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The Trajectory of Thought through Khwārizmī, Ibn al-Haitham, Fārābī, and Suhrawardī

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Abstract

A great deal of scientists and philosophers made the history of humanity heavily indebted, blossoming out during the Islamic Golden Age. Tracing the development of Muslim civilization, we can observe distinct thinking methods which have improved different facets of society. Contributing to the promotion of civilization, mathematics and its various apparatus cannot be neglected. Khwārizmī is the most critical figure in mathematics as the bedrock of empirical method. Ibn al-Haitham is reckoned as the leading figure of that era in the scientific method on which all sciences and technologies are based. Fārābī as a profound philosopher focused on imagination and art for distributing wisdom and reason among public. In his utopia, artists have this task and they are called the conveyors of religion. Suhrawardī concentrated on intuition besides wisdom and reason. In addition, Suhrawardī typified the artist of Fārābī's virtuous city. In Suhrawardī's mystical treatises, he allegorized intelligible happiness. Each method would contribute to human civilization—that is, a set of thinking methods is required for surviving and developing civilization. However, dramatically important in today's world is that the balance ought to be maintained.

Keywords

Mathematics, Scientific method, Reason, Mystical experience, Philart approach.

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Introduction

Thinking methods are nothing short of the bedrocks of human civilization. The revolutions and developments in the world proved beholden to the variations in our way of thinking. Throughout the Islamic Golden Age, between eighth and thirteenth centuries, the world embraced a variety of new ideas and opinions. Isolated regions of the world with different cultures were connected via the far-reaching Muslim trade networks (Hobson, 2004: 29-30; Labib, 1969: 79-96). The splendors of this Golden Age whet appetites for more study of the thinking methods of scholars belonged to that era. Designating some of the most representative figures of different areas of thought, I will be keying on Khwārizmī, Ibn al-Haitham, Fārābī, and Suhrawardī. The two former are scientists and the two latter are philosophers.

Mathematics and its tools are the building blocks of thought, first and foremost. As a mathematician, Khwārizmī is unimpeachably a profound scholar of the third AH century. Affecting other sciences and improving their methods, he penned several influential books in the areas of mathematics a detailed account of which follows. Being a key scientist of the fifth AH century, Ibn al-Haitham dramatically developed an empirical method based on observation and experiment which resulted in technology promotion.

As a leading philosopher of the fourth AH century, Fārābī set out a socio-political plan for the utopia focusing primarily on reason and secondarily on art, literature, and rhetoric. The artists and rhetoricians of virtuous city, as the conveyors of religion, bring rational issues and intelligible happiness to people's mind through their imagination. Suhrawardī, known as the founder of Illumination school in the sixth AH century, turned the discourse toward intuition and mystical experiment as the primary guide without giving up the discursive reason. He also exemplified the artist of Fārābī's virtuous city and allegorized intelligible truth and happiness in his fictions.

Analyzing the thinking methods of these four historic figures, I try to better show the significance of each thought and method for constituting civilization. It is nothing short of remarkable that the Qur'ān and Hadith represent the sources of the Muslim thinkers, probably all of them in no small part. And our discussion continues on their thinking methods rather than their sources.

Khwārizmī: Mathematics

Muḥammad b. Mūsā Khwārizmī (780-850), Latinized as Algoritmi, was a scholar, mathematician, astronomer and geographer in the House of Wisdom in Baghdad during the Abbasid Caliphate. Drastically contributing to two major divisions of mathematics, i.e., arithmetic and algebra, he indeed

played an integral role in the development of all sciences (Corona, 2006; al-Khalīlī, 2010: 93-123).

Khwārizmī showed that the way of doing arithmetic based on Roman numerals was inefficient and clumsy. Yet Khwārizmī went further than just translating the Indian system into Arabic and introducing the decimal positional number system. One of his greatest contributions was to provide a comprehensive guide to the numbering system which originated in India about 500 CE. This system was later called the Arabic, Hindu-Arabic, or Arabic number system, employing 10 as the base and requiring 10 different numerals, the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, because it came to Western world from Khwārizmī and became the basis for our modern numbers. It was first introduced to the Arabic-speaking world by al-Kindī, but it was Khwārizmī who brought it into the mainstream with his book on the use of the Indian numerals named *Kitāb fī Isti'māl al-A'dād al-Hindī* in which he stated the system clearly. Along with the decimal number system, English also gained another word, algorithm, for a logical mathematical process, based on the spelling of Khwārizmī's name in the Latin title of his book, *Algoritmi de numero Indorum*. Khwārizmī also introduced a new word to the language, algebra, and a whole new branch of mathematics.

