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Why Science Did Not Die?

Secrets of the Islamic Mind in Its Golden Age

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What do we need in order to construct a building? Beyond suitable land, we undoubtedly require materials of labor (such as iron, sand, cement, etc.) and tools of labor (like cranes, mixers, etc.). We also need labor power, which—through the use of tools—can employ the materials to construct the building. It is self-evident that the more suitable and stronger the land is, the higher and firmer the building will rise. I will not concern myself here with the preparation of unsuitable land, as that belongs to a broader field.

This is about constructing a building; what about the production of thought? Producing thought is analogous to constructing a building. Beyond the effort exerted by the researcher—the fatigue, continuous anxiety, persistent worry, enduring confusion, and sustained passion in the pursuit of knowledge—the materials required for producing thought consist of the accumulated knowledge that a person consciously acquires throughout life, based on principles that must be respected and whose significance must be understood before being ignored or destroyed through ignorance, following the blind rejection of the foundations of things without questioning the meanings carried by these principles before rejecting them. As for the tools, which occupy a decisive position in our approach, they manifest in the path followed by the mind in producing knowledge. Tools are the method, while materials are the accumulated knowledge. Tools represent quality, and materials represent quantity. While access to this accumulated knowledge is relatively easy—since the researcher can obtain it by consulting encyclopedias, summaries, abstracts, indexes, specialized dictionaries, etc.—and has become even easier with technological development, allowing one to reach thousands of pieces of information and ideas using a good search engine, the real problem lies in classifying this flood of information and organizing the torrent of ideas, so that each piece of knowledge or idea is returned to the whole to which it belongs, thereby producing scientific knowledge. The problem lies in the tool through which knowledge is produced—the method. The method, as a tool used to validate a hypothesis and reach a truth, manifests itself in conscious abstraction through Dialectical Contradiction.

I. Abstraction

(1)

When we ask about the number of colors, melodies, ideas, or even words in a language—can they be counted, or is it impossible? Before providing an answer, we must first understand some fundamental concepts related to the method, which is the path the mind follows to provide an answer. When a cognitive question, any cognitive question, is posed, it is not important in my approach to give an answer per se; what matters is the path the mind takes to produce this answer. A correct answer, without claiming to possess absolute truth, will ultimately be the result of sound intellectual steps.

Let us, therefore, temporarily set aside our questions regarding colors, melodies, ideas, and words, and ask a primary question: How did the Islamic mind produce knowledge during its Golden Age? The mind that, at a decisive historical moment, became the intellectual heir to Greek science (with its ancient Eastern origins) and the continuation of Roman jurisprudence, which manifested in legal debate and the science of drafting laws.

The answer to this question is found in history, which explains why Islamic civilization once prevailed and illuminated the medieval world during one of its darkest and most ignorant phases. In Europe during the Middle Ages, at the same historical moment when human consciousness was crushed, between the idolatry of ecclesiastical thought and the oppression of feudal property, and at the same moment when souls were enslaved, Islamic thought shone in the darkness, and its treatises illuminated a decisive era in the history of human thought and the journey of humanity as a whole. While Europe was in such darkness, light emanated creatively from Bukhara to Andalusia. This light was not a reflection of an overwhelming flood of progressive ideas, but rather a reflection of the method through which these progressive ideas were produced.

Muslim scholars in their Golden Age, the era of intellectual refinement, despite political decline, used Abstraction as a method of thinking to discern the objective laws governing natural phenomena. They classified, organized, and explained phenomena by rising above all that was secondary, isolating each concept mentally from others, in order to reveal the universal principles of all phenomena that preoccupied their minds, without being hindered by prohibitions or taboos—even in religious sciences—and they were able to reach the hidden areas of human thought.

If we wish to understand, albeit briefly, how the Islamic mind produced scientific knowledge during its Golden Age, we can look at some examples. Ibn al-Muqaffa (724–759) directed his message toward the method to be followed for comprehension and awareness, writing:

“O student of knowledge, know the principles and the chapters; for many people seek the chapters while neglecting the principles. Whoever masters the principles is satisfied with them instead of the chapters, and if he attains the chapter after mastering the principle, it is better.” (Ibn al-Muqaffa, *Al-Adab al-Kabir*, p. 280)

Ibn al-Muqaffa ‘emphasizes the importance of equipping oneself with the power of abstraction when studying any field of knowledge. He clearly advises the student to observe the universal principles and fundamental rules, and once achieved, the student will have mastery over details and secondary matters.

