

**Mathematical Figures
in the
Rubaiyat of Omar Khayyam**

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(i)

To employ 'science' or 'scientific method' in reading a literary work, which may seem to be a distinguishing feature of modern critical approaches to both visual and literary arts, is in fact as old as the ancient poets and critics of Greece and Rome. It was Aristotle who first established the psychological function of poetry, which he called 'Katharsis' in his *Poetics* and *Art of Rhetoric*. The tendency came to be gradually adopted by countless leading critics and poets beginning from the Roman 'Horace' (who saw that a work of art should be melodious and informative, or 'dulce et utile')¹ to modern times. The first modern formalists such as: Jakobson, Viktor Shklovsky, Boris Eichenbaum, Boris Tomashevsky and Yuri Tynyanov who laid the foundations of Russian 'Formalism' (1917) through "The Moscow Linguistic Circle (1915) and the *Opojaz*: (standing for The Society for the Study of Poetic Language)"²; and the devotees of 'Structuralism' such as Ronald Barthes, Umberto Eco, Tzvetan Todorov, A.J. Greimas and Gerard Genette –³ all have favoured a scientific approach to the literary text, with no regard to any further considerations outside the text itself.

It is on this basis that 'Barthes' comes to define the text on 'Einsteinian' rules of 'relativity', in the sense that the understanding of a text depends basically on "the positions from which a text is read ...".⁴ The recurrence of specific ideas, themes, images, patterns or words and phrases within a text seems to be the main gate or door through which all various critics and readers enter to get to the meanings and formal guidelines of a text.⁵

A new perspective on the *Rubaiyat of Omar Khayyam* seems to be, therefore, in order. It has been stressed by more than one source that 'Nishapur', the birthplace of Khayyam, was so familiar with several Greek philosophical and scientific works about seven or eight centuries

before Khayyam's birth.⁶ That might have paved the way for Khayyam's interest in studying and teaching various Greek sciences. Reynold Alleyne and Richolson have even declared that Omar "composed many famous works on astronomy, mathematics, metaphysics and natural philosophy".⁷ The text of his long poem is, in fact, a witness to the influence of Greek learning on him, and one need hardly go beyond the text in search of proof of such influence.

FitzGerald's rendering of the *Rubaiyat* into English, generally regarded, to cite Christensen, as a "faithful representation of the spirit of Umar"⁸ will be used in this study, not on account of any faithfulness alone (to the letter or the spirit of the original) but also because it has come to be regarded as part of the tradition of English literature.

An examination of the *Rubaiyat* will reveal the reliance of its composer on his profession as an astrologist, philosopher and mathematician. All the thought that he reflects in the verses seems to depend basically, to quote Watson's words, on the attempt "to discover the laws of nature through experiment and scientific analysis [especially mathematical]".⁹ Even the images he uses to draw a picture of the human world – with the probable view of letting us have, to quote Curtis' phrase, "a knowingness about the wider context of life ..."¹⁰ – are rationalized more than sensed. There are, in fact, many other signs in the *Rubaiyat* which can tell that Khayyam, unlike several poets, prefers "the beauty of thought over the charms of sense ...".¹¹ It is on this basis that all his views towards what he writes about appear to have a great deal of logic. Philip Hobsbaum may seem to give credit to such concept by saying: "unless we rationalize our feelings, we cannot be certain whether our reaction is a just one or not".¹² It is hardly surprising, therefore, to discover that Khayyam tends to represent the general context of life on earth, either directly or indirectly, in a variety of mathematical formulas such as numbers, rules, lines, circles, ratios or proportions.

This study aims at pointing out and explaining the most important mathematical formulas which play a vital role in building up the contexture of the *Rubaiyat*. It also tries to evince Khayyam's ability to forge a union between mathematics and poetry or, more precisely, to employ science in the service of literature.

(ii)

The varied representations of life and death in the *Rubaiyat* could be related in more than one way to specific mathematical bases. The concept of death in Khayyam as the force which reduces the life of any living creature to 'nothing', is, in a way, inspired by mathematics. Mathematically formulated 'nothing' is closely related to the figure '0' which marks the absence of quantity. There are innumerable verses in the *Rubaiyat* which imply that 'nothingness', or 'zero', is the inevitable end of even the most luxurious and eventful lives of well-known kings. Consider these lines:

Irām indeed is gone with all its Rose,
And Jamshyd's Seven-ring'd Cup where no one knows;¹³

As interpreted by A.J. Arberry, the lines mean that 'King Schedad' and his grand garden of roses (Irām) are "now sunk somewhere in the Sands of Arabia". Likewise, 'Jamshyd' – "king-splendid" of the mythical Preeshdadian Dynasty" – is obliterated by death and no trace is left of his 'divining cup', which "was typical of the Seven Heavens, 7 planets, 7 Seas ...".¹⁴

Beneath this simple statement of the death of certain persons lies a marked acuteness of a mathematician – poet. The nullification of the kings' lives and their fabulous thrones is made final and categorical by the use of 'indeed' and 'all' in the first line above. It should be borne into mind here that 'the tone of certainty' is mostly a feature of the scientist. Aside from all this, the detailed description of Jamshyd's 'Cup' to have '7' rings is a patent sign of mathematics' irresistible influence upon Omar's fancy.