In his work on algebra, Khwārizmī wrote another book: *Al-kitab al-mukhtasar fi hisab al-gabr wa'l-muqabalah* (The *Compendious Book on Calculation by Completion and Balancing*) in which he worked with both what now is called linear equations and quadratic equations. He effectively reduced every equation to its simplest possible form by a combination of two processes: al-jabr and al-muqābalah.

From another perspective, the practice of Islam demanded Muslims to have some crucial information. So, Khwārizmī had something applicable in mind, not just the abstract theory. According to one report, he wrote his book on algebra in response to a request from the Caliph to present a simple method for calculating Islamic rules on inheritance, legacies, and so on. In his introduction to the book in which he describes algebra, he says that the aim is to work with "what is easiest and most useful in mathematics, such as when men constantly require in cases of inheritance, legacies, partition, lawsuits, and trade, and in all their dealings with one another, or when they measure lands, digg canals and make geometrical calculations." (Masʿūd, 2009: 139-145; al-Khalīlī, 2010: 93-123)

Ibn Al-Haitham: Scientific Method

Abu Alī al-Ḥassan b. al-Ḥassan b. al-Haitham (965-1040), also known by the Latinization Alhazen or Alhacen, was a great polymath scientist, mathematician, astronomer, and philosopher, who worked in Fatimid Cairo

(*al-Fāṭimīyyūn*) during the 11th century under the ruler al-Ḥakīm (Masʿūd, 2009: 121-122).

Ibn al-Haitham worked in a range of disciplines and made major contributions to the scientific method as well as optics, mathematics, meteorology, and astronomy. He laid many of the foundations for integral calculus, which is used for calculating areas and volumes (Ibid: 145). However by and large, he is known in the West for his works on optics and astronomy, including *The Book of Optics (Kitab al-Manazir), On the Spherical Burning Mirror, On the Light of the Moon,* and *Doubts Concerning Ptolemy.* In *Doubts Concerning Ptolemy* or *Shukūk ʿalā Baṭlamyūs*, he raised questions, criticizing elements of the Ptolemaic models.

Ibn al-Haitham constitutes an experimentalist who used his abilities to great effect when testing out the theories of the day (Selin, 2008: 1667). Ibn al-Haitham's some main contribution to optics was in suggesting that the mathematics of optics – such as reflection and refraction – needs to be consistent with what we know about the biology of the eye.

In addition, he, as an empirical physicist, overhauled our understanding of eyesight and is credited with describing an early imaging device (a *camera obscura*). His theory of vision was enormously prominent and much of our understanding of optics and light is based upon his groundbreaking discoveries (Masʿūd, 2009: 5, 84, 89-90). Figuring out the mechanisms for sight and the nature of vision is amongst the oldest questions in the history of physics and philosophy. These were of interest to scientists from the Islamic world too, and by the time of the Translation Movement from Greek to Arabic, Ibn al-Haitham was conscious of the leading theories of the day.

Perhaps the most popular of these theories of vision was what is now called the emission or extromission theory, whose proponents included Plato. Although our current understanding of vision did not come directly from Ibn al-Haitham, he was among the first to demonstrate critical flaws in the emission theory (Ibid: 173-175). For this theory, the human eye is able to see objects because the eye releases a special kind of optical energy. This energy can be regarded as being a bit like electromagnetic radiation; it streams ahead out of the eye in pulses, shining a sort of light, which allows humans to see.

The emission theory wasn't without its critics, including Aristotle. The critics of emission theory hold that, instead of a light pulsing out of the eye, our vision is more likely to come from a light that is released from physical objects themselves, which then interacts with the eye. This theory is known as intromission, and is not outlying from our latest knowledge of vision.

