

*Scientific Interview***Knowledge of Polymath Walks, Talks, Makes Waves, Turns into Deeds****Interviewee:** Professor Hamlet IsaxanliFounder of Khazar University, Chairman, Board of Directors and Trustees
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Hamlet Isakhanli is a scientist, poet, social scientist, educator and lecturer, publisher and editor, translator, columnist, broadcaster – TV program presenter, public figure. He has published as author, co-author over 40 books and over 350 articles on a broad range of topics in mathematics and its applications; history of science and culture; poetry and creative writing; language, lexicography and literary studies; theory and history of translation; education policy and management.

Interviewer: Waqas AhmedHead of Special Projects, Global Correspondent, FIRST magazine
Author of *Polymathy* (to be published)**Waqas Ahmed: How would you define a polymath?**

Professor Hamlet Isakhanli: A *polymath* is a person who displays genuine creative activity in multiple fields that differ from one another. Despite the fact that the dictionary definition of the word “polymath” implies someone with much knowledge or varied learning, not just everyone who knows multiple fields well is called a polymath; to know and to produce are not the same. Understanding many things about physics, mathematics or biology from popular literature is absolutely not the same as being a physicist, mathematician or biologist. If a person contents himself with knowing but cannot turn his knowledge into action or some type of work, he is simply a very knowledgeable, erudite, educated person—he is not a polymath. The knowledge of a polymath does not remain passive or sit in one place. It walks, talks, makes waves, creates practical results, turns into deeds. A polymath expresses capability to work in varied areas; his interests influence others

and he sparks interest in other people. A polymath makes a contribution in several different fields. His multifaceted and superior creative activity amazes knowledgeable people and specialists. A polymath has learned the basic principles of various fields and is capable of undertaking and solving problems related to those fields. Usually the term polymathy is applied to a highly-esteemed specialist in both sciences and the humanities. If a professional physicist is also a talented artist, a biologist is also a talented writer, or a mathematician is also a talented composer, this can be considered a sign of polymathy. This type of two-faceted talent and activity often paves the way for more multifaceted work; for example, a person involved in both physics and art might also be an alpinist or might earn fame by researching, writing and earning recognition in the area of cultural history. Usually phrases like *universal genius* or *encyclopedic scholar* are applied to polymathy. Although the term *Renaissance Man* is also clear, it is not historically comprehensive; many polymaths also arose in the ancient world, in China, and especially in Islamic civilization (in the Islamic Golden Age).

Waqas Ahmed: In which fields do you feel you have contributed the most?

Professor Hamlet Isaxanli: My formal higher education and academic rank are in the field of mathematics. I am a professional mathematician. Mathematics has helped me to understand nature and the world. I have become known as a mathematician. As early as the Soviet period, I visited different countries, carried out research, delivered lectures, participated in conferences, and made the acquaintance of very talented people. However, the poetry and literature with which I have lived from my childhood were at first planted in me, then they germinated, grew, and finally sprung into light. A considerable number of people now are more familiar with me as a poet, literary scholar, and specialist in the humanities. In general, the humanities are more familiar to everyone; the majority of people can see successes in these fields and appraise them (which is not necessarily true of mathematics and the natural sciences). The third field I love and in which I have made a contribution is related to history: the history of sciences and cultures, history of ideas, intellectual history and philosophy of history. That might be the field I am currently most actively engaged, reading and writing in. And of course one of my most important contributions is founding, building and developing research, education and cultural institutions, which I have been working on both physically and mentally every day over the past 20 years. I'm referring mainly to Khazar University—which I created from nothing through years of toil and challenge, and now rejoice in its successes—as well as Dunya School (an integrated preschool, elementary and high school) and other institutions.

I cannot say that one of the fields I work in is more significant than another or that I love one more or less than another; they are all important and inseparable parts of my life, my being and my identity. I'm not touching on my other activities here, including language studies and lexicography; translation work and translation theory; education policy, theory and history; popular science writing; publisher and editorship; and regular appearance in both print and broadcast media.

Waqas Ahmed: What factors have caused/encouraged you to explore different fields?

Professor Hamlet Isaxanli: My childhood nature of wanting to know everything, my hunger to learn, the way I would get excited as I learned and would always search out the answers to questions like “then what?” and “how?” never left me when I grew up and grew older. Adults and teachers used to say, and still say, that from the beginning of my conscious life, that is how I knew myself. In addition, I had a constant desire to create a system out of everything I had learned, to mobilize others (my peers and those younger than me) around some idea or problem; I also always had the desire to apply what I knew as much as possible. In high school, I loved almost all the subjects, and I studied well (although I didn't have good teachers in certain subjects). In addition, I never grew tired of reading Eastern and Western literature and being a closet writer; I created my own works (if the juvenile writings from my childhood dreams can be described as such). I really loved sports, especially chess and soccer. Even though I was only a child myself, I had my own clubs to motivate, teach and involve other children in activities. My father (who was a mathematics teacher) and my high school mathematics teacher played an important role in my love of mathematics. As I studied mathematics in university, the desire to grasp the world broadly and comprehend it more deeply increased my interest not only in mathematics and my second love, literature, but also in other fields such as physics, history and philosophy. I delighted in thinking broadly about issues such as the interconnections among natural sciences and their interactions with humanities, for example, the history and philosophy of science, or the history of ideas; I delighted in out-of-the-box thinking in general. Also, devoting the focus of your attention to one subject more than others for a set time interval, in other words spending more time on one field despite being interested in multiple fields, or prioritizing your time among different subjects, is very important. For example, for a certain length of time my main activity will be in mathematics, and my other interests will fall to second and third place. Then my interests and preferences can shift to a different field. Sometimes a neighboring field, or even a distant one, can consciously or subconsciously distract you from the main field that you love, in which you are a professional or to which you are

