neshama*) and the lower animal drive (*nefesh*). A corollary of these spiritual components can be found within the structures of the brain. The more ancient structures, known as the reptilian brain, govern the animalistic drives whereas the cortex (and especially the prefrontal cortex) governs the executive functions, which can override the desire to act on impulse.

22. Rashi on Gen. 1:1.

who attempt to understand the six 'days' of creation as twenty-four-hour periods, the sun, together with other celestial bodies, was only created on day four.²³

Yet there is one sticking point which remains. Even if Jewish commentators have historically explained the Torah in a way that is compatible with science, it may allow us to accept both science and Torah, but still leaves us with a question about the source of the Torah itself. While it is satisfying to be able to reconcile our understanding of the Torah with modern science, it does not automatically imply that it is rational to believe in the divine source of Torah. Taking this to its logical conclusion, *faith in God and the divine origin of the Torah cannot be generated by reconciling science and Torah.*

On the contrary, why should we believe in God and the divinity of the Torah if doing so requires faith? Even if the Torah's true message does not contradict the scientific explanation of reality, the consequence of a lack of direct evidence for God's existence or divine revelation means that faith is still required for those who believe in God. Apparently, given that God cannot be seen or detected through scientific means, His existence and all that is implied by it can never be based on evidence.

Bertrand Russell famously illustrated this point by positing the idea of a cosmic teapot:

Many orthodox people speak as though it were the business of sceptics to disprove received dogmas rather than of dogmatists to prove them. This is, of course, a mistake. If I were to suggest that between the Earth and Mars there is a china teapot revolving about the sun in an elliptical orbit, nobody would be able to disprove my assertion provided I were careful to add that the teapot is too small to be revealed even by our most powerful telescopes. But if I were to go on to say that, since my assertion cannot be disproved, it is intolerable presumption on the part of human reason to doubt it, I should rightly be thought to be talking nonsense. If, however, the existence of such a teapot were affirmed in ancient books, taught as the sacred truth every Sunday, and instilled into the minds of children at school, hesitation to believe in its existence would become a mark of eccentricity and entitle the doubter to the attentions of the psychiatrist in an enlightened age or of the Inquisitor in an earlier time.²⁴

23. Gen. 1:14.

24. Bertrand Russell, 'Is There a God?', *Illustrated Magazine*, 1952 (commissioned but never published).

Russell's point seems to be that it is preposterous to claim that since God cannot be disproved as He cannot be seen or detected using scientific methods,²⁵ His existence is above doubt or scrutiny. Indeed, the burden of proof of God's existence still remains with those who believe in Him. What is more striking, though, is that his point implies *inter alia* that it is equally logical to believe in Russell's cosmic teapot (or any other undetectable fanciful being or object) as it is to believe in God.

One could be excused for thinking that a revelation by God, or any other supernatural being, does not directly contradict the rational, evidence-based scientific explanation of the world. Yet if evidence-based investigation yields far more rational and compelling results, why should we even begin to entertain the premise that God exists any more than a cosmic teapot? Why should the Torah be taken seriously as a divine text which must be reconciled with science for any reason other than to make adherents to its teachings more comfortable about practising their religion, while accepting the truth of science? In essence, an act of divine revelation may not be unscientific, but such extraordinary claims require more than blind faith to be considered rational. Put bluntly, it appears to be no more rational to believe in God than it does to believe in fairies at the bottom of the garden, undetectable cosmic teapots or the Flying Spaghetti Monster.²⁶

From the teleological argument (known as the argument from design), made famous by William Paley's watchmaker analogy,²⁷ to Pascal's

25. See Moshe Freedman, 'Will Science Prove God's Existence?' *The Jewish Chronicle*, 18 Aug. 2011, as to why, from a Jewish theological perspective, science cannot detect God or spiritual claims such as prayer or the soul.

26. Following the Kansas State Board of Education decision to permit teaching intelligent design as an alternative to evolution in public school science classes, Bobby Henderson wrote a satirical open letter describing the divine Flying Spaghetti Monster. Henderson satirized creationism by professing his belief that whenever a scientist carbon-dates an object, a supernatural creator that closely resembles spaghetti and meatballs is there 'changing the results with His Noodly Appendage'. The accompanying parody religion, the Church of the Flying Spaghetti Monster otherwise known as Pastafarianism, has thousands of followers around the world keen to expose the flawed logic of the intelligent design movement, while opposing the teaching of creationism in public schools. In 2011, after reading that, according to Austrian law, hats and other such headgear were only allowed in official photographs for religious reasons, Niko Alm, an Austrian Pastafarian, successfully obtained a driving licence while wearing a colander on his head.