The view of death as annihilator of mankind is made manifest again and again in the *Rubaiyat*. The following lines support this view:

How Sultan after Sultan with his Pomp
Abode his Hour or two, and went his way¹⁵

and:

The mighty Mahmud, the victorious Lord,
That all the misbelieving and black Horde
Of Fears and Sorrows that infest the Soul
Scatters and slays with his enchanted Sword.¹⁶

The lives of the 'Sultans', along with their splendours, are annulled gradually (one after another), and their short abode on earth is made parallel to 'one' hour or 'two'. But the second four-line stanza does not rely upon numbers or any obvious mathematical specifications, as in the first group of two lines, to explain the same outlook on death. Still, the second stanza does not fail to convey the poet's concept. The Sultans are made to stand on a line with the bravest warriors as destined to have the same end of 'nothingness'. 'Mahmud' is just an example of those countless leaders and conquerors whose glorious life was turned into 'nothing' by death. It is true, according to history perhaps, that Mahmud was one of the greatest conquerors of India, that he frightened and killed the nomadic tribes and was described as 'the victorious Lord'¹⁷; but what is left now of all this? Surely, nothing more than 'nothing'.

Like death, fate turns man's life into 'nothing', but with a marked difference. 'Death' annuls his life, whereas 'fate' annuls his will in life. It is stressed again and again in the *Rubaiyat* that man's preordained destiny on earth has caused Khayyam to see man's value as 'nothing'. In other words, man's will-lessness makes him as unimportant as a 'cipher'. There is no better drawing of man's real value than the following:

For in and out, above, about, below,
'Tis nothing but a Magic Shadow – show,
Play'd in a Box whose Candle is the Sun,
Round which we Phantom Figures come and go.¹⁸

The 'Valuelessness' of human beings in life on earth is the mainstream of thought informing this verse. In all cases ('in and out, above, about, below'), human existence is regarded as nothing more than 'a Magic Shadow – show' which is acted out in the universe's 'Box' by humans who are not different at all from the 'Phantom Figures'. It is destiny of course that forces men's entrances and exits from this box. It should be noted here that the representation of the universe as a circle is probably familiar, but the image of the box is all Khayyam's own. This dictates the need to look for further meanings of the word. Apart from being a rectangular shape, 'box' is taken as 'any of the various spaces on a baseball field marking the playing positions of the players'¹⁹; it may stand for the chessboard. In any case (a baseball field or a chessboard),

the two have to do with 'playgrounds, notwithstanding the difference between one playground and another. Does this mean that Khayyam compares our existence to the world of sports? The answer is given by John Charles E. Bowen who suggests that the poet "compares the fate of men on earth with the arbitrary disappearance from a chessboard of the pieces of varying power and performance ...".²⁰ This premise may be relied upon, as its roots are found in:

'Tis all a Chaquer -board of Nights and Days
Where Destiny with Men for Pieces plays:
Hither and thither moves, and slays,
And one by one back in the Closet lays.²¹

The days and nights are compared to the black and white squares of a chessboard. Since men have no choice in life, they are reduced by the metaphor to 'pieces' (chessmen) with which 'Destiny' plays freely (moving them here and there, taking them all out of the box during the game, and thrusting them back in the box as the game is over). This example of man's will-lessness has many echoes elsewhere in the poem:

The Ball no Question makes of Ayes and Noes,
But Right or Left as strikes the Player goes;²²

Apart from 'death' or 'will-lessness' man's existence is seen by Khayyam to amount to nothing more than 'zero' because of other reasons. All man's worldly pleasures as well as other things in general are destined to end in 'nothing'. This bitter reality of which man is blind is sometimes stated boldly:

And if the Wine you drink, the lip you press,
End in the Nothing all Things end in – Yes –
Then Fancy while Thou art, Thou art but what
Thou shalt be – Nothing – Thou shalt not be less.²³

To Khayyam, if the most ecstatic joys of earthly life (most commonly, wine and women) lead to nothing, as all other things do, man himself must be nothing. The logic here is perhaps meant to convey the philosophical idea that man never gets satisfied with any earthly pleasure, yet he always runs after the unattainable desires as long as he lives. Hence man is foolish, for being unconscious of the 'nothingness' of his identity and the entity of all the worldly things.