Galen (129 AD – c. 200/ c. 216) had yet another view: he shared the

emission idea that the eye emits optical energy, but he also held that our ability to see happens when this energy combines with the surrounding air and with sunlight. Ibn Sīnā's critiques of emission were powerful and to a certain extent convincing. However, he was unable to significantly advance our understanding of vision. Instead, the job of taking the study of optics to new heights fell to Ibn al-Haitham. He began his criticism of emission by describing what happens when people are exposed to bright lights. For example, anyone who tries to look directly at the sun feels pain as do those who try to look at the sun's reflection in a mirror. No matter what the light source, the effect of bright lights is always the same. This suggested to Ibn al-Haitham that light entering into the eye from an external source had some role in eyesight.

Furthermore, he argued, even provided we accepted Galen's view, holding that the eye released a visual energy which interacts with the air, the result of this interaction would need to flow back into the eye so that vision could be registered by the observer's brain. This confirmed even provided we accept emission, that some form of intromission would be needed for the eye to be able to see.

To try his ideas further, he began to experiment with refraction, which is the bending of light as it passes from one medium to another. According to Ibn al-Haitham, provided that vision is what happens when light passes from an object and into the eye, it is likely to bend once it enters the eye. This refracted light could lead to a distorted image; so Ibn al-Haitham implemented many tests to see if it was possible for light to transfer from one medium to another without being bent.

The crucial notion is that the idea of light traveling through transparent bodies in straight lines was confirmed by Ibn al-Haitham just after years of effort. His demonstration of the theory was to place a straight stick or taut thread next to the light beam to prove that light goes in a straight line (Guimaraes, 2011: 105; Sambursky, 1974: 136).

He explained his method presenting the problem: "How does light travel through transparent bodies? Light travels through transparent bodies in straight lines… We have explained this exhaustively in our *Book of optics*. But let us now mention something to prove this convincingly." He asserted the fact that light goes in straight lines clearly observable in the lights entering into dark rooms through holes. And the entering light will be perspicuously observable in the dust which fills the air (Guimaraes, 2011: 102, 105).

By dint of this manner, Ibn al-Haitham constitutes one of the key figures in the development of the scientific method (Ibid: 102). The central theme in

scientific method is that all evidence must be empirical. In scientific method, the word empirical points to the use of working hypothesis that can be tested using observation and experiment (Pickett, 2011: 585).

Ibn al-Haitham used experimentation to support most of the statements in his *Book of Optics* and grounded his theories of vision, light and color, as well as his research in catoptrics and dioptrics. In effect, he combined observation, experiment and rational argument to support his intromission theory of vision, in which rays of light are emitted from objects rather than from the eyes. He used similar demonstrations to show that the ancient emission theory of eyesight supported by Ptolemy and Euclid, and the ancient intromission theory supported by Aristotle, were both wrong.

Ibn al-Haitham also explained the role of induction in syllogism, and criticized Aristotle for his lack of contribution to the method of induction, which Ibn al-Haitham regarded as superior to syllogism, and he considered induction to be the basic requirement for true scientific research (Plott, 2000: 462).

Rāshed points out that Ibn al-Haitham may have been the first scientist to adopt a form of positivism in his approach. Ibn al-Haitham wrote that, "We do not go beyond experience, and we cannot be content to use pure concepts in investigating natural phenomena", and that the understanding of these cannot be acquired without mathematics. After assuming that light is a material substance, he does not further discuss its nature but confines his investigations to the diffusion and propagation of light. The only properties of light he takes into account are those treatable by geometry and verifiable by experiment (Rāshed, 2007: 19).

Ibn al-Haitham explained his method himself, saying: "Whosoever seeks the truth will not proceed by studying the writings of his predecessors and by simply accepting his own good opinion of them. Whosoever studies works of science must, if he wants to find the truth, transform himself into a critic of everything he reads. He must examine tests and explanations with the greatest precision and question them from all angles and aspects." (Masʿūd, 2009: 169)

George Sarton considered Ibn al-Haitham "the greatest Muslim physicist and one of the greatest students of optics of all times." (Sarton, 1927: 721)

In *Theories of Vision from Al-Kindī to Kepler* another science historian said: "Alhazen was undoubtedly the most significant figure in the history of optics between antiquity and the seventeenth century." (Lindberg, 1976: 58)

Of the many sources describing Ibn al-Haitham as the father of modern optics, the UNESCO said: "One name stands out as that of a rare genius in physical research: Abu Ali Al-Hasan Ibn Al-Haitham of Basrah, without question the father of modern optics." (UNESCO, 1976: 140)

As leading representatives, I confine my discussion to the above-mentioned pioneers. Needless to mention, however, Bīrūnī (973-1048) and Ibn Sīnā (980-1073) clearly are landmarks in the history of the subject.