27. William Paley's *Natural Theology*, published in 1802: "Suppose I found a watch upon the ground, and it should be inquired how the watch happened to be in that place, I should hardly think ... that, for anything I knew, the watch might have always been there. Yet why should not this answer serve for the watch as well as for [a] stone [that happened to be lying on the ground]? For this reason, and for no other; namely, that, if the different parts had been differently shaped from

wager,²⁸ man has grappled with God's existence, proposing a menagerie of philosophical proofs.

When faced with the question of relying on faith, Jewish philosophers often took a different approach to the classic philosophical proofs. Rabbi Joseph Albo (d. 1444), in fact, entirely dismissed any indication that the fundamentals of Judaism could be based on any sort of deductive reasoning of the mind or physical reality.²⁹

Rabbi Moshe Alshikh (d. 1593) also drew attention to the question of why God could not simply reveal the secrets of the universe to mankind. Firstly, with man's finite intellect they would be unfathomable and beyond human comprehension. Secondly, if mankind could understand the deepest questions of the universe it would render him like God, in whom wisdom and will are the same. Alshikh continues and explains the source for Jewish faith:

God chose a different way, which is superior to the others. It provides a more convincing basis for religion than all the possible intellectual proofs and evidence that can possibly be found. That basis is the direct perception of the senses, which cannot be refuted by intellectual proofs or other types of evidence. Therefore, God chose to provide the generation that received the Torah at Sinai experiences that were totally unique in the history of mankind and which demonstrated all the principles of faith. This was done so that not the slightest doubt remained, so that they had no reason to deviate by the slightest amount from the principles of faith.³⁰

In other words, God's reality must be experienced through revelation, not induced through logical thinking. The experience of that revelation is the only reliable basis for faith. That's all well and good for the generation that witnessed God's revelation at Sinai, but over 3,300 years on, we have no direct contact with God.

what they are, if a different size from what they are, or placed after any other manner, or in any order than that in which they are placed, either no motion at all would have been carried on in the machine, or none which would have answered the use that is now served by it."

28. Blaise Pascal, in his *Pensées* (1690), argued that if, on balance, the evidence for the existence of God is inconclusive, one is faced with a choice between believing and not believing. If we choose to believe and are right, then eternal bliss awaits us. If we are wrong, we lose very little in the long run. But if we choose not to believe and are right, we gain very little. Yet if we are wrong (God does exist and we have gambled on His non-existence) our loss is enormous. Faced with the possibility of suffering eternal damnation, one would be foolish to discount God.

29. *Book of Foundations: First Discourse*, ch. 17.

30. Commentary on Deut. 5:4.

He does not reveal Himself to us to give us that direct experience and remove “the slightest doubt” of His existence.

Yet while the event of God’s revelation may have been thousands of years ago, His message, bound up and encoded in the Written and Oral Torah, was given to the Jewish people together with a process of communicating that message through the future generations. Two elements of that claim can be tested: we can establish whether the message received today has been corrupted from its original transmission, and, in addition, we can test whether the story of God’s revelation to the Jewish people is historical or mythical.

If there is one area in which mankind has excelled, it is to communicate with one another through science and technology. If God’s revelation was authentic and His message, the Torah, is His communication, it will stand up to the same tests used by scientists and engineers to ensure the integrity of information as it is transferred across the vast expanses of space and time.

RATIONAL JEWISH FAITH: COMMUNICATION AND TORAH

Ever since the dawn of civilization, man has understood the importance of sharing ideas. Communication builds relationships and relationships are the cornerstone of humanity. One of the earliest methods of communicating over large geographical divides was the use of mountain-top signal fires. This form of communication was excellent at rapidly transmitting simple binary messages, such as the onset of war, over large distances. An example of this can be found in the Gemara, where mountain-top fires were lit to signal the onset of the new month.³¹ Yet, as a communication system, this method was limited in the complexity of the message it could send; signal fires can convey the result of a simple yes or no question but no more. Nevertheless, it was this concept of using simple yes or no questions to code information that heralded a new era in long-distance communication.