When the second teacher, Al-Farabi (874–950), enumerated the sciences, he explained:

“As for the science of numbers, there are two sciences known by this name: one is practical arithmetic, the other is theoretical arithmetic. The practical examines numbers as countable entities that need to be determined in bodies or other objects, like men, dinars, or dirhams. The theoretical, however, examines numbers abstractly, detached from bodies and from all countable entities; it considers numbers independently of the tangible objects that could be counted. Theoretical geometry considers the lines and surfaces of objects in general, in abstraction, imagining lines without concern for which body they belong to, imagining surfaces, squaring, rotating, and triangulating in general terms, without regard to any particular body, and imagining solids in general, regardless of their material or perceptibility, without forming a solid as a piece of wood or a wall in mind.”(Al-Farabi, *Enumeration of the Sciences*, pp. 75–77; compare: *Opinions of the People of the Virtuous City*, pp. 41–42)

Al-Tawhidi (922–1023) reached the highest levels of abstraction when he identified the four areas one must comprehend to seek knowledge, considering them sufficient:

“The closest paths and easiest means are to know nature, the soul, the intellect, and God; for when one knows this whole in detail, and examines the details in the whole, he achieves the greatest success, attains the highest dominion, and saves much effort in reading large books with many pages...”(Al-Tawhidi, *Al-Imta’ wa al-Mu’anasa*, p. 106).

The Brethren of Purity (10th-century scholars), in the eighth epistle of the Mathematical Section in the *Practical Arts and their Purpose*, analyzed the nature of goods and services in society at the highest level of abstraction. They did not focus on the countless and varied products humans produce, but rather on universal principles, uncovering the roots of crafts, defining them by the four elements (water, earth, fire, air), then by the three materials (metal, plant, animal), then by quantities and values, and finally by the human soul and body. Their abstract concern was universal foundations, not particulars:

“Among the crafts, some involve water, like the work of salt makers, water carriers, and distillers. Others involve earth, like the work of well diggers and canal builders. Others involve fire, like the work of lamp lighters and blacksmiths. Others involve air, like the work of wind instrument players and blowers. Others involve a metallic body, like the work of blacksmiths, silversmiths, and glassmakers. Others involve plant matter from trees, rods, or leaves, like carpenters, flax workers, and millers. Others involve animals, like hunters, shepherds, and veterinarians. Others involve parts of animals, like butchers, tanners, cooks. Some involve measurement, like weighers and measurers. Some involve value, like money changers and brokers. Some involve human bodies, like doctors and beauticians. Some involve the human soul, like teachers...”(Brethren of Purity, *Rasa’il Ikhwan al-Safa’ wa Khilal al-Wafa’*, Vol. 1, p. 204).

Ibn Khaldun (1332–1382), despite living in one of the worst centuries for the Islamic world before the complete decline caused by the shift of trade routes around Africa in the late 15th century, discussed the fundamental principles upon which sciences are based. He attributed the difficulty of learning to the details and secondary matters that impede proper understanding. Details and secondary matters are not neglected but are treated only as such, i.e., non-influential to the phenomenon under study. They come second after deep comprehension of the essential principles of the science to be learned:

“Had the teachers restricted themselves to jurisprudential issues alone, matters would have been far simpler, and education would have been easier and more accessible.” (Ibn Khaldun, *Muqaddimah*, p. 539)

(2)

Perhaps the most superficial and simultaneously provocative claims are those that appear like seasonal diseases, such as the flu. They take the form of slogans like “Reviving Arab Thought!”, “Engaging with Islamic Heritage!”, or “Authenticity and Modernity!”, etc. In these ceremonial proclamations, what is mostly found is nothing but the tedious regurgitation of details, information, and news of Islamic history, often deliberately culminating in the statement—not a real claim— “The mentioned thought preceded Western thought in discovering this amount of knowledge or that degree of science.” This assertion does not confirm that the ancients are alive, as much as it confirms that we, the living, are dead!

Muslims, in their Golden Age, taught the world science and knowledge! Or, that Muslim sciences and knowledge rescued Europe from the quagmire of ignorance, backwardness, and underdevelopment! Or, that without Muslim knowledge, Europe would not have flourished except after far longer historical periods! All these statements are hollow in meaning, empty in content, and have no place within a scientific framework, yet they stubbornly retain their position in selective, neurotic history. It is a history preoccupied with pre-prepared conclusions, which are immediately fed into the notebooks of generalizations to be absorbed uncritically by minds indoctrinated in one branch of knowledge or another.

“Muslims, in their Golden Age, taught the world how to think.” This is the answer—assuming its validity— to the question of what Muslim scholars left behind for the world.