currently devoting most of your attention. During the course of the distraction you may realize that this “other” field becomes your main work and focus; something that you had considered just a side interest or hobby has swept you up in its embrace, you’ve been seduced by it, you live with its love, and even if you haven’t completely forgotten all your past lovers (genuine love is never forgotten!), your attention towards them is decreased. To use another illustration, if you have not one but several lovers, when you grow tired of one of them, you can go to another one; you are always with a lover and always busy, but it feels like you are resting as well (please interpret this as a metaphor, not as a moral statement). If you continue this type of pattern all your life, good for you! You will see and accomplish many things.

Waqas Ahmed: Is there a link between mathematics and poetry?

Professor Hamlet Isaxanli: Mathematics and poetry... in reality they have very different roles and niches in society. The majority probably view them as diametrically opposed fields. There are people who introduce them as close relatives, but those are few; those are either mathematicians, physicists and philosophers, or they are people who have heard something like K. Weierstrass’s quote “a mathematician who is not also something of a poet will never be a perfect mathematician.” There have been beautiful thoughts expressed about the connection between mathematics and poetry, and there has also been much speculation.

Often people see a certain math in poetry (or in art or music) and begin to seek it out. It is true that there is a certain rhythm, measure, proportion, and harmony in poetry and art, like a certain calculation (arithmetic) or a kind of form (geometry); however, this similarity is not actually a connection; it is a superficial similarity. The true similarity between the two is in the nature of mathematics and poetry, in the mathematician’s mindset and in his/her dream world. A mathematician is quite different from the outsider’s and media-created stereotype of a cold, callous person, a slave of abstract logic; in reality his/her thought processes are very colorful and poetic. A mathematician is in search of truth and beauty within certain logical frames, and his dream world, fantasies, and sense of harmony and aesthetics play an important role in that search. It is thought that logical frames and the search for truth relate more to science, and beauty, dreams and fantasy relate more to art and poetry; in reality, these two paradigms are in complete organic unity.

From another perspective, thoughts, ideas and philosophy in general are important in poetry as well; their introduction into poetry requires special qualities such as

beauty, harmony, metaphor and sincerity. It is as if one thought or several lines simply fall from the heavens and are embedded into the poet's mind (some poets try to show their own extraordinariness by saying "I speak with God"), and the poet creates poetry around this first "divine" discovery.

A similar phenomenon happens to mathematicians: an idea that has been immersed in beauty, harmony and logic seems to descend from the sky and conquer the mathematician's thoughts; he begins to explore and to formulate his own theory around this. The mathematician plays in a certain sense; he makes choices and invents ideas, but his play is subject to rules, and what he makes up is not baseless; it is a choice of the road that leads to truth, or rather, the creation of that road. A poet also plays, but his rules are fuzzy; he has much more freedom to make up, to synthesize. The intent of the poet, frankly speaking, is not to search for truth.

The mathematician searches for an idea to solve a problem; the poet searches for beauty to express an idea, and the manifestation of some truth within this beauty is not an exceptional case. The mathematician mainly discovers (hidden truth), but the poet mainly creates, and certain hidden senses (intuition) are used in the process. Mathematics is a science, but to a certain degree it is also an art. Probably also for this reason the vast majority of mathematicians love poetry and music, art and history, or chess; some of them also delve into these fields, displaying creative activities to varying degrees. A poet's language is full of metaphor; even if it is decorated, it is laconic, measured, "mathematic." A mathematician's language is symbolic and universal; there is no need to translate mathematical thoughts, formulas, and forms. But a poem is a phenomenon connected to the language of its birth; poetry fades somewhat in translation or in a foreign environment; it loses some of its beauty and is subject to erosion and change.

Both mathematicians and poets search out nature itself, creating its models and forms. Only professional mathematicians and specialists in science and technology can see the content and the beauty of mathematics, but almost everyone understands poetry. Those who know mathematics well speak metaphorically of its greatness, depth and strength in terms of God being a geometer (i.e. God created the Universe through mathematical laws), while those who love poetry (and some poets) speak of the similarities between poets and prophets.

Waqas Ahmed: Please comment on the art-science-humanities connection.