In 1605, the English philosopher and scientist Francis Bacon showed how letters could be encoded using a bilateral cipher. With the invention of the telescope by German-Dutch lens-maker Johann Lippershey in 1608, a raft of inventions capitalized on Bacon’s idea. In 1795 the Anglican vicar Lord George Murray invented Britain’s first optical telegraph. Messages were coded using six shutters, which transmitted military and naval messages between London and Deal, critical for the impending threat from France and the imminent Napoleonic wars. While electricity had yet to be discovered, the first digital communications system paved the way for the communications boom which continues to this day.

31. Rosh Hashana 23a.

As techniques became more sophisticated, the demand for rapidly transferring ever more complex sets of information over long distances was confronted by a number of engineering problems.

Information Theory

Imagine a makeshift device for speaking to a friend at the other end of a field involving two tin cans, connected at their base with a wire. At one end, one person speaks into their can, which transmits the vibrations of sound along the wire. When they reach the other end, the second can amplifies these vibrations so they can be heard by the listener.

There are two difficulties which challenge the reliability of this system. The first is that over long distances the vibrations will attenuate and the signal will eventually be lost. The second is that the wire is susceptible to interference from extraneous vibrations caused, for example, by the wind. A more common example is the static and hiss heard on a radio caused by electromagnetic interference. If this interference, referred to as 'noise', exceeds a certain limit, it will drown out the signal, rendering the message undecipherable.

The field of information theory attempts to address these problems. The American mathematician, engineer, and cryptographer Claude Elwood Shannon (d. 2001), considered to be the forefather of information theory, described the problem of information transfer over a noisy channel by breaking down each component of any communication system. Shannon's masterstroke was to show that all forms of information can be reduced to a complex set of binary choices, in the same way that the shutters in Lord Murray's optical telegraph only had two states (open or closed). These choices were named by the American mathematician John W. Turkey as binary digits or simply 'bits'.³² All modern communication, from mobile phones to satellite television, relies on Shannon's theories.

Data Compression and Error Correction

Working with the American engineer Ralph Hartley, Shannon developed the idea that communication could be optimized by maximizing the rate at which data can be transferred and minimizing the effects of noise by detecting and correcting erroneous data.

The two methods used in modern communications to achieve this are data compression and error correction. Data compression methods involve increasing

32. Claude E. Shannon and Warren Weaver, *The Mathematical Theory of Communication* (University of Illinois Press, 1963), 9.

the efficiency of data transfer by removing redundant information. Depending on need, some methods of data compression deliberately compromise on the details of the message in favour of a more concise yet efficient set of data.

Error correction methods involve algorithms which can check the integrity of the data and request that it be retransmitted if received in a corrupted form.

Torah as a Communication from God

The giving of the Torah on Mount Sinai is perhaps the most defining moment in the history of the Jewish people. God communicated His divine wisdom to Moses in the form of the Written and Oral Torah together with the Ten Commandments.³³ In essence, Torah is information and the dissemination of Torah from God to Moses and from Moses to the rest of the Jewish people can be thought of as a system of communication.³⁴

It should, therefore, be possible to apply the same concepts found in information theory to both the actual giving of the Torah at Mount Sinai together with the process of its transmission. Theoretically, the same components of Shannon's communication system should be found.

Verification of the Source

The Torah itself describes how the entire nation witnessed the revelation at Sinai.³⁵ The Torah indicates that this event was like no other in human history: "Did ever a people hear God's voice speaking out of the midst of the fire as you have heard and live?"³⁶ Significantly, the uniqueness of this national-scale revelation means that the chances of someone fabricating it are vanishingly small. Any individual may claim to have had a personal numinous experience or communication with the Divine. Yet while it is impossible to disprove the claim, it is equally impossible to verify it.³⁷

In contrast, it would be challenging, to say the least, for someone to concoct a claim of divine revelation experienced on a national scale. The fact that the story of the Exodus and national revelation at Mount Sinai are stories which are universally accepted by the Jewish people and retold throughout the generations provides a strong and rational indication that these events are historical

33. Lev. 26:46 and *Sifra* on *Parashat Behukotai* 2:12.

34. See *Mishna Avot* 1:1 and Rambam's introduction to the *Mishna* regarding the unbroken chain of transmission.

35. Ex. 20:14.

36. Deut. 4:33.

37. *Kuzari* 4:11.

fact. While not a ‘proof’ of the revelation at Sinai as such, the claim of national revelation would have been too exorbitant to fabricate and would have left clear bifurcations in the most fundamental concepts of Jewish thought.³⁸

The existence of the Jewish people as a medium for the transmission of Torah, the repetition of the story of the Exodus, and the culture of intergenerational learning are the most profound factors in preserving the authenticity of Torah and its transmission through time.³⁹ To base one’s faith in God revealing

38. See *Permission to Believe: Four Rational Approaches to the Torah’s Divine Origin* by Rabbi Lawrence Kelemen (Targum Press, 1990), 63–70.