(3)

Accordingly, we can say, clearly, that the crisis of education in the Arab world in general, and in Egypt in particular, stems from the insistence on cramming students' minds with an enormous quantity of details and information (not even ideas!). What is demanded of these victims is not understanding but memorization, without awareness, followed by the tragedy of "exams", which measure the extent to which the victim has absorbed knowledge quantitatively, not qualitatively. What students learn in the schools and universities of the Arab world in general, and Egypt in particular, is far removed from being aimed at preparing them to become generations capable of producing thought, as their ancestors did, when they led nations by mastering the secret of producing human knowledge.

(4)

We can now return to our questions regarding the finiteness of colors, melodies, ideas, and words in language. If we employ Abstraction, that is, the method through which scientific knowledge has been produced throughout human history—the method relied upon by Islamic civilization and upon which all great civilizations have based the production of their enduring histories—we can say that colors are finite, melodies are finite, ideas are finite, and words in language are finite.

Anyone who views colors, melodies, ideas, or words in a detailed/operational manner, and thus focuses quantitatively on minutiae and particulars, will inevitably claim they are infinite; for the human population grows continuously, and each day these humans could produce millions upon millions of colors, melodies, ideas, and words!

However, anyone who adopts Abstraction as a method will say they are finite; for upon reaching a certain color, the spectrum is complete, and the same applies to melodies. No new mixing process produces anything but repetition of a previous color or melody. The first mind is preoccupied with quantity and misunderstands it as the goal; the second mind focuses correctly on quality and realizes that it is indeed the intended aim.

The difference between the finiteness of colors, melodies, and words on one hand, and the finiteness of ideas on the other, becomes clear in their respective domains. Colors, melodies, and words represent, in geometric terms, a line segment. Colors are bounded by two limits: white and black. No matter how many mixing operations occur, one cannot produce a color outside this line segment, which begins at white and ends at black, or vice versa.

In another sense, no matter how many mixing operations are done, colors cannot exceed the seven fundamental hues of the spectrum; all mixtures remain within the seven basic colors. Likewise, melodies cannot exceed the linear range starting from Do to Si according to the musical scale. No matter the number of harmonious or discordant melodies, none can fall outside the musical scale.

As for words in a language, let us consider Arabic words, which are also confined by the alphabet, beginning with Alif and ending with Ya. It is important to emphasize that our inability to perceive the finiteness of colors, for example, or our incapacity to fully

comprehend them, does not negate their finiteness. Not only are colors finite, but so too is human capacity.

This concerns colors, melodies, and words. What about ideas? Are they finite as well? Yes, they are finite. However, their limits, in geometric terms, resemble a square bounded by the four types of relationships through which a human being lives: relationship with the self, relationship with others, relationship with nature, and relationship with a deity—even if one denies the existence of that deity! The mind cannot produce scientific knowledge outside this square. Ideas are therefore finite, and this conclusion could only be reached through Abstraction.

Through Abstraction alone, we are able to answer the question of the nature of colors, melodies, ideas, and words in language: are they finite or infinite? In reality, any answer to a question arising from a social phenomenon that does not employ Abstraction as a method of thinking will achieve nothing; it will drown in details and minor matters, yielding only more obscure and confused particulars.

II. Dialectical Contradiction

When we contemplate life around us—both in thought and reality—in all its phenomena, including economic activity, we find it the product of unending Dialectical Contradiction. Contradiction in continuous development: life and death; light and darkness; good and evil; positive and negative; action and reaction; existence and non-existence; peace and war... etc. All are contradictory poles.

The two poles of contradiction together constitute a unity; the existence of one pole necessitates the existence of the other. Each pole loses its condition for existence if the opposing pole is absent. There is no life without death, no light without darkness, no good without evil... etc. Through this contradiction, life continues and develops. Contradiction is not always between fixed opposites, nor between equivalents, nor always with the same intensity; it is ultimately in a state of perpetual becoming.

First, it is not always between fixed opposites—i.e., not always between the extremes of light and the extremes of darkness—but between degrees of light and degrees of darkness. Not between the extremes of victory and the extremes of defeat, but between degrees of victory and degrees of defeat. Similarly, it is not always between the capitalist class at the height of its dominance and the working class at the peak of its revolutionary maturity; it exists between varying levels of each.

Within this principle, it becomes possible:

- The emergence of alliances among opposing forces: Capital may ally with labor, despite their contradictions, to confront authority.
- Transformation of one pole into its opposite: Absolute justice is absolute injustice. Absolute light is absolute darkness. The strongest, whose dominance seems insurmountable, can collapse into weakness and die. The more capitalism tightens its grip; some capitalists themselves may become wage laborers!