Relying on mathematical rules in terms of 'amount' or 'value', the last two lines seem to answer philosophically the implied question: what is man? It is stressed that man 'is' and 'shall not' be more or less than 'Nothing'. It is on this basis that Khayyam comes to open men's eyes to the real destiny of their worldly hopes as follows:

The Worldly Hope men set their Hearts upon
Turns Ashes – or it prospers; and anon,
Like Snow upon the Desert's dusty Face
Lightning a little Hour or two – is gone.²⁴

Though many of the human hopes on earth are fulfilled, they are deliberately made by Khayyam to come to 'nothing' or turn into 'Ashes', as mentioned in the second line. But this should not subject his concept to any question, for the simple reason that people are never satisfied by having their hopes fulfilled. Usually, the achievement of certain hopes is just a step to new more hopes. See how man's 'infinite' desires and wishes are put in a competition with the 'infiniteness' of time':

How long, how long, in infinite Pursuit
Of This and That endeavour and dispute?
Better be merry with the fruitful Grape
Than sadden after none, or bitter, Fruit,²⁵

Obviously, Khayyam's view indicates his perfect awareness of the reality of life and humanity. Life's inevitable end is a clear-cut fact which people forget all about by keeping their minds and eyes open on what to come and be expected tomorrow. It is on this basis that these people are made to suffer, because their life is mostly lost in the midst of the jumbleness caused by, as Ali Dashti puts it, their "regret for the past and worry about the future".²⁶ The truth that man is destined to die at any moment and without being notified in advance must have evoked Khayyam's advice to all people to enjoy the present moment (which he calls 'the fruitful Grape', or as mentioned somewhere else in the *Rubaiyat*, 'Cash in hand'),²⁷ hence, neither the past nor the future is attainable. Here he says:

Ah, my Beloved, fill the Cup that clears
To-Day of past Regrets and future Fears –²⁸

It may be useful to recall the previous lines on 'hope'. Interesting is their blending of mathematics with philosophy and imagery in picturing 'hope'. The first two lines define hope on earth in the light of the mathematical formulas of the 'infinite' and 'finite'. Man's infinite worldly hopes are reduced to 'zero', or 'a non' as mentioned in the second line. The philosophy of hope turning into ashes is exemplified again by the striking simile of the last two lines. Even in his use of the imagery, Khayyam seems to be unable to free his imagination from the fixities of science. The peculiar comparison of hope to the melting snow gives the strong impression that there is an experienced scientist standing behind it. We see the scientist in the precise terms of the metaphor, the peculiar attention to detail, and the logical conclusion drawn from the analogy.

The mathematical formula 'zero', which is implied in many ways by the word 'nothing' in the *Rubaiyat*, can again be adduced as the basis of new philosophical concepts of Khayyam. People often disregard the limitation of the human mind, and ask why we are born to die ?, and what is to come after death ? And all the inquiries have come to the inevitable 'nothingness' at which all things must end. It is a painful mystery which the *Rubaiyat* boldly confronts:

Myself when young did eagerly frequent
Doctor and Saint and heard great Argument
About it and about: but evermore
Came out by the same Door as in I went.²⁹

With them the Seed of Wisdom did I sow,
And with my own hand labour'd it to grow:
And this was all the Harvest that I reap'd –
"I came like Water, and like Wind I go".³⁰

Into this Universe, and *why* not knowing,
Nor *whence*, like Water willy-nilly flowing:
And out of it, as Wind along the Waste,
I know not *whither*, willy-nilly blowing.³¹

Establishing this fact, through geometry, as a solid rock around which a circle is drawn, Khayyam's mind believes it is predestined to move just inside the circle. Khayyam admits that all he knows about his 'existence' or 'non-existence' in the universe is nothing more than the 'willy-nilly flowing' of water and the 'willy-nilly blowing' of wind. It is beyond the capacity of his finite mind, and all minds, to know 'why' this happens and 'when' to vanish from the universe like the wind. Man's coming to and departure from the universe are acts performed against his will, a predetermined circle which no one can break. And all the thinkers who have attempted to break free of the circle by engaging in arguments about issues lying beyond their knowledge have admitted their failure. In other words, as stressed in the first quatrain, all the philosophical discourses about the mysteries of the universe are deemed to be futile or, as Christensen puts it, "are but the piling up of bricks upon the surface of the sea".³² It is on this basis that Khayyam's mathematical logic is established: if this is the bitter truth of our life, why do we trouble ourselves by looking for the invisible 'Grail' of the universe's secrets. isn't what we do foolish ? The immediate answer is given by these lines:

Alike for those who for To-DAY prepare,
And those that after a To-MORROW stare.
A Muezzin from the Tower of Darkness cries
"Fools ! Your Reward is neither Here nor There".³³

Why, all the Saints and Sages who discuss'd
Of the Two Worlds so learnedly, are thrust
Like Foolish Prophets forth: their Words to Scorn
Are scatter'd, and their Mouths are stopt with Dust.³⁴

In a wiseman's voice (or as a Muezzin), Khayyam tries to awaken men to a consciousness of the irrevocable determinism of the universe. Even the 'Sages' or 'Saints' are not exempted from this loss either: all their resounding talk about the secrets of life here or there turn out to be nothing more than the frivolous words of false apostles. Out of all this springs once again the 'nothingness' or 'valuelessness' of all attempts by men to know what they are not allowed to know.