39. One of the classic challenges to the continual transmission of Torah is the account given of the rediscovery of a Torah scroll by King Josiah (11 Kings 20 and 11 Chron. 34). Following the death of the righteous king Hezekiah (11 Kings 20:21), his son Manasseh began to reign over Judah. From the outset Manasseh undid the righteous work of his father and reinstated every type of forbidden worship, including the sacrifice of his own child (ibid. 21:2–9). He reigned for 55 years, bringing terror and bloodshed to the Land of Israel. His successor was his son Amon, who continued idol worship but was killed by his servants after serving as king for only two years (ibid. 21:23). The next to reign was his son Josiah, who was righteous and sought the help of Hilkiah the High Priest to collect funds to rebuild the Temple in Jerusalem (ibid. 22:1–7). During the rebuilding, a Torah scroll is discovered by Hilkiah, who brings it to Shafan the scribe, who reads it to Josiah. The king tears his garments and commands Hilkiah, together with his other servants, to enquire of God what will happen as a result of the Jewish people’s previous idolatrous practices. They ask Huldah, a prophetess, who informs them that God will exile the Jewish people as a result of the idol worship practised. Josiah leads a campaign of repentance, which he begins by arranging a public reading from the Torah that they had found in the Temple (ibid. 23:1–3) before removing all of the idols and burning them outside Jerusalem (ibid. 4). When the scroll was discovered, 67 years had passed since the beginning of Manasseh’s campaign to banish Jewish practice from Israel and impose idolatry on the nation. The rediscovery of Torah during this episode appears to some as a break in the transmission of Torah. Indeed, many Bible critics use this story to propagate the idea that Deuteronomy was not written by Moses, but much later. It also seems to represent the idea that Torah and Jewish practice had ceased entirely, breaking the chain of transmission from Sinai. Yet the notion that Torah had been forgotten during Manasseh’s reign is challenged by both classical and modern commentators. According to tradition, the Torah discovered was the original copy written by Moses himself, which had been hidden during Manasseh’s reign. This was to protect it from being destroyed after Aḥaz had burned a Torah scroll (Malbim and Radak ibid. 22:8). In addition, the catalyst for Josiah’s fear at finding the scroll was not the discovery of Torah anew, but rather the fact that it unusually opened to the section of the curses in Deuteronomy instead of being rolled to the beginning (Malbim ibid. and Abravanel ibid. 22:15–17). In particular, he saw the verse (Deut. 28:36) “The Lord will lead you and your king whom you will have established over you, to a nation unknown to you or your fathers; and there you will serve other deities [made] of wood and stone” (Rashi on 11 Kings 22:8). Later commentaries also show that Torah and Jewish practice had not been broken completely during the time of Manasseh. Rabbi Zvi Hirsch Schlez (nineteenth century) makes a number of points. Firstly, the gap between the reign of the righteous

Himself to the entire nation at Mount Sinai is therefore qualitatively different to the sort of blind faith which is often espoused by religious adherents. It is evidence-based faith, both rational and logical, and while it may not necessarily be an incontrovertible proof of God's existence, it demonstrates a level of reasonable evidence equal to many scientific concepts.

Accuracy of the Written Torah

There are many laws which attempt to ensure that the text of the Written Torah remains unadulterated. God explicitly commands that the Torah should remain unchanged,⁴⁰ even if later prophets who commune with God intimate that a particular law is no longer valid, or attempt to innovate something themselves.⁴¹ Just as any signal may be corrupted by noise, the writing of new Torah scrolls is threatened by scribal errors.

Shortly before Moses died, he wrote thirteen Torah scrolls; one for each of the twelve tribes and one to be kept in the Ark of the Covenant.⁴² The third-century CE Rabbi Yannai explained that the purpose of the Torah scroll kept in the Ark was so that it would act as the standard to which other later copies could be compared.