Professor Hamlet Isaxanli: We touched on the art-science-humanities connection while speaking about mathematics and poetry. The "two cultures" of sciences and

the arts and humanities differ from each other in themes, in the methods they apply and in their principles of internal development.

Natural sciences uncover the secrets of nature and the universe; they discover laws and regularities. Engineering and technology apply these achievements to improve life. Technological progress of an inconceivable scope has changed human lifestyles, demands, needs, wishes and psyches to a significant degree.

Sciences and technology are of a cumulative nature: knowledge builds on previous knowledge, and each step is one step beyond the ones taken before. Knowledge constantly becomes obsolete and new knowledge constantly enters the scene. What is new disproves what is old, or it melts down what is old into a new knowledge system. In other words, what is old turns into the particular case of what is new, and in addition what is old takes on simplicity and clarity. Therefore, a transition into higher levels takes place; this is what we call progress (in the scientific/technological sense). Ptolemy and Euclid explained the phenomenon of vision with rays of light coming from the eyes and reaching the object being viewed. The great polymath Ibn al-Haytham (or Alhazen; 965-1040) corrected the direction of light (turned the rays to the opposite direction), describing the mechanism of vision as rays of light originating from an object and reaching the eye. He laid the foundation for optics, and then Kepler, I. Newton, W. Snellius, C. Huygens and others determined the basic principles of the science of optics (the saga of light is long, and it continues...). The constant development of the field simplified these revolutionary discoveries and theories, including them in secondary school textbooks. Now no one besides those writing about the history of science refers to the works of those geniuses; instead they read the books and articles of recent scientists. The big picture in the majority of the arts and humanities—which study the human and the society he lives in, soothe the soul, and discuss beauty and moral values—is completely the opposite. No great work is the generalization of a previous work; not does it disprove or confirm a previous one. Kant showed that metaphysical hypotheses cannot be proven or disproven. Today Homer's *Iliad*, Rumi's *Masnavi*, Shakespeare's *Hamlet*, V. Hugo's *Les Misérables*, Leonardo da Vinci and Mozart's works are still beloved and still arouse emotion. No matter how beautiful the works of today's famous writers, artists and musicians, the classics we listed (and didn't list) are not forgotten. On the contrary, many people love them even more than our contemporaries. In the fine arts, literature and music, culture and the humanities, "progress" cannot be observed as it can in science and technology; rather, here there is only innovation or novelty.

A scientist makes observations, comes up with hypotheses, creates experiments if possible, tests his hypotheses and tries to prove them; where experiments and tests are impossible he formulates abstract models. Well-founded hypotheses that line up with reality to one degree or another turn into the laws of the scientific field. Laws create the opportunity to describe events that occur and to foresee what will happen in the future. If objectivity, realism and rationalism are characteristic to natural sciences and mathematics, idealism is characteristic to the arts and humanities, where the expression of feelings is important. In the arts and humanities, “lawlessness runs unbridled” (even though certain principles do exist), and the beauty of these fields lies in precisely that “lawlessness” and freedom. The process of history is also most probably an expression of the will, desires and dreams of individuals and societies, not of laws.

Literature and language, history and psychology, sociology and anthropology, philosophy and religion work to understand human nature; they discuss the values, the problem of good and evil. They participate not only in the creation of ideologies, the formation of national and other identities, love and humanism, but also in the stirring up of intolerance, exceptionalism, hatred, conflicts and wars. In this case, the world, in which capital has usurped power and politics depends on capital, what can prevent morality from being completely overpowered and crushed by material interests? From another perspective, why do people become enamored with fields that do not bring material benefit; and sometimes do not serve to improve personal well-being, such as painting, listening to music, reading literature, history or philosophy, “wasting their time,” and even devoting their lives to these kinds of activities? Wouldn't it be more rational for people to invest their time in more useful, directly progressive fields such as the natural sciences, engineering, and medicine? In this wealth-hungry world, how is it possible for a person be an altruist and to spend his/her own energy for the good of others?

Despite the strength of capital and material interests, the happiness people strive for is connected to love and to the inspiration of the soul... What fulfills the offspring of mankind is to love, to be loved, and to rejoice! People spend their time (which “is money”) on music and literature, arts and beloved fields of humanities (even, in many cases, when their occupation is in science or engineering), and they enjoy doing so. A person considers himself blessed when he can care for and help people close to him and others who have needs. Two forces—materiality and capital on the one hand, and love and happiness on the other—give people life and make their lives beautiful. Even if morality does not measurably progress, it is with us!

Waqas Ahmed: What do you think of Omar Khayyam, another mathematician/poet?