The fact that there are many secrets of the universe lying beyond the reach of any man seems to have prompted Khayyam to express his doubts openly regarding the authority of science over nature. Though scientists have succeeded in exploring many secrets of nature, they have announced their inability to deal with such natural forces as 'death' and 'fate'. Being an astrologist, he used to soar with his imagination into the sky attempting to unravel the mystery which overwhelms our world:

Up from Earth's Centre through the Seventh Gate
I rose, and on the Throne of Saturn sate,
And many knots unravel'd by the Road;
But not the knot of Human Death and Fate.³⁵

Literally, the lines mean that the speaker has travelled imaginatively to the seventh heaven ('Seventh Gate') and had a seat on 'Saturn' (the sixth planet from the sun). Through this long cogitative journey many of the intricacies are encountered but resolved ('And many Knots unravel'ed by the Road') except for the intricacy of 'Human Death and Fate'. This is to say that the quest of the astrologist after hidden natural forces comes up with 'nothing'. This evident failure of astronomy is certified once more by mathematical rules in:

For 'Is' and 'Is-Not' though *with* Rule and Line,
And "Up-And-Down" *without*, I could define,
I yet in all I only cared to know,
Was never deep in anything but – Wine.³⁶

Admittedly, Khayyam shows that all the knowledge he has striven to acquire regarding the secret behind man's 'existence' or 'non-existence' (referred to by 'Is' and 'Is-Not') is worth 'nothing' ('was never deep in anything'), despite his reliance in investigation upon recognized mathematical theories (signified in the above lines by 'Rule', 'Line', 'Up-And-Down'). This is simply because he could reach the same conclusion without any such theories ('without, I could define'). It is a mockery of the 'uselessness' of mathematics, which is perhaps severer than his previous mockery of both philosophy and astrology. His use of 'up', 'down', 'center', 'rule' and 'line' (which are all geometrical signs) is an illustrative example of the influence of geometry on him.

One last aspect of 'nothingness' is that man can do 'nothing', even if he struggles all his lifetime, to change a single word in the lines stating his fate, written on his forehead, and with which he is born:

The Moving Finger writes; and, having writ,
Moves on: nor all thy Piety nor Wit
Shall lure it back to cancel half a Line,
Nor all thy Tears wash out a Word of it.³⁷

The lines strongly imply the 'uselessness' of all such silly things that several men do on earth. Many of them cry, shout and even revolt against the various hardships of life; others raise hands helplessly to the sky. The more these men pray for help, the more they are pushed into the hell of helplessness. Such men must be blind to the fact, as Khayyam shows in the following lines, that the sky can do 'nothing' for them, because it is itself helpless:

And that inverted Bowl we call The Sky,
Whereunder crawling coop't we live and die,
Lift not thy hands to *It* for help – for it
Rolls impotently on as Thou or I.³⁸

Men, sky, earth and all creatures are seen as working under a predetermined system, which no power in the world can repeal or even slightly change. Khayyam concludes by saying: "Yea, the first Morning of Creation wrote / What the Last Dawn of Reckoning shall read".³⁹ This conclusion itself implies the uttermost failure of Khayyam—who (as shown by R. Alleyen and Richolson) was regarded by Najmu'ddin Dâya in *Mirsâdu'l-Ibad* and Ibnu'l-Qifti in *Tarikhu'l- Hukama* as "a teacher of Greek science, and had an unrivalled knowledge of astronomy and philosophy"—⁴⁰ in trying to translate the residing mystery in 'death' and 'fate'.