Fārābī: Reason and Art

Abu Naṣr Muḥammad b. Muḥammad Fārābī (872-950), otherwise known as the Second Teacher, was a renowned philosopher having a variety of writings in the fields of metaphysics, political philosophy, ethics, logic, mathematics, and cosmology. He was also a musician and music scholar.

Fārābī impressed outstanding philosophers like Ibn Sīnā. Moreover, he is credited with his treatises and commentaries on the original Greek texts.

However, what compels me to single out Fārābī is the significance of imagination and art besides reason in his philosophy. In this section, I try to flesh out this notion.

Fārābī planned ahead for a virtuous city with five parts: "the most virtuous or excellent, the interpreters, the assessors or measurers, the combatants, and the wealthy." Fārābī himself interpreted these five parts. The first part, called the most excellent, are the wise, the men of practical wisdom and those with ideas on great subjects. The next and the second part, named the interpreters, are the conveyors of religion who include the rhetoricians, the eloquent, the poets, the musicians, the writers and the like, belonging to their number. The third part, called the measurers, include the accountants, geometers, doctors, astrologers and the like. The fourth part, the combatants, are the army, watchmen, and the like, considered with them. The fifth part and the last, named the wealthy, are the obtainers of riches in the city, such as the farmers, herdsmen, merchants, and the like (Fārābī, 1961: 50).

In the virtuous city, Fārābī regarded the poets, the rhetoricians, the musicians, the writers and the like as the bearers of religion, locating them in the second position of the city. Why are they settled in the second stage of virtuous city? What are they doing there? And what does it mean to bear the religion? The answers depend on the features and functions of imagination and art according to Fārābī.

Art in its broader account includes literature. That being the case, artist could be applied to the poets, the musicians, the writers and the like. Fārābī speaks of art in general, making references to the particular branches of art, such as poetry, music, singing, and visual art (Fārābī, 1998: 13, 19-24, 554, 555, 559). He gives an account of art including its function in virtuous city or utopia (Fārābī, 2004: 55). As will be shown, the utopian artist should represent intelligible truth and rational happiness through the use of imaginary forms. Such type of artist would be called philartist or sciartist. Some sciart issues occur in astronomical art, sci-fi, theater, poetry as well as

literature (Grünzweig, 2012: 61-182). Accordingly, Fārābī's artist who generates some sort of connection between philosophy and art would be called a philartist or sciartist. Philosophy is regarded as a branch of science in the broader concept, allowing us to call philart sciart.

I continue with Fārābī's account of imagination and art. He holds that imagination has three main activities; it keeps sensory forms; it analyzes and synthesizes sensory forms; and it uses metaphor and embodiment. Among the different faculties of the soul, only the imagination is able to portray the sensible and the intelligible. It can even depict the intelligible truths of utter perfection, such as the prime cause and abstract beings. Of course, it embodies these truths using the most exalted and most perfect sensible forms – beautiful and stunning things. It also embodies the imperfect intelligible affairs through the use of ugly and imperfect sensible forms (Fārābī, 2003: 84, 95, 106-107).

Fārābī defines art in general as a taste and a talent, combined with an intelligible element, reflecting concepts and imaginings that exist within the soul.

When describing the characteristics of a poem, he says, "Poetic speech consists of words that excite a mood in the audience, or demonstrate something higher than what it is or below the reality." He stresses that when we listen to poetic words, our imagination creates sensations so real that they resemble our feelings when we look at the objects (Farabi, 2002: 66-67). In this account, he emphasizes two elements: its ability to excite emotions, and its tendency to create strong responses in the imagination.