Hezekiah and that of Josiah was only 57 years. It is fair to say that there were people alive during Josiah's discovery who had been alive during the reign of Hezekiah. Indeed, even Manasseh repented towards the end of his life (11 Chron. 33:16). Since Amon only reigned for two years, it seems far-fetched to say that the knowledge and observance of Torah would have been entirely lost to Jews at the time of Josiah. In addition, according to the account in the book of Chronicles, Josiah was righteous from the start, long before the discovery of the Torah scroll: "And he did that which was right in the eyes of the Lord, and he walked in the ways of David his father, and turned aside neither to the right nor to the left. And in the eighth year when he became king, when he was still a youth, he started to purge Judah and Jerusalem of the high places, the *asherim*, the graven images, and the molten images" (11 Chron. 34:2-3). Rabbi Schlez notes that this would have been impossible had the Torah been forgotten entirely. Therefore it should not be assumed that the episode with Josiah indicates a break in the chain of transmission. On the contrary, it shows how strong that chain is when placed under decades of strain by the scourge of idol worship and the evil tyrants who deliberately tried to eradicate Jewish practice and Torah learning (see *Niflaot MiTorat HaShem Yitbarakh, Even Pina*, Introduction, 23-4). Sid Z. Leiman also points out that a break in tradition is not compatible with the text. He writes in *The Canonization of Hebrew Scripture: The Talmudic and Midrashic Evidence* (pp. 143-4 n. 77), "As the narrative unfolds in 2K 22:8 ff. it assumes the existence of a pre-Josianic Torah. Moreover, the people could hardly have been made accountable for violating a law code which neither they nor their forefathers had ever seen." See also J. H. Hertz, *Pentateuch and Haftorahs*, pp. 937-9.

40. Deut. 4:2.

41. Shabbat 104a (cf. Lev. 27:34).

42. Deuteronomy Rabba 9:9 (cf. Deut 31:9).

In addition, there are a variety of laws which are designed to minimize scribal errors. In writing a new Torah scroll, the scribe must copy from an existing text. For example, if even one letter has been written by heart, it is disqualified.⁴³ A Torah scroll is further disqualified if even a single letter is omitted or added,⁴⁴ and each letter must be surrounded by blank parchment to ensure that letters do not touch one another, forming new letters.⁴⁵ For the same reason, each letter has to be formed properly.⁴⁶ This set of laws (together with many others) provides the safety mechanisms comparable to an inbuilt automated repeat request error correction method. However, since after the destruction of the First Temple the Ark of the Covenant was lost together with the Torah of Moses, Jewish scribes no longer had the original Torah against which to check their copies. Coupled with national dispersion and separation, small differences began to occur in the Torah texts. Nevertheless, after all of the trials and tribulations, displacements and dispersions, pogroms and persecutions over the last two thousand years, very few scribal mistakes have been made.

Rabbi Professor Mordechai Breuer (d. 2007) analysed different Torah scrolls for differences and errors. While it was a complex study, in conclusion only twelve irreconcilable differences were found, all of which regard the spelling of different words but in no way change their meaning.⁴⁷ Nevertheless, if we consider these differences as noise, we can calculate the signal-to-noise ratio of the Written Torah in the same way that a telecommunications signal is assessed for its transmission. In modern internet wireless systems, a typical signal-to-noise ratio of 40 to 50 dB is considered excellent. By taking the number of letters in the Torah and the twelve differences, the error rate is 0.004%. This is equivalent to a signal-to-noise ratio of over 80dB.

Written Torah, Oral Torah, and the Ten Commandments

The Talmud⁴⁸ discusses the meaning of the following verse: “And the Lord said to Moses, ‘Come up to Me to the mountain and remain there, and I will give you the stone tablets, the Law and the commandments, which I have written to instruct them.’”⁴⁹ The Talmud concludes that not only were the Ten Commandments and

43. *Shulhan Arukh, Yoreh De'a* 274:2.

44. *Ibid.* 275:6.

45. *Ibid.* 274:4.

46. *Ibid.* 274:5.

47. One example can be found in Gen. 4:13, where the word **נִשְׁבַּח** can also be spelt **נִשְׁבָּח**.

48. *Berakhot* 5a.

49. *Ex.* 24:12.

the Written Torah given at Sinai, the entire gamut of Oral Torah was also given at that time. Rabbi Moses Hayim Luzzatto (Ramhal) writes that God did not want to give man a Torah that could be understood without explanation.⁵⁰ On the contrary, the Written Torah contains many vague, indeterminate, and undefined concepts such as the prohibition of *melakha* (creative activity) on Shabbat,⁵¹ or the precise description of a mezuzah or tefillin.⁵²

Nevertheless, while the Torah details the giving of the Ten Commandments, it is clear that these are a subset of commandments already contained within the Torah. This then begs the question as to what the purpose was of giving Moses and the Jewish people two tablets containing a mere fraction of the total information. If they do not add anything new to the Torah they would appear to be superfluous.