* * *

Omar's utilization of 'numerology' has been shown so far to function, and quite effectively, as a means of explaining the definite absolutes of nature. This is more effective when used symbolically in specific quatrains of the *Rubaiyat*. The figure 'I' is used directly about 15 times, and implied many more times, in various verses. Because repetition in any form (of sounds, words, patterns ... etc.) in a work of art has remarkable effects (tonal, emotional, intellectual or

rhythmical),⁴¹ Khayyam's repetition of this cannot be disregarded. Pythagoras (a Greek philosopher and mathematician, c582 – c500 B.C.) believed that 'individual numbers' may be used as symbolic indicators of specific things in the universe. an idea handed to him by Aristotle and Plato. and now seems applicable to Khayyam's use of numbers. To Pythagoras (as shown by Brooks), man's responsive or meditative attitude to 'music' or the 'universe' is bound to "possess number within him".⁴² It is on this basis that Khayyam's description of many aspects of life on earth with the number '1' can be considered as a symbol of his great appreciation of God's 'oneness'. Such premise is supported by Wadia' Al-Bustany. In his commentary on the *Rubaiyat*, which he translated from the Persian into Arabic, Al-Bustany proposes that Omar's repeated use of the number '1000' (which means '1' in total quantities) signifies that God is one.⁴³

There are some other numbers mentioned more than once in the *Rubaiyat*, and which may have certain associations. For instance, the number '7' may stand for the seventh seas, planets or heavens (as suggested by A.J. Arberry), phenomena of nature which surely preoccupied Khayyam's mind as an astrologist. Number '4' in quatrain 'XI' is interpreted by Al-Bustany as a reference to the four elements pertaining to man's origin, which are 'dust', 'water', 'air', and 'fire'.⁴⁴ Thus, the probable meaning that Khayyam may want to convey behind both '7' and '4' is that human beings belong to the seventh heavens and the fourth constituents of their creation.⁴⁵ The number '72' in quatrain 'XLIII' may refer to the prophet Mohammed's prediction of the Moslem believers' split into seventy-two sects or more, due to wrangling among themselves about minor religious issues. It is most likely, too, that Khayyam uses this number to stand for the so many contradictory views of the 'Nishapurian' Sufis during his time on the question of 'wine'. They agreed and disagreed upon the idea that using the word 'wine' in the religious songs had nothing to do with the literal sense of the word, but closely pertained to intoxicating the self in an intimate relation with God. This last allegorical sense of the word is applied largely to the poetry of many Persian and Arab authors such as 'Ibn Al-Farid' and 'Hafiz'.⁴⁶ All these hypothetical associations of the numbers concerned find their powerful advocates in various analyses of the *Rubaiyat*. The commentary notes of Al-Bustany and A.J. Arberry are good representative examples. After all, what might be noteworthy

here is that such assumed meanings of 'wine' in the *Rubaiyat* refute many of the arguments of Omar's enemies who accused him of being an 'epicurean' Moslem thinker (recommending people to eat, drink, and forget all about their pains and troubles, for tomorrow they will die).

(iii)

'Equation' seems to be a mathematical formula to which Khayyam returns again and again in establishing many of his ideas in the *Rubaiyat*. In the first place, he believes that all human beings (regardless of their distinct titles, ranks, races, colours, religions, origins ... etc.) are equal because they are all predestined to turn into dust after death:

And those who husbanded the Golden Grain,
And those who flung it to the Winds like Rain,
Alike to no such aureate Earth are turn'd ⁴⁷

And we, that now make merry in the Room,
They left, and Summer dresses in new Bloom,
Ourselves must we beneath the Couch of Earth
Descend, ourselves to make a Couch-for whom ?⁴⁸

The first three lines emphasize that the men who lived either frugally ('husbanded the Golden Grain') or wastefully ('flung it in the Winds like Rain') equally turn into dust: none of the two distinct types of men has ever changed into a 'golden' dust, as stressed in the third line. The following from lines equate the dead with the living men in sharing the same destiny. That is, sooner or later, we are going to die and be nothing more than 'couches of earth' for others to be buried in. The whole logic here can be represented by the following mathematical formula:

$$\begin{aligned} &\text{Since } (X \Rightarrow D) \wedge (Y \Rightarrow D) \\ &\text{Hence } (X \vee Y) \Rightarrow D \\ &\Leftrightarrow (H \Rightarrow D) \end{aligned}$$

which means: since the living men (X) turn after death to dust (D) and (\wedge) the dead ones (Y) dissolve into dust as well, the living or (\vee) dead, men are nothing more than dust. In this way, humankind (H) equals dust.

This philosophical concept of mankind, based on mathematical rules, is emphasized in the *Rubaiyat*. In the following stanza, for example, Khayyam believes that the clay that a potter shapes into various pots suffers but silently. His subtle awareness of the reality of dust to be nothing other than human bodies invites him to imagine that the clay begs the potter to ‘thump’ it gently, for he himself will soon become dust and wish if he were handled kindly by the hands of another potter:

For in the Market-place, one Dusk of Day,
I watch'd the Potter thumping his wet Clay,
And with its all obliterated Tongue
It murmur'd – “Gently, Brother, gently, pray!”⁴⁹

Another figure of ‘equation’ is drawn in the *Rubaiyat* by the idea that balance in the universe is maintained through the continuously equal proportion of ‘creation’ and ‘decreation’, or life and death, on earth. The following quatrain best represents the figure:

And look – a thousand Blossoms with the Day
Woke – and a thousand scatter'd into Clay:
And this first Summer Month that brings the Rose
Shall take Jamshy'd and Kaikobád away.⁵⁰

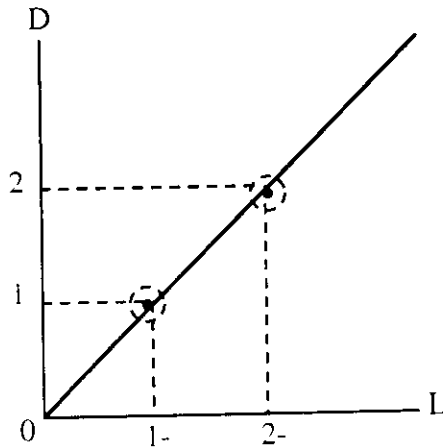
Interesting is the double parallelism these four lines create between the force of death and that of life in the world of plants on the one hand, and between the world of plants and that of human beings on the other. It is directly mentioned (regardless of any other considerations) in the first two lines that ‘a thousand’ roses burst into bloom at the moment in which an equal number of other grown roses wither (‘scatter'd into Clay’) every day.

Al-Khayyam's philosophical view that all creatures are equal is to be detected many times in the *Rubaiyat*. There is no better evidence of this than quatrain number ‘72’:

Look to the Rose that blows about us – “Lo,
“Laughing,” she says, “into the World I blow:
At once the silken Tassel of my Purse
“Tear, and its Treasure on the Garden throw”.⁵¹

The rose is given man's flesh and blood here: like man, it is made to speak and laugh, even ironically. The irony of fate is only too obvious.

The poet's consciousness of 'time' as the absolute force that governs both 'existence' and 'non-existence' of all creatures on earth distinguishes the above two quatrains. Time is the force of life and death, moving in parallel lines in this universe. As for the equal proportion of death and life (as seen by the poet), which may look strange in so far as it is not based on a 'scientific statistics', it can be regarded as logical. In one sense, any lack of balance between life and death should leave its marked influence on the universe. In other words, if the ratio of deaths excels that of births, mankind will perish; the reverse is correct: if the birth rate exceeds the death rate, we shall have a population explosion. Whether right or wrong, this theory is perhaps meant to show that 'time' is not just 'a force of doom' (as shown by many poets)⁵² but of life as well. The poet's view of the relation among the three forces of nature (life, death and time) may be represented by the following geometrical diagram:



This figure can be interpreted this way: (0) means the beginning point of the straight line of life (L) and of death (D). In this way, and according to the poet, $L = D$ or, as it is shown above, the ratio of life is equal to that of death. In this regard 'time' is implied to be stable in its linear movement on earth. Thus life, death and time are all made 'infinite' through the continuity of their existence on the globe.

However, the poet's concept of life as 'infinite' sometimes contradicts, to borrow Cascardi's phrase, "a concept of the world as a finite totality ...".⁵³ In one quatrain he draws an interesting image of 'time' and 'life' as follows:

The bird of time has but a little way
To fly – and Lo ! the Bird is on the Wing.⁵⁴

The aphoristic definition of 'time' (time runs fast) is lucidly given through the metaphor of the bird. The word 'little' (suggesting the mathematical sense of 'the smallest amount') evokes the feeling that the poet is circumscribing the human world with a wall at which life as a whole ends. The concept of the 'infinite' as 'finite' (for no one can tell when human existence will eventually come to an end) is not in fact unfamiliar: it is used by countless authors.⁵⁵ Unlike an ordinary bird, which is known not to fly permanently and is liable to die any moment, the bird of time never stops flying, never dies: it is always in flight.

The feeling that most people are not conscious of the passing away of their life drives the poet to draw our attention, now and then, to the need to make the most of the little time we are allowed on earth. Once again, the 'finite' (man) and the 'infinite' (time) are put together but in a different image from the above one. With the acuteness of a scientist, the poet comes here to look upon 'time' as something that slides smoothly under our feet without being noticed by us: "How Time is slipping underneath our feet", he utters in a quatrain.⁵⁶

From all the ideas discussed so far, it can be easily seen, perhaps, that the 'circle' (which is a geometrical formula) is an implied general basis of the poet's varied concepts of our universe. Concepts of life, death, time, fate and philosophical or scientific arguments about it, all can be regarded as circular. The continuity of each one of these aspects of nature makes it very difficult for any one of us to determine either the beginning or the end of each aspect.