Elsewhere he divides the arts of singing, music, and poetry into six types: three of these are desirable, and the other three are not. The first type, described as the highest form, aims at improving the faculty of reason, as well as thoughts and actions. It aims to produce happiness, glorifying the virtues; it leads the mind to consider divine actions. The second type of art attempts to moderate radical qualities and attitudes: these include anger, egotism, possessiveness, acquisitiveness, and the like. The third type of desirable art aims at the opposite qualities: that is, it tries to do away with apathy and feebleness. This kind of art tries to correct these deficiencies, and to moderate lassitude, fear, grief, etc. The three kinds of undesirable arts are opposite to the three ones, working to corrupt thoughts and produce immoderate, sensual qualities and moods (Fārābī, 2004: 53-54). In short, when describing the desirable arts, Fārābī focuses on those that produce goodness and happiness in the imagination, as well as those that moderate the emotions.

Dealing with the motives for multiple branches of art like singing and

playing music, images, statues, and paintings, he revolves around four kinds; to create comfort and pleasure, and to forget their fatigue and the passage of time; to create emotions like satisfaction, affection, anger, fear, and the like; to create imaginary forms; and to enable humans to understand the meaning of the words that accompany the notes of the song (Fārābī, 1998: 13, 19-24, 554, 555, 559).

To sum up, Fārābī focuses on constituents such as imagination, understanding the intelligible, and emotions. Moreover, people come to understand intelligible truths through the use of their imagination. And feelings and emotions often originates in their imagination.

According to Fārābī, final happiness is the state in which a human being successfully perceives the intelligible, and achieves the nearest possible status to the Active Intellect (Fārābī, 1984: 31). But there are two sorts of perceiving: one can perceive the essence of something and imagine it in its true form, or one can imagine an idea and all the things similar to it (Fārābī, 1997: 225). It is not feasible, however, to speak of or bring into action the particular details of that which is non-sensible such as the ten intellects. Although such things cannot be felt, we can imagine them through analogy, parallelism, or allegory (Fārābī, 1998: 43). In addition, the majority of people are not used to reasoning about the intelligible. To most people, the soul is attracted to the imagination, and the imagination controls the self. Thus, the proper method for educating the public on such affairs is through transferring images and resemblances into their minds through the imagination (Fārābī, 1997: 225).

Furthermore, Fārābī reiterates that the public is not to follow the intelligible. Human actions are often guided by the imagination, even though the imagination may be in conflict with one's knowledge, or be subject to one's suspicions (Fārābī, 1987: 502). In some cases, one's beliefs are actually contrary to what one imagines. For instance, when a person merely imagines something frightening, he or she feels a sense of horror as if the idea were real (Fārābī, 2004 : 52-53). People are afraid to sleep next to a corpse, even though we know that dead bodies are harmless.

Eventually, in order to make people approach happiness, it is necessary to convey intelligible happiness through the use of imagination.

This devoir initially is undertaken by the Prophet, who has himself been linked to the Active Intellect, and has thus received all facts in both intelligible and imaginary forms. In Fārābī's utopia, some artists by and large do in this way. The utopia is governed by five kinds of wise leaders. The first section is composed of the sages, as well as those who are clear-sighted in important affairs (Ibid: 55). The ultimate leader of the utopia,

however, is none other than the prophet (Fārābī, 1991: 44). In second place, there are the "religion-conveyers" including orators, missionaries, poets, singers, writers and the like (Fārābī, 2004: 55). Fārābī places these poets, singers and the like – all of whom he refers to as artists – immediately after the prophet, and next in importance to orators and religious missionaries.

Among the elements mentioned in Fārābī's discussion of art, imagination and the comprehension of the intelligible are most useful in explaining the task of the utopian artist. As mentioned above, it is believed that the most exalted art is in the kind that uses imaginary forms to lead the people to imagine divine thoughts and actions. Moreover, desirable art, by nourishing the imagination, works to moderate extremes of emotions.

According to Fārābī's theory of the imagination, there is a relation between the imagination and the intellectual faculty. The imaginary faculties are able to access the intelligible through imaginary and sensory forms. The ultimate goal of the utopian rulers is to provide the public with intelligible happiness. The prophet, through revelation, perceives all the truths, both rationally and in his imagination. He has the ability to perceive the essence of truths; in addition, he knows the metaphors and allegories through which to describe these truths.