Professor Hamlet Isaxanli: I have especially studied Omar Khayyam, and I have written about his creative works and his later fame. Khayyam (1048-1131) was a great polymath: according to his main interests he was a mathematician, astronomer, philosopher and poet. Two special reasons for his fame should be noted: 1) Khayyam was both a strong mathematician and at the same time a poet, which are two different, beloved and respected fields, and 2) the extraordinary fame resulting from translation of Khayyam's rubaiyat (quatrains) into English. During his lifetime, Khayyam was praised with phrases such as "the most knowledgeable person," "master of a sharp intellect," and "the best mathematician," but his contemporaries said nothing of his poetry or his being a poet. As a scholar and philosopher, Khayyam was not as fruitful as his predecessors Al-Biruni, Ibn al-Haytham and Ibn Sina (Avicenna), or his contemporary Al-Ghazali. He wrote few works, and all of them are brief. Most of his writings on mathematics are devoted to the geometric method of solving third degree polynomial equations and an interesting discussion of Euclid's 5th postulate. However, Khayyam's mathematical works, as opposed to the works of many other Islamic-era mathematicians and scholars, were not translated until the middle of the 19th century in Europe, and as a result they did not leave a mark in the development of science in Europe. Khayyam's main achievement in astronomy was the Jalali calendar produced under his leadership (which is more precise than the Gregorian calendar in use today). His philosophy and theology works were influenced by Ibn Sina.

In the East or even in his native land of Iran, Omar Khayyam was not considered as great a poet as the likes of Al-Ma'arri, Firdovsi, Nizami, Saadi, Rumi, Hafiz, Nava'i, or Fuzuli. A few rubaiyat appeared in connection with his name almost a century after his death. Then the rubaiyat were gradually collected from various sources, and became known as "wandering quatrains" in Khayyam scholarship. It has not yet been completely resolved which of the rubaiyat accredited to his name are actually his. As a poet, Khayyam first earned fame and prestige not in his own land of great poetic tradition, Iran, but in the West, in Europe and America. What really brought world-wide recognition to Omar Khayyam was the translation of his rubaiyat into English by E. Fitzgerald. In his first publication in 1859 the translator Fitzgerald's name was not included, but by the 4th publication in 1875 his name was noted as the translator who had presented 101 of Khayyam's rubaiyat to readers. His goal was not to translate Khayyam's poems and ideas precisely as they were, but to bring Khayyam's spirit to life, and he achieved that purpose. It's

possible that there was never another translator who became more famous for just one translation than Fitzgerald. It's also very possible that if Fitzgerald had not translated Khayyam's rubaiyat, the world would not have known Khayyam as a great poet. The translation had a wide impact: Khayyam's rubaiyat became the most-read literary work of English-speaking countries and worldwide, and "Omar mania" was born.

In my opinion, it was very natural for Omar Khayyam to write rubaiyat; just as in mathematics and philosophy, he was not longwinded in poetry. Four lines were enough for him to express his thoughts. There is one aspect of Omar Khayyam that sets him apart from other "greats:" no other mathematician has acquired as much popularity as a poet as Khayyam did, and no other popular poet has been a recognized mathematician and polymath like Khayyam.

Waqas Ahmed: Polymathy was previously widespread in the East/Islamic world; why do you think the region is no longer producing polymaths?

Professor Hamlet Isaxanli: The Eastern/Islamic world was the most developed part of the world as far as science and art from the 8th to 15th centuries. The only other region that could compete with it, China, probably fell behind because of two differences from the Islamic world. First and foremost, Islam strongly reflected the Greek culture that preceded it, but China did not have that opportunity. Second, the achievements of the Islamic world quickly reached Europe (and the Chinese-Indian world as well); European science, culture and identity were formed by benefiting from the fruits of Islamic civilization and by struggling against it). (China influenced Europe indirectly, mainly through the Islamic world.) In its own Golden Age, the world of Islam produced some of the greatest polymaths mankind has known. Then a decline began in the Islamic world. The decline was comprehensive: economic, political, military, scientific... the creative activities that had been characteristic to the developed, thriving era of Islamic culture began to wane, and some of them were reduced to nothing; the organizational and financial assistance of statesmen and the wealthy was weakened; at the same time open discussions, debates, experimentation and individual initiatives were not promoted in education and science, which gave way to memorization and recitation. There was a decreased interest in academic and literary works written in other languages, and incessant wars eroded economic and moral resources. Intellectual adventures and passions decreased sharply. All of these factors extremely weakened the development and legacy of scholarship.

Beginning in the 16th century, the center of world power shifted to Europe. To paraphrase Renan's view, the East forgot its own school and didn't attend Newton's new school, or more accurately, showed up much too late. The Islamic world which had once been the center of attraction with its famous madrasas, observatories and libraries began to build new European-style universities only in the 19th century. European civilization had covered a vast distance. North America, Japan, and the Soviets, the latter with their partially Muslim population, had overcome this distance and were even beginning to take the lead. The Soviet socialist system fell. Now the revival of several nations whose populations are connected to Islam can be observed.

In general, a polymath is an exception for all periods and in all nations and cultures; we know of polymaths who arose out of the ancient period from Greece to China. There were many polymaths in the Middle Ages in Islam and in the Chinese-Indian world, and in the Renaissance, but even they (or the greatest of them) are not many; their number does not reach into the thousands. The rapid scientific and economic development of the present era has resulted in a sharply increased need for specialists in very specific subjects. In other words, the need of the hour has become specialists, not polymaths. Of course, polymathy is extraordinary intellectual and personal quality, which can mature even without an expressed need for it. In any case, it seems more likely for a polymath to appear in a society that is strong in science and technology.