Rashi⁵³ quotes Saadya Gaon, who wrote poems extolling the 613 commandments. Saadya does not merely list all the commandments; he links them to each of the Ten Commandments. In other words, the Ten Commandments contain the whole of Torah in some condensed form. Clearly, much of the detail of the Torah is lost, but their concise nature means that it is easier to transmit and remember them.

Noise in the Transmission of Torah

Just as every system of communication is affected by noise, God's divine will is also open to distortion from two primary sources. The first is deliberate fabrication or filtering of the information. God Himself makes the distinction between Moses and other prophets.⁵⁴ The Midrash⁵⁵ describes how the prophecy of Moses was different to that of all other prophets. While other prophets witnessed God's message through an unclear lens, Moses spoke to God directly, without distorting the message. This is what the Torah means when it says that God spoke to Moses face to face,⁵⁶ mouth to mouth.⁵⁷

Yet the dissemination of Torah is equally (and in some circles primarily) focused on the process of teaching the Oral Torah. This has become associated

50. Rabbi Moshe Hayim Luzzatto (known as Ramhal, d. 1746), *Essay on Fundamentals*.

51. Ex. 31:15.

52. Deut. 6:9.

53. Rashi on Ex. 24:12.

54. Num. 12:6, 12.

55. Leviticus Rabba 1:14; cf. Ramhal, *Derekh HaShem* III:5:1, 4.

56. Deut. 5:4.

57. Num. 12:8.

with the teachings of the tannaic sages, whose discussions and debates were redacted by Rabbi Judah HaNasi around the year 200 CE into the Mishna. Around three hundred years later, Ravina and Rav Ashi compiled the Gemara, which contains the wisdom of the later amoraic sages, who analysed and scrutinized the words of their tannaic predecessors. Together with a plethora of other ancient texts, later commentators and scholars were able to crystallize Jewish law and apply it to every contemporary challenge.

Nevertheless, even a cursory glance at the Talmud (the compilation of the Mishna and Gemara) reveals a range of views in almost every area of Jewish law and thought. Although it seems that God originally transmitted one message to Moses, it wasn't long before noise entered the system causing disparity and a divergence in opinion. Doubts and uncertainties morphed into disagreements and disputes and the very integrity of God's message seemed to be under threat.

The Talmud readily accepts that laws were forgotten when unpractised.⁵⁸ Yet the system by which Jewish law is applied to everyday life contains its own checks and balances to try to derive the correct approach; ultimately, if Jewish law is to be useable, there must be some way to decide which path of many should be followed.

Indeed, there are many examples in the Talmud where different sages will reach different conclusions in their analysis. Nevertheless, the Gemara will try to reconstruct the original law.⁵⁹ Sometimes students will misunderstand the words of their teachers, who often spoke in terse language.⁶⁰ There are even examples of two students giving conflicting reports about the teachings of their teacher. In each case, the Talmud will attempt to reconcile the disagreement and test each position until a final conclusion is reached.⁶¹

On occasions, the matter will be left unresolved, such as in the question of which type of *shofar* note should be blown between the *tekiot* (long blasts) on Rosh Hashana.⁶² This is why we must sometimes resort to compromise in order to fulfil God's Will.⁶³

58. Berakhot 33a; cf. *Tosafot* on Berakhot, s.v. "Let us see then what Ezra did ordain".

59. Temura 15a–16a.

60. Based on the dictum in Pesachim 3b, לְעוֹלָם יִשְׁנֶה לְתַלְמִידָיו דְּרַךְ קְצֵרָה – "One must always teach one's students in a succinct way". This resonates again with the concept of data compression; condensing the message facilitates its transmission. Yet there are examples where students have misunderstood their teacher.

61. Bava Metzia 46b–47a; *ibid.* 66a and 101a.

62. Rosh Hashana 33b.

63. Maimonides, *Mishne Torah, Laws of Shofar, Sukka, and Lulav* 3:2.

There are however, many other occasions when differences in opinion are not examples of noise but of two (or more) legitimate expressions of the original message. This is what the Gemara means when it says *elu ve'elu divrei Elokim hayim hen* – these and those are the words of the Living God.⁶⁴ It means that both conflicting opinions are part of the system of Jewish law; even if only one of the positions can be ruled part of Jewish practice, the other opinion is still a legitimate expression of Torah even if it was never accepted into Jewish practice.