But since intellectual perception of true happiness is not possible for the public, metaphors are provided that will appeal to the peoples' imaginary faculties.

The utopian artist produces intelligible happiness through creating sensory and imaginary forms. So he or she performs an activity similar to that of the prophet. Such artist would be called philartist or sciartist.

Suhrawardī: reason, mystical experience, and art

The value of reason decreases in Suhrawardī's thought. Suhrawardī was affected by anti-Avicennan current which took its cue from al-Ghazālī's *Incoherence of the Philosophers* (Shiḥādih, 2013: 135-174). He set the reason after intuition, embodying the philartist of Farabi's virtuous city and symbolizing intelligible happiness and rational truth in his mystical treatises. Fleshing complicated philosophical issues out by allegory, he might be considered a sciartist.

In his allegorical treatises, some wayfarer has journeys to the heaven spheres and the ten Separate Intellects, pursuing intelligible happiness. There are three profound philosophical issues Suhrawardī deals with: sense perception, emanation, and cosmology (Suhrawardī, 1999).

The problem I focus on is sense perception. Ibn Sīnā is the first major thinker holding five exterior as well as five interior senses (Ibn Sīnā, 1997: 308-404; Ibid, 1983: 33-171; Ibid, 1986: 321-330; Ibid, 1953: 82-100; Ibid,

1937: 7-10). Avicenna differs from Aristotle and *al-Fārābī* on sense perception (see Maftūnī, 2015: 45-54). The latter consists of the sensus communis or sensorium that intermingles what it receives from the four exterior perceptions; the imagination that keeps these forms deposited; the imaginative power or active imagination that mingles and separates forms kept in the imagination; the estimative faculty that figures out the specific significances, like the fear of one particular snake; and the memory that stores the specific significances.

Suhrawardī criticized Avicenna's stance on five interior senses, reasoning that there is at most one faculty for all internal perceptions. Of the foundations of Suhrawardī's disposition of the theory of imagination, the most prominent is the principle of seeing, which he has developed in multiple positions, and based on which he has accounted for imagination as the illumination of the soul (Suhrawardī, 2002: 150, 214). Apart from intuitive proofs, Suhrawardī's major argument for illumationist imagination is the refutation of manifold cognitive faculties.[1] Notwithstanding all this, he indicates the faculties of ten sense perceptions in allegory.

The allegories of ten sense perceptions comprise ten towers, ten straps, ten graves, ten flyers, ten wardens, five chambers and five gates.

In "Treatise on Towers", the towers are ten in number with the five external towers, allegorizing the five traditionally recognized methods of perception, and with the five internal towers the five parts of the brain reputed to be the seat of our mental capacities (Suhrawardī, 2002: 462-471).

In "The Language of the Ants", we find the following allegory of the ten senses. And so commences the story: "Key-Khusrow had a cup that showed the whole world: in it he could see whatever he wanted, be informed of all things, and gain access to hidden things. It is said that it had a sheath of leather made in the shape of a cone, and there were ten wide straps placed around it." (Suhrawardī, 1999: 81) It is a long shot that we can justifiably regard the ten wide straps as distinct from the ten senses.

"A Tale of Occidental Exile" implies the allegory of ten graves, where the wayfarer utters: "And I cast the sphere of spheres onto the heavens until the sun moon, and stars were crushed; then, I was rescued from fourteen coffins and ten graves." (Ibid: 117-118)

"The Sīmurgh's Shrill Cry" includes the allegory of ten flyers: "Those who wish to tear down the spider's web must expel nineteen pincers from themselves: of these, five are visible flyers and five are concealed." (Ibid: 104-105)

1. It is based on this refutation that he devotes an echelon of the universe to suspended archetypes or incorporeal forms. See Suhrawardī, 2002: 209-215.