Waqas Ahmed: Please specify those whom you consider to be the greatest polymaths a) in history and b) today

Professor Hamlet Isaxanli:In history, it is difficult to name one person as "the greatest," in any meaning of the word. Looking at the Islamic Golden Age, it is possible to name the following among the greatest polymaths: al-Khwarizmi, Thabit ibn Qurra, al-Farabi, Biruni, Ibn Sina, O. Khayyam, Ibn al-Haytham, Nasir al-Din Tusi, Ibn Rushd (Averroes), Ibn Khaldun and others. Let's look at N. Tusi.

It is said among many historians, including historians of science and culture, that "after the 12th century a serious decline began in Islam, and the Golden Age was replaced by an uninterrupted fall." Tusi, living in the 13th century (1203-1274), and the Maragha School he created (or the "Maragha Revolution" in its academic meaning) together form one of the facts that prove the inaccuracy of this thought (Maragha is a city located in northwestern modern-day Iran, in the East Azerbaijan Province, near Tabriz). N. Tusi is the author of profound scientific findings in mathematical fields such as trigonometry, geometry (including research on

Euclid's 5th postulate), and the nature of numbers and calculations. It was Tusi who studied and wrote the first book on plane and spherical trigonometry as a scientific field independent from astronomy (250 years before Regiomontanus). He developed his own model to replace Ptolemy's Almagest model, because in the latter planetary motion in practice did not line up with the explanation given.

He also contradicted Aristotle's thoughts, that the universe's two parts, close to Earth ("Terrestrial" or "Under Moon") and far from Earth ("Aether" or "Above Moon") are subject to various laws, showing that Celestial Mechanics has the same nature as the Mechanics on Earth. Both his revolutionary discoveries of planetary motion and the nature of terrestrial/celestial mechanics were based on his celebrated theorem, the so-called Tusi-couple (rotation of two circles may cause a linear motion).

The Tusi-couple was used in its entirety (without referring to Tusi) by Copernicus in his famous 1543 "De Revolutionibus orbium coelestium" (On the Revolutions of Heavenly Spheres). The similarities between the results obtained by Tusi and his followers (see below) and those of Copernicus are too remarkable to be a coincidence; even the characters used to mark points of intersection on their diagrams (in their Arabic and Latin equivalents) are the same! Tusi, together with his colleagues and students, prepared the Zij-illkhani astronomical table which was thereafter widely used. He is also the author of broadly accepted works on philosophy, ethics, religious studies, and logic; his *Akhlaq-i-Nasiri*, or *Nasiri's Ethics* (a Mirrors for Princes book) became very famous and is still commonly read today. Tusi is the author of works in physics, mineralogy, finance, and medicine, as well as several interesting scientific/popular writings. He also wrote poetry.

Not all great people, including scholars, create schools. In a comparison of Genghis Khan and Alexander the Great as military and state leaders, J. Nehru highly appraised Genghis Khan. He considered the most important element of greatness to be the fact that Genghis Khan founded a school of public administration and military leadership, which gave his empire longevity and caused it to grow further even after his death. On the contrary, Alexander the Great's empire quickly dissolved after his death. Tusi's activities as an academic administrator, politician and statesman played a special role in his greatness and polymathy in addition to his wide-reaching academic and artistic works. The Maragha Observatory which Tusi founded (with immense support from Mongol ruler Hulagu Khan) and led was the first large, serious (in the modern sense) observatory and scientific institute in history. Tusi hired the most capable scholars and engineers of his time from Andalusia (Spain) to China, and he trained talented

youth. He created a large library (some say it contained 400,000 volumes!) and compiled all possible astronomical equipment; new equipment was also produced by Tusi himself and especially by Mu'ayyad al-Din al-'Urdu (?1200-1266), a prominent Syrian astronomer and engineer that he had invited to Maragha. As a side note, Urdu's lemma was another main result that Copernicus relied on, alongside the Tusi-couple. Two members of Tusi's school, M. Urdu and Qutb al-Din al-Shirazi (1236-1311), who worked at Maragha for a period of time, created an alternative to Ptolemy's model of planetary motion. Another Syrian astronomer and engineer, Ibn al-Shatir (1304-1375), overthrew Ptolemy's planetary motion system, developed Tusi's model a bit further and offered a perfect (from the point of view of mathematics, physics and practice) model of the motions of the sun, moon and planets. It is important to note that geocentric and heliocentric models are considered equivalent in a mathematical sense; from this perspective, Copernicus's model of the motion of the moon and Ibn al-Shatir's model are completely identical. The Maragha School could indeed be called N. Tusi School. There are scientists and science writers who refer to the Maragha Revolution and Copernican Revolution together or even vis-à-vis. The creator and leader of the magnificent observatory and scientific institution in astronomy and mathematics in Samarkand, Ulugh Beg (1394-1449), had seen the ruins of the Maragha observatory in his childhood. One can say this is what gave direction to his thoughts. An astronomer who studied in Samarkand, Ali Qushji (1403-1474), created his own model of planetary motion in the style of Tusi's; a model very similar to his is also found in Copernicus's works.