Feedback

During the Second World War, the American author and academic Wilbur Schramm (d. 1987) joined the Office of War Information to investigate the nature of propaganda. During his time he developed new models of communication, building on the original work of Shannon and Weaver. He later became the founding director and research professor of the Institute for Communications Research at the University of Illinois at Urbana-Champaign.

Schramm developed Shannon's original linear model of information transfer by adding one extra feature: the concept of feedback. He writes that communication is "a relationship built around the exchange of information."⁶⁵ In our Torah model this reflects the idea that Torah learning should not be an academic subject but must change us in some way.⁶⁶ Those differences in behaviour, those small acts which allow us to grow stronger in our connection to God, have effects which, according to Jewish mysticism, reverberate back into the heavens.⁶⁷

DISSEMINATION OF TORAH: THE JEWISH PEOPLE ARE THE MEDIUM

Shannon and Hartley wrote a theorem which states that the amount of information that can be reliably transmitted over a communications channel of a specified bandwidth⁶⁸ in the presence of noise (known as channel capacity) is directly related to increasing the bandwidth of the medium over which the information

64. Eruvin 13b.

65. "The Unique Perspective of Communication: A Retrospective View", *Journal of Communication* (Summer 1983), 15.

66. Ramhal, *Derekh HaShem* 1v:2:2.

67. *Ibid.* 1:4:9,10 and 1:5:4.

68. The rate at which information can be transmitted.

is being transferred and reducing the signal-to-noise ratio through error correction and noise reduction techniques.⁶⁹

The Written Torah is replete with commands for parents and grandparents to pass on Jewish teachings and heritage to the next generation.⁷⁰ God praises Abraham because he “commands his children and household after him.”⁷¹ In the *Shema*, which draws on three sections from the Torah, we repeat twice a day the commandment to educate our children.⁷² God warns us about forgetting our heritage and exhorts us to pass on the stories and teachings of our ancestors to our children and grandchildren.⁷³

Hebrew has two words for tradition: *kabbala* and *mesora*. The word *kabbala* comes from the root *k-b-l* meaning receive, and *mesora* comes from the root *m-s-r* meaning to pass on. Tradition, therefore, in a Jewish sense, means to receive Jewish knowledge and teachings from the previous generation and to pass them on to the next.

In terms of Shannon’s concept of information transfer, the Jewish people represent both the receiver of the message and the medium by which its transmission continues. We must learn Torah to understand God’s will but also teach it to others so that His message is perpetuated. The ultimate destination of this message is represented by our children and grandchildren, the next generations, who wait expectantly to be inspired by their parents, grandparents, and teachers.

Every parent and every teacher, every child and every student represents the medium through which God’s message is transmitted. Whenever a parent inspires in their child a love of Judaism or whenever a teacher or rabbi imparts their knowledge to others, the bandwidth of Jewish learning and experience widens, thus strengthening our collective connection to God.

In our time, Lord Sacks has led our community with an unrivalled passion for Judaism and the Jewish people. Coupled with his profound scholarship, his uniquely thoughtful and insightful reflections have provided a Jewish perspective on every subject, from politics to science, economics to sociology, morality to faith. He has consequently widened the bandwidth of Jewish learning and experience, inspiring a generation of Jews from all backgrounds to thirst for a

69. R. V. L. Hartley, “Transmission of Information,” *Bell System Technical Journal* (July 1928), and C. E. Shannon, “Communication in the presence of noise,” *Proceedings of the Institute of Radio Engineers*, 37 (1) (Jan. 1949), 10–21.

70. Gen. 18:19 and Rashi ad loc.; Ex. 13:8, Deut. 6:7, and Deut. 4:9–10.

71. Gen. 18:19.

72. Deut. 6:7.

73. Deut. 4:9–10; cf. Ex. 13:8.

stronger connection to the lessons and experiences of our forefathers at Sinai while making them relevant to modern life. His contribution to public life and the esteem in which he is held outside of Anglo-Jewry has engendered a deep sense of pride within our community. He has ensured that our tradition is seen as an important voice in wider public affairs, relevant far beyond our synagogues, study halls, and homes. In essence, he has been a champion of faith within a society which has all but lost its faith.