In "The Red Intellect" is amplified the allegory of ten wardens. One day the hunters, Fate and Destiny, laid the trap of Fore-ordination and filled it with the grain of Will, and in this manner they caught the wayfarer and appointed ten wardens to watch over him. Five of them faced him with their backs towards the outside. These five refer to the five external senses. The other five wardens faced him representing five internal senses. (Ibid: 20)

Suhrawardī fleshes out the last allegory of senses, five chambers and five gates in "On the Reality of Love". On his way seeks the wayfarer the inhabited quarter and reaches the city, catching sight of a three-storied pavilion. The first story is fitted with two chambers. In the first is someone extremely clever but his dominant trait is forgetfulness. "He can solve any problem in a flash, but he never remembers anything." This first chamber alludes to sensus communis. The faculty of imagination is epitomized by the next chamber. "It takes him a long time to discover allusions, but once he understands he never forgets." (Ibid: 64-65) Then the wayfarer goes to the second story. There are two chambers representing the estimative faculty and the imaginative power. The memorizing faculty exists in the third story, storing specific significances. "He is absorbed in thought. The many things left to him in trust are piled around him, and he never betrays anyone's faith in him. Whatever profit is made from these things is entrusted to him so that they may be put to use again." (Ibid: 65)

On the way, the wayfarer confronts with five gates. By the five gates, Suhrawardī alludes to the five exterior senses. At first, the faculty of seeing is depicted: "The first has two doorways, in each of which is an oblong, almond-shaped throne with two curtains, one black and the other white, hung before. There are many ropes fastened to the gate. On both of the thrones reclines someone who serves as a look-out." (Ibid)

The faculty of perceiving sounds is the next:

> Going to the second gate, he will find two doorways, beyond each of which is a corridor, long and twisted and talismanically sealed. At the end of each corridor is a round throne, and over the two reclines someone who is a master of news and information. He has messengers who are continually on the go seizing every sound that comes to be and delivering it to the master, who comprehends it.

The power of smelling is represented by the third gate having two doorways from each one the seeker will go through a long corridor until he emerges in a chamber in which there are two seats, on which someone sits. "He has a servant called Air who goes around the world every day and brings a bit of every good and foul thing he sees." (Ibid: 65-66)

The fourth gate illustrates the mouth and teeth and the power of tasting. "This one is wider than the other three. Inside is a pleasant spring surrounded by a wall of pearl. In the middle of the spring is a divan that moves and on it sits someone who is called the Taster." (Ibid: 66-67)

The faculty of touching is the last gate which surrounds the city. Everything that is in the city is within the scope of this gate, around about which a carpet is spread, and on the carpet sits someone ruling over eight different things and distinguishes among the eight (Ibid: 67). The eight different things hint at the eight tastes, usually enumerated as: sweet, greasy, bitter, salty, sharp, harsh, salty like the sea, and vinegary (Freedman, 2007: 168).

Conclusion

The thinking methods of Muslim thinkers include a variety of approaches: mathematical method, empirical method, reason, mystical intuition, and philart or sciart.

A highly developed mathematics is the first crucial component of the scientific method. Such being the case, Khwārizmī took the first critical step to practice the scientific method. Khwārizmī as an influential figure in mathematics translated the Indian system into Arabic and introduced the decimal positional number system in a comprehensive guide. The logical mathematical process, named algorithm, and a whole new branch of mathematics, called algebra, are indebted to Khwārizmī. He also worked with both what now is called linear equations and quadratic equations, reducing every equation to its simplest form. Through arithmetic and algebra, Khwārizmī affected other sciences and their methods.

Ibn al-Haitham is a key scientist developing empirical method based on observation and experiment. He is considered the greatest Muslim physicist and the most significant figure in the history of optics between antiquity and the seventeenth century.

Fārābī as a philosopher sets out a socio-political plan for the virtuous city focusing on reason and art. In his plan, the wise men stand in the highest position and the artists and rhetoricians stand in the second level of the city. The artists of virtuous city are the conveyors of religion, bringing intelligible truth to people's mind through their imagination.

In addition to reason, Suhrawardī remarked on intuition and mystical experiment. Furthermore, he himself exemplifies the philartist of Fārābī's virtuous city and allegorizes intelligible truth and happiness in his fictions. In his works, it is art that allows philosophy to be held up against peoples' minds; and it is philosophy that allows art to be held up against supposed

realities. For instance, in the field of sense perception, ten interior and exterior senses are allegorized by ten towers, ten wide straps, ten graves, ten flyers, ten wardens, five chambers and five gates.

Human civilization needs all of these methods. However, the balance ought to be maintained.

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