When I was born, John von Neumann (1903-1957) was still alive. This phenomenal and multitalented coryphaeus is one of the rare gems of the 20th century and humanity in general. He brought influential discoveries to various fields of mathematics, and he developed decisive works in quantum physics, nuclear physics, and the theory and practice of atom and hydrogen bombs. He was actively involved in the Manhattan Project (he made calculations about the dropping of atom bombs on cities of Japan and their results). He performed groundbreaking work in economic theory and particularly in game theory. He is also considered a pioneer in the field of computer architecture and programming.

The multifaceted and talented Douglas Hofstadter (1945) is a kindred spirit to me. He is a mathematician, physicist, specialist in computer science, and psychologist (studying cognitive science and mental processes), as well as working in and being a well-known popularizer and writer of the history of science. He is also a man of art and polyglot; he does serious poetic translations, composes music and paints.

Waqas Ahmed: How can the education system encourage polymathy?

Professor Hamlet Isaxanli:The modern education system, at least in theory, encourages polymathy from the perspective of curriculum. The high school curriculum covers almost all important fields, such as mathematics and natural science, fine arts, languages and humanities. In universities there is the liberal arts concept; in addition to students' major courses, they have the chance to elect courses from the group of general education requirements, namely, in natural sciences, humanities and social sciences. The modern information or knowledge-based society with the internet creates great opportunities for anyone who wants to learn many things.

A child's worldview and his/her desire to read, to pay attention to one or several fields, and enthusiasm for creative works—the seeds of these are sown in the family (or at least, it is best if they are). In my opinion, the most necessary factors for the birth and first development of interests are good parents and good teachers, and also the natural passion to know and understand many things (if not everything). A large portion of secondary schools use conveyor-belt methodology, complete a standard training program, but do not nurture the desire to learn many things and become tedious (this depends on the teachers as well). Problem-based or project-based education can facilitate students' understanding and usage of connections among the main academic subjects. I believe that it is possible to introduce those students who do well in mathematics, physics, chemistry and biology to humanities, social sciences and fine arts using a special approach. For example, it is possible to take a student who understands the natural sciences well and teach him/her to listen to music, remind him/her of simple elements of mathematical and physical theories about sound and harmony, work on the connections between poetry and music, dive into music history, and maybe even give him/her projects in the same vein like writing a composition. As a result, it is possible to acquire certain skills and knowledge about music, poetry, history and creative writing through close association with the same sciences. In reality, no student is ever interested in just one field; he/she has a circle of interests encompassing several fields, and hobbies. It is necessary to create the opportunity for him/her to display abilities in these fields. Maybe it would be possible to create a "polymath club!" If education on all levels strives to dive into mystery-filled fields and to bring to life the desire for adventure (adventures can happen in places we don't know well) and the sense of aesthetics, then it is possible that all this will become a lifestyle and will help to train up a person who can think broadly and deeply.

Waqas Ahmed: How can one succeed in multiple domains in an era of increased specialization?

Professor Hamlet Isaxanli: Polymaths of ancient times and the Middle Ages won the favor and hearts of their contemporaries, became specimen to emulate, and would amaze future generations. It seems as though the educated people of that period pursued the goal of knowing everything; it is apparent that in that time, a “well-educated” person was one of whom it could be said, “he knows almost everything.” The specialization that began in the 17-19th centuries increased as time passed and had reached an enormous scale by the 20th century. I don’t believe that a modern polymath could be produced who is not a specialist in mathematics and natural sciences. In theory there is a chance that very few people working in these fields who are deeply interested in humanities and social sciences or fine arts could be polymaths. The reality is that it is possible to be self-taught or to not have attended a specialized school but to still be creative (even deeply so) in fields such as literature, history, philosophy, and to some degree in music and other arts. However, it is practically impossible to go the other way: musicians, writers and historians cannot learn serious mathematics or physics from scratch without attending a professional school. In the Islamic Golden Age the writings of famous mathematicians, astronomers, scientists, and doctors about their own fields were full of citations from poetry and philosophical thoughts. The love of poetry and to a certain extent philosophy and religion were widespread in the East; for many scholars, this love turned into an important activity. That same trend can be observed in the present time.

A person who knows a little of everything is not called a polymath. It is a prerequisite that a polymath first must be a strong monomath; he or she must be a worthy specialist in one area and be able to delve deeply into it (that same depth may pull him to the line of contact with another field!) A talented person is not just talented in one field. It is possible to change one’s activity from time to time, to pull some desire from the depths of one’s heart and bring it to life. Polymathy is connected to spirit, passion, a rich inherent sense of aesthetics; it’s possible that these things originate from both sides, nature and nurture. Polymathy requires courage to break the mold.