Second, contradiction is not always between poles of equal strength and scope. For example, the relation between capital and labor is not always balanced; capital may assert dominance at times, while labor may seemingly dominate at other times.

Third, contradiction does not always maintain the same intensity. Capital may appease labor, or under certain circumstances do the opposite. The poles may antagonize each other and fight in other situations.

Finally, contradiction never ceases. It is in perpetual motion. When contradiction stops, life stops and death prevails. When weakness disappears before strength, when institutions of governance vanish before the governed, when those who possess disappear before those who do not, when light vanishes before darkness... life ceases its eternal epic cycle.

Thus, Dialectical Contradiction teaches us dialectical analysis of phenomena, sparing us linear thinking and mechanical interpretations of things and ideas. It allows us to understand the phenomenon arising from contradiction, to interact with it intelligently and effectively, beginning with recognizing the outcome of contradiction and uncovering the objective law governing the phenomenon.

III. The Roots and the Enduring Legacy

To complete the picture, we must mention that the Islamic mind in its Golden Age did not invent its methodology; rather, it inherited it from preceding civilizations. The scientific history of Europe, and indeed of the whole world, is usually presented as starting from the land of Greece, for it was in that country, as the European historian is accustomed to saying, that science began, giving rise to the sciences of philosophy, astronomy, geometry, and so on. However, historical reality confirms that the earliest beginnings of those sciences were formed in Sumer, Babylon, Assyria, Egypt, Phoenicia, and Persia. The Greek philosopher was merely a historical heir, perhaps an astute and diligent one, to those civilizations. He received these sciences from the civilizations of the ancient Eastern world, and perhaps, surreptitiously, attributed most or all of those sciences to himself! In this regard, he owes much to these ancient civilizations.

The most important thing the Greek philosopher inherited from the ancient Eastern civilizations was the method by which knowledge was produced. This is the same method that the Islamic world would inherit in its Golden Age, and then reintroduce to Europe during the Renaissance, where it would represent the foundation of the Age of Enlightenment thereafter. This method is based on classifying principles and fundamentals, extracting commonalities, and grouping similarities to elevate the phenomenon that occupies the mind above everything that is secondary and non-influential. That method is "Abstraction."

With the awareness that the Gospels themselves were written in the Greek language, and a text is rarely written in one language without carrying the culture of that language, in addition to a large number of nations entering the Christian religion with the Greek cultures and philosophies they carried and their attempts to integrate these philosophies with the Christian faith, Greek science (and the method for producing

knowledge it relied on) was destined to be saved from oblivion through three historical stages.

In a first stage, it was destined to continue, after the fragmentation of the Hellenistic world at the hands of the Roman armies, thanks to the fundamental role this science played in the ongoing debate in the Eastern Empire about the nature of Christ and the Holy Spirit, particularly in the four Ecumenical Councils held in Nicaea (325 CE), Constantinople (381 CE), Ephesus (431 CE), and Chalcedon (451 CE). Each group, and the Church alike, found its objective in Greek science and used its ideas and terminology to champion its doctrine and claim against its adversaries. Thus, the Eastern Empire saved Greek science and preserved the method of knowledge production from destruction when Byzantium, to one extent or another, embraced the intellectual conflict raging between the different Christian currents.

In a second historical stage, it was saved by the Islamic civilization, which received it through cultural contact with Byzantium and added to it (in Baghdad, Qayrawan, and Cordoba) throughout the centuries extending from the tenth until the fifteenth century, only to present it to Europe, particularly during the Crusades, which served as one of the intellectual conduits for the transfer of the civilizational center of gravity from the East to the West.

As soon as Europe, particularly the Italian cities, received this heritage—and this is the third stage in the history of preserving the Greek heritage and the method of knowledge production—these cities embarked on their astonishing universal renaissance, which paved the way for the review and critique of Greek science itself in the Age of Enlightenment, using the very same method of thinking that produces knowledge, starting from the seventeenth century, ushering in the emergence of modern European thought based on Abstraction. Abstraction that would extend its influence over the contemporary world, just as it extended its influence throughout the history of the intellectual creativity of our human species.

About the author

Muhammad Adel Zaky is an Egyptian researcher specializing in the history of economic thought. He graduated from the Faculty of Law, Alexandria University, in 1992, and practices law before the Egyptian Court of Cassation and the Supreme Constitutional Court. He is the author of *Critique of Political Economy*, which has gone through six editions. His research focuses on the evolution of economic ideas in relation to social and historical change. He has published more than 50 research papers, all of which are available through his ORCID profile.