IMPLICATIONS FOR FAITH

To sceptics, faith is the process which seeks to bypass rational thought in order to alleviate the pain of cognitive dissonance. Science is provable and evidence-based, whereas religious ideas such as God are, by definition, not. For some, when science challenges belief, faith takes effect to sooth the psychological distress. This is the faith that any rationalist would rile against, prompting the eminent evolutionary scientist Richard Dawkins to write that “Faith is the great cop-out, the great excuse to evade the need to think and evaluate evidence. Faith is belief in spite of, even perhaps because of, the lack of evidence.”⁷⁴

But Jewish faith was never meant to be blind, it was meant to be as evidence-based as science.⁷⁵ We do not believe in God because we have bamboozled ourselves into doing so. Nor do we believe because it makes us feel better about the world or because that is what our parents taught us to do, as their parents taught before them and so on, *ad nauseum*. We believe in God and the divinity of the Torah because we have a *mesora* – a chain of transmission which contains all of the necessary features of any modern communication system needed to ensure a proper transmission from source to receiver.

74. “Inheriting Religion”, *The Nullifidian*, Nov. 1994.

75. Maimonides, *Moreh Nevukhim* (*Guide to the Perplexed* 3:51). Maimonides also writes:

One should not believe something to be true unless it belongs to one of three categories. (1) Something that can be validated by clear proof based upon human reasoning or empirically, e.g. arithmetic, geometry, or astronomy. (2) Something that can be perceived directly by one of the five senses. For example, if he sees something is red or black, or he tastes something is bitter or sweet or he can feel that something is hot or cold ... (3) Something which he has received as a tradition from the prophets and righteous people. A sensible person needs to classify everything he believes into that which is based on rational proof, that which he directly perceives with his senses, and that which he believes because of valid tradition. Anyone who believes something outside these three categories is described by the verse (Prov. 14:15), “A fool believes in everything.” (*Letter on Astrology*)

See also Rabbi Samson Rafael Hirsch, *Collected Writings*, i. 97 ff.; Rabbi Simḥa Zissel Ziv Broida (known as the Alter of Kelm, d. 1898), *Hokhma and Mussar* 2:62.

This teaches us two things. Firstly, that our knowledge of God comes from His national revelation to our people, collectively experienced by our forefathers and universally passed down from generation to generation in an unadulterated form.⁷⁶ Secondly, the text of the Torah He gave them can be shown beyond reasonable doubt to be the same as the one we have today.

We do not believe in God “in spite of, even perhaps because of, the lack of evidence” but see our faith as rational and evidence-based. Malbim expressed it as follows:⁷⁷ “Knowledge is something which is perceived directly with the senses or is understood through such a clear proof that it is impossible to doubt it at all. *Emuna*, on the other hand, is something which is not comprehended in an irrefutable manner but is accepted from highly reliable sources and is believed based on their say-so.”

In truth, the Hebrew word *emuna* does not really translate as faith, but rather as a steady faithfulness or nurturing process based on something which is known from investigation.⁷⁸

Jewish faith requires parallel thinking. The greatest rewards come to those who have the intellectual courage to evaluate the world without prejudice. By accepting F. Scott Fitzgerald’s challenge to gain a first-rate intelligence by functioning with two opposing ideas in mind, we learn to maintain our cognitive integrity and harmony while engaging in the most exciting adventure to the heart of the truth. Once there, the most supreme cognitive emancipation comes when parallel thinking gives rise to integrated thinking, allowing us to skip between two previously conflicting worlds. Our efforts yield a higher truth, where science and Torah reveal different but equally valid perspectives on reality.⁷⁹ Reconciliation without the dregs of dishonesty or prejudice provides the greatest gift in satisfying our complex human minds while giving us the most solid foundation on which to lead the most fulfilled, engaged and integrated lives.

76. Rabbi Moses Sofer (known as Hatam Sofer, d. 1839), on *Yoreh De'a* 2:340, where he asserts that “Parents don’t [deliberately] teach lies to their children.”

77. Malbim, commentary on Hosea 2:21.

78. Ex. 17:12: וַיְהִי יָדָיו אֶמּוּנָה עַד בַּאֲרֶבֶת הַשָּׁמֶשׁ , “Moses’ hands were held *steady* until the morning”; Esther 2:7: וַיְהִי אִמֵּן אֶת הַדָּסָה , “And he had *raised* Hadassa”. The word “amen” derives from the same root. Hosea (2:22) implies that *emuna* is designed to lead to knowledge of God. See *Metzudat David* ad loc.

79. See Chief Rabbi Jonathan Sacks, *The Great Partnership* (Hodder and Stoughton, 2011).