The 'circle' or circular movement is reflected sometimes in the medium of expression itself in various verses of the *Rubaiyat*. Man's predestination makes him look like a will-less 'ball'; the sky is portrayed as 'rolling' above us; man's short life is represented as the process of drinking a cup of wine just 'a round or two'; and even the pots in a pottery shop are conceived by the poet as standing in 'round' rows. Thus, 'circularity' is achieved in entirely different ways from those of both traditional and modern poets, without recourse the mythologies employed by T.S. Eliot or Arab Poets, through "the possibility of rebirth after suffering and death".⁵⁷

(iv)

Apart from the paramount role that mathematics plays in crystalizing the poet's philosophical and scientific outlook on the universe, mathematics plays a no less important role in determining the structural pattern in the *Rubaiyat*. Differing much from his contemporary 'Khorasani' writers and those who came after him (e.g. Naser Khosrou, Farrokhi, Manuchehri ... etc.), Al-Khayyam tends to use the 'epigrammatic quatrain' which does not have an access to the exaggerated ornaments that are hackneyed in both the verse and prose of the time and focuses on stating certain ideas with a distinguished 'brevity'. The form is that of the 'aphorism' which has found its way into several European and American poems.⁵⁸

The structural pattern of all the quatrains testifies to their heavy reliance upon a marked mathematical logic. Describing such pattern, Ali Dashti says that it "is a perfect example of the logical syllogism, with the fourth line conveying the conclusion to the premises contained in the first three".⁵⁹ He goes on to mention that it is hardly surprising to find out such technique of writing, because Al-Khayyam "was after all a mathematician, with a natural inclination towards a logical statement of ideas".⁶⁰ The explanatory examples are actually countless in the *Rubaiyat*, so we should take just the following quatrain as representative:

And if the Wine you drink, the Lip you press,
End in the Nothing all Things end in – Yes –
Then fancy while Thou art, Thou art but what
Thou shalt be – Nothing – Thou shalt not be less.⁶¹

It is quite apparent that the first three lines make a supposition which is proved to be right by the last line: if all things on earth were worth nothing, man can be no exception. Only a mathematician's mind, I believe, can build up a 'structure' like this in verse.

The stanza form which Khayyam uses in the *Rubaiyat* turns out to be a suitable means of expressing his ideas, which are mostly philosophical. It is the 'meditative' stanza, "rhyming a a b a", and which has been borrowed by several English poets in the nineteenth century. According to Philip Hobsbaum, the novelist and poet Emily Brontë is one of them.⁶²

The mathematical technique is well suited to the ideas presented in the *Rubaiyat*. This exact 'matching of form' to content appears to Clive Bloom as a luminous sign of beauty in classical poetry.⁶³ In this way Al-Khayyam should not be regarded as just a mathematician whose primary concern is to convey his ideas and views in any form of writing, but an experienced poet.

NOTES

- (1) Wilfred L. Guerin & Others, *Literature and Interpretive Techniques*, New York: Harper & Row, Publishers, 1986, p. 7.
- (2) Philip Rice & Patricia Waugh, eds., *Modern Literary Theory*, second edition, London & New York: Edward Arnold, 1992, p. 16.
- (3) Ibid., p. 22.
- (4) Roger Webster, *Studying Literary Theory*, An Introduction, Second edition, New York: Arnold, 1996, p. 99.
- (5) Guerin, Op.Cit., p. 8.
- (٦) عبد القادر زيدان ، دكتور ، قضايا العصر في أدب ابي العلاء المعري ، دراسات أدبية ، الهيئة المصرية العامة للكتاب ، القاهرة ، ١٩٨٦ ، ص ٥٩ . وانظر ايضاً ، عبد الرحمن بدوي ، دكتور ، التراث اليوناني في الحضارة الاسلامية . بيروت ، ١٩٨٠ ، ط ٤ ، ص ٥٣ .
- (7) Edward FitzGerald, *Rubiyat of Omar Khayyam*, ed. with Introduction and Notes by Reynold Allens & Richolson. London : Adam & Charles Black, 1909, p. 11. See also. A. J. Arberry, *Rubaiyat of Omar Khayyam: Rendered into English Verse*. London : Macmillan & Co., Ltd., 1908, p. 25.
- (8) Arthur Christensen, *Critical Studies in the Rubaiyat of Umar Khayyam*, A Rendered Text with English Translation, Kobenhavn : Hovedkomissionaer, Ander Fred. Host & Son, KGL, 1927, p. 54.
- (9) J.R. Watson, *English Poetry of the Romantic Period 1789-1830*, London & New York: Longman Group Ltd., 1985, p. 23.
- (10) Tony Curtis, *How to Study Modern Poetry*, London: Macmillan, 1990 (reprinted 1991, 92, 93), p. 127.
- (11) C.H. Herford, *English Literature*, New Delhi: Karlyani Publishers, 1988, p. 57.
- (12) Philip Hobsbaum, *Essentials of Literary Criticism*, London : Thomas & Hudson Ltd., 1983 (reprinted 1993), p. 33.