In ancient times and the Middle Ages there seemed to be a social need for polymathy; no such need is apparent today. However, today it is desirable for specialists in all areas to have leadership abilities (the maxim of most education institutions), and it is my opinion that a multifaceted person has a greater chance of being a leader and of achieving success in leadership. In the modern information

age, one would think the chance to obtain information more quickly would call forth polymathy. Self-education, the lifelong desire to learn, a strong will, and endurance are important. Someone who is heavily engaged in one field may not have time to work on other fields for a period of time. However, he or she will find the time later; his/her interests will change. In this case his/her previous interest, knowledge and skills will help (even if only slightly) in the new field of interest.

Public activity, innovative works, and entrepreneurship not only support polymathy; they can be considered signs of polymaths' activities. Rulers, viziers, military leaders, and other persons in charge have established translation and scientific centers, schools and madrasas, observatories, hospitals, and assemblies of poets, gathering talented people together and creating ripe conditions for them to be involved in inventive activity and to teach classes to youth. This was a fertile environment for the production of polymaths. There were many such leaders in Eastern/Islamic history; some of them were polymaths themselves. In our current era as well, entrepreneurship, leadership and/or broad public activity can be considered factors that increase tendencies toward polymathy.

Waqas Ahmed: Why is the World, including the culture, so Eurocentric, even though we live in a supposedly 'globalized' world?

Professor Hamlet Isaxanli: Every period of globalization pushes one geographical area or society forward, and as a result, a certain part of the world falls under the influence of that civilization or empire: Alexander the Great's campaigns and Hellenism; Pax Romana; the Islamic Period extending between the Atlantic Ocean and China; the Pax Mongolica which opened trade routes and created security between Europe and the Pacific Ocean... Then it became Europe's turn. Three peaceful revolutions, namely, the Scientific, Industrial and Information Revolutions, occurred in the West.

The printing press and the increase in literacy with the development of universities strengthened human resources in Western Europe. The large world fell under little Europe's influence as Europe discovered and colonized it. Then the blossoming of the arts and music, technological inventions (telescopes, microscopes...) and great scientific discoveries increased Europe's attractiveness, while colonization significantly increased its economic power by allowing it to obtain important natural resources and global trade.

European domination reached its peak as a result of industrialization. The passion to unite the world under one roof led to large wars, conquests, and a proliferation of colonization around the world. European colonial policies led to the spread of

languages such as Spanish, English, French, and Portuguese, turning them into major world languages.

In 1492, at the time when Columbus discovered the New World, Europe held approximately 9 percent of the globe. By the time of the First World War, the majority of the world (about 80%) was controlled by whites. Finally there was no room left to expand, and European powers began to fight among themselves, generating at least the following three effects: deglobalization within several decades, division of the world along two fronts - capitalist and socialist - with US hegemony, and the beginning of decolonization.

Philosophies of society's progress toward perfection and freedom (Kant and Hegel), Darwin's theory of evolution, Marx's historical materialism and political economy theories, Comte's positivism and others fueled Eurocentrism; moreover, ideas of prosperity and enlightenment justified colonialism.

The world was seen through European eyes (or glasses) and judged according to European values. Of course powerful Europe, which had conquered the world, wouldn't think any other way! In order for other nations to be seen as "normal," they were given no other option but to follow in Europe's footsteps. The world accepted this for the most part; there was no other appealing model, and European-style education was founded on this idea and served to further strengthen it.

From another perspective, doesn't "globalization" (beginning in the 16th century) mainly mean Europeanization?! Americanization is the direct continuation of Europeanization. The modern world has been most heavily influenced by Europe. European education and scientific thought have put down deep roots in most of the world. Even when one tries to analyze non-Western cultures in an unbiased, objective way, Eurocentric values and measures are used. We take Eurocentrism for granted, and we don't even notice it most of the time.

It would be an injustice not to mention, besides Edward Said's correct (and negatively-toned) Orientalism, the selfless work of many European (and American) scholars who deeply studied and promoted the East. In general, serious objections to Eurocentrism began in the 20th century, especially in its latter half. There was increased interest in the history of creative Chinese and Islamic civilizations, and their academic, cultural and economic achievements were emphasized. The current development of the non-West has also increased the attention paid to the creation of new economic, political and cultural centers as well as to history and the present (China and Asia in general are growing stronger; unfortunately, the same cannot be said about Sub-Saharan Africa). Eurocentrism pulled education under its own

influence, but it also created opportunities to become well educated and to oppose Eurocentrism. However, it would be naïve to say that Eurocentrism has been greatly weakened.

Waqas Ahmed: Why is it that even in the non-West, we feel compelled to acclaim Western classics, much more so than indigenous literature?

Professor Hamlet Isaxanli: Wherein lie the roots of Eurocentrism, therein to a certain degree lie the roots of Eurocentrism in modern literature as well. It is possible to answer this question with another question. Why are modern lifestyles in the non-West also Europeanized?

It would be biased and inaccurate to explain Eurocentrism in literature as only a fruit of ideology and colonization. For example, who reads Greek (and Roman) classic literature outside the West? At the very most Homer is read, and even those readers are few and far between. However, the Persian-speaking world reads Ferdowsi, Khayyam, Nizami, Saadi, Mevlana Jalal ad-Din Rumi (who has many readers in the West now as well), Hafiz, and Jami, or in the Turkish-speaking world, Fuzuli and Nava'i are read today. All of them are studied at least in the schools of related countries; that is to say, these nations are not indifferent to their classics. From another perspective, notice that the above names are all poets; they are the greats of Divan literature. Prose and drama were developed in the new era in the West (I am not including the drama of ancient Greece here).

The "new literature" produced by the West was more widely read; poetry fell somewhat behind, and interest in prose and theater increased (this process gradually took place in the East in the 19th century). Don Quixote (M. de Cervantes) and Shakespeare's plays turned into masterpieces of world literature. In the 18th century, J.J.Rousseau's ideas won the hearts not only of genteel readers but also of those who were passionate about changing the world. In the 19th century, great writers of the West intrigued readers: Victor Hugo, de Balzac, C. Dickens, Mark Twain, L. Tolstoy, F. Dostoevsky, and also classic adventures and classic children's literature. The latter two genres are very similar to one another; even Robinson Crusoe (D.Defoe) and Gulliver's Travels (J. Swift) of the 18th century were generally considered pearls of world literature. In the 19th century, just to name English-language writers, authors like R.L. Stevenson, L. Carroll, J.R. Kipling, M.Twain, and J.F. Cooper created works of children's literature that would remain popular for all ages. Goethe's Faust was a deep philosophical work that was unmatched in world literature (for comparison, the Sumerian-Akkadian Gilgamesh comes to mind). Thus, even though Eurocentrism may have provided

impetus, European classics were “rightfully” popularized in the East with their new thoughts and means of expression.

The idea that culture is based on tradition creates an opportunity for alternatives to Eurocentrism. Deep and rich traditions endure even in the face of pressures such as globalization, cultural imperialism and Eurocentrism. In addition, not conservatism but fusion makes it possible to combine national and progressive global values, to develop a new creative perspective on tradition. Azerbaijanis have preserved the melodic nature of Azerbaijani and Eastern music while combining it with European polyphonic styles and developing symphonic music with national spirit, opera and ballet. In this way they have continued to admire U. Hajibeyli, the pioneer of this movement, as well as traditional mugham music and national poetry.

What steps are necessary for the development and promotion of indigenous literature? The inherent potential of national literature is strong; even if it is not completely free of ideological influence, it is capable of sensible and appreciable autonomy, and we should work to ensure that it bears fruit. The majority of ancient literature has been preserved until the present time in the form of oral literature (folklore). It would be possible to respond appropriately to the Eurocentric perspective by studying traditional folklore and making it available in the media (in films and on television).

The spread of national literature beyond borders and its availability to a larger audience is made possible by translation. Reputable journals such as *World Literature Today* make a significant contribution to the development of modern world literature through their work in the translation and publication of indigenous literature. It would be desirable for a journal like this to be published in every major world language (there are many such journals in relatively minor languages which translate and print selections from world literature to make them available to their readers). Fields like Comparative Literature (the comparative study of two or more literatures) also create bridges among local and larger (in the sense of language and readership) literatures. Anthologies and textbooks also play a role in the translation, study and dissemination of indigenous literatures. Textbooks and anthologies are usually selections in which a small minority of people make decisions for a large majority. There is a great need for alternative textbooks, conferences, anthologies, and journals. This process is also aided by a reward system supporting indigenous literatures and their translations. The role of film and internet in the spread of literature should also not be forgotten.

The study of world literature, including European literature, is crucial for us to understand, correctly evaluate and develop our own literature.

Summary

Interviewee: Professor Hamlet Isaxanli

Founder of Khazar University, Chairman, Board of Directors and Trustees
Founding Member of Eurasian Academy

Interviewer: Waqas Ahmed

Head of Special Projects, Global Correspondent, FIRST magazine
Author of *Polymathy* (to be published)

In this interview, Hamlet Isaxanli shares his opinion on polymathy. What makes a polymath? Isaxanli stresses the importance of two factors: a person's nature may lead him/her to an insatiable thirst for knowledge and the desire to explore different fields simultaneously. On the other hand, the education system encourages polymathy from the perspective of the richness and diversity of the high school curriculum. Isaxanli also goes into the relationship between math and poetry as well as the art-science-humanities connections. He then calls attention to Omar Khayyam, Nasr al-Din Tusi and some polymaths of the 20th century. Finally yet importantly, Isaxanli discusses issues related to Eurocentrism and literature.

Keywords: Polymath, history, Philosophy, Literature, Mathematics, Poetry, Art-science-humanities, Education system, Eurocentrism, Islamic world.