- (13) Edward FitzGerald, trans., *Rubaiyat of Omar Khayyam*, The Astronomer Poet of Persia (first edition 1859), reprinted with Introduction and Notes by A.J. Arberry, London: George Allen & Unwin Ltd., 1959, p. 164.
- (14) *Ibid.*, p. 180.
- (15) *Ibid.*, p. 166.
- (16) *Ibid.*, p. 172.
- (17) *Ibid.*, p. 183.
- (18) *Ibid.*, p. 172.
- (19) Jess Stein, *The Random House Dictionary of the English Language*, New York: Randon House, 1968.
- (20) John Charles E. Bowen, *A New Sellection From The Rubaiyat of Omar Khayyam*, Rendered into English verse, England: Aris & Phillips Ltd., 1976, p. XXVIII.
- (21) *Rubaiyat of Omar Khayyam*, Op.Cit., p. 173.
- (22) Loc. Cit.
- (23) *Ibid.*, p. 172.
- (24). *Ibid.*, p. 166.
- (25) *Ibid.*, p. 171.
- (26) Ali Dashti, *In Search of Omar Khayyam*, Translated from the Persian by L.P. Elwell-Sutton, London: George Allen & Unwin Ltd., 1971, p. 129.
- (27) *Rubaiyat of Omar Khayyam*, Op. Cit., p. 165 & 171.
- (28) *Ibid.*, p. 167.
- (29) *Ibid.*, p. 168.
- (30) Loc. Cit.
- (31) *Ibid.*, p. 169.
- (32) Christensen, Op. Cit., p. 49.
- (33) *Rubaiyat of Omar Khayyam*, Op. Cit., p. 168.
- (34) Loc. Cit.

- (35) Ibid., p. 169.
- (36) Ibid., p. 171.
- (37) Ibid., p. 173.
- (38) Loc. Cit.
- (39) Loc. Cit.
- (40) Alleyn & Richolson, Op.Cit., p. 9.
- (41) See Majorie Boulton, *The Anatomy of Poetry*, Great Britain : Routledge & Kegan Paul Ltd., 1953 (reprinted 1955, 59, 62, 74), p. 73. See also. Geoffrey Leech, *A Linguistic Guide to English Poetry*, London: Longman Group Ltd., 1969, p. 79.
- (42) Douglas Brooks, *Number and Pattern in the Eighteenth-Century Novel*, Defoe, Fielding, Smollett and Sterne, London & Boston : Routledge & Kegan Paul Ltd., 1972, p. 2.
- (٤٣) وديع البستاني ، مترجم ، رباعيات الخيام ، الفلكي الشاعر الفيلسوف الفارسي ، دار المعارف ، القاهرة ، ١٩٦٩ ، ط٤ ، ص ١٣٠ .
- (٤٤) المرجع السابق ، نفس الصفحة .
- (٤٥) الصفحة السابقة .
- (٤٦) المرجع السابق ، ص ١٩ .
- (47) *Rubaiyat of Omar Khayyam*, Op. Cit., p. 166.
- (48) Ibid., p. 167.
- (49) Ibid., p. 170.
- (50) Ibid., p. 164.
- (51) Ibid., p. 165.
- (52) See for example, E. Enani, *Varieties of Irony, An Essay on Modern English Poetry*, Cairo: State Publishing House GEBO, 1994, p. 71 where it is explained that Philip Larkin, as a representative Poet of Modernists, looks upon 'time' as the force that "only serves to bring man nearer to death ...".
- (53) Anthony J. Cascardi, *The Subject of Modernity*, New York : Cambridge Univ. Press, 1992, p. 126.

- (54) *Rubaiyat of Omar Khayyam*, Op.Cit., p. 167.
- (55) Rice & Waugh, Op. Cit., p. 174.
- (56) *Rubaiyat of Omar Khayyam*, Op. Cit., p. 170.
- (57) Salma Khadra Jayyusi, ed., *Modern Arabic Poetry*, An Anthology, with an introduction, New York: Columbia Univ. Press, 1987. p. 22.
- (58) See, Henry W. Wells, *An Introduction to Emily Dickinson*, New York: Hendricks House, Inc., 1958, p. 47, where it is stressed that Dickinson is an illustrative example of the many poets who have been influenced by Omar's aphorism in the *Rubaiyat*.
- (59) Dashti, Op. Cit., p. 134.
- (60) *Ibid.*, p. 135.
- (61) *Rubaiyat of Omar Khayyam*, Op.Cit., p. 172.
- (62) Philip Hobsbaum, *Metre, Rhythm and Verse Form*, London & N.Y.: Routledge, 1996, p. 130.
- (63) Clive Bloom, ed., *Literature and Culture in Modern Britain, 1900-1929*, V. I, London & N.Y.: Longman, 1993, p. 25.

