

CHAOS THEORY AND STOPPARD'S *ARCADIA*

Zekiye ANTAKYALIOĞLU¹

ABSTRACT

This study aims at presenting how Chaos Theory can be held in a work of art, especially in the hands of Tom Stoppard, who is a very renown British playwright. Chaos and Chaotic Systems may sound to be the main areas of interest of the disciplines like mathematics and physics, however, Chaos Theory stands for the matrix of Postmodern theory and art as well. Chaos Theory illustrates the very essence of almost all plays of Stoppard because the main question he has been dealing with is: "Is there a system behind the absurdity of existence?". This theory attracts Stoppard mostly because it asks the same question. Stoppard, as an artist deals with human being and meaning of its existence. In *Arcadia*, he tackles this subject matter relating it to concepts like bifurcation, entropy and second law of thermodynamics. He moulds these scientific concepts with the idea of history, love and the irreversibility of time in two distinct time periods. Some of the scenes take place in 1800s, whereas others in 1990s. Stoppard, in a way, wants to demonstrate that however much physics and literature sound remote, they still deal with the same problems and concerns related to existence.

Tom Stoppard is a playwright with an international reputation as a writer of "serious comedy"; in Turkey, he is widely known with his screenplay of the film *Shakespeare in Love*. His plays are plays of ideas that deal with philosophical issues, yet he combines the philosophical ideas he presents with verbal wit and visual humor. His linguistic complexity, with its puns, jokes, innuendo, and other wordplay, is a chief characteristic of his work. Stoppard's topics cover an eclectic array of themes and topics: from the world of science to the potential chaos theories (*Arcadia*, *Hapgood*); from philosophy (*Jumpers*) to Wittgenstein's language games (*Cahoot's Macbeth* and *Dogg's Hamlet*); from morality to relative and socially constructed metaphysical absolutes (*Every Good Boy Deserves Favour*); from history to parody (*Travesties*). He has explored the nature of love and the requirements of intimate human relationships. Interwoven in many of these plays are recurrent issues of the nature of personal identity as well as the unreliability of human memory and perspective.

This study, however, will be mainly about his 1993 play *Arcadia*. Like the other plays by Stoppard, *Arcadia* is an uproarious comedy with unsettling undercurrents. These undercurrents find their source in the term 'unpredictability' based on the themes as second law of thermodynamics, history, chaos, maths, and love highlighting not only the limitations of scientific prediction but also the inescapable fact that we can never hope to foresee just what course our lives will take.

Throughout the play the dominant theory is the "chaos theory". The nature of knowledge whether mathematical, physical or historical is chaotic. And from this very chaos Stoppard creates his comic nuances.

The plot of *Arcadia* depicts two different periods of time at once. The play takes place in the Sidley Park mansion of Coverly Family in two parallel periods: 1800s and 1990s. It is a two-act play containing seven scenes. The characters belonging to past are: Septimus, Thomasina, Mr. and Mrs. Chater, Lady Croom, Captain Brice, Mr. Noakes. The characters belonging to the present time are: Hannah, Valentine, Bernard, Gus and Chloe.

¹Istanbul Kültür Üniversitesi, İngiliz Dili ve Edebiyatı Bölümü, Ataköy Kampüsü,
İstanbul 0 212 498 43 33, z.antakyalioglu@iku.edu.tr

The play is based on the research –at present time- of two literary historicist academicians (Hannah and Bernard) about the history of Coverly Family. Scenes representing both periods develop gradually and separately till the seventh scene where we find the representatives of both periods appear on the stage together.

Thomasina, the teen-age daughter of Coverly Family, is interested in studying Newtonian science, which approaches the universe as a linear, stable and ordered concept. She asks Septimus (her tutor) a question about rice pudding which makes her think that Newtonian view of universe is incomplete:

When you stir your rice pudding, Septimus, the spoonful of jam spreads itself round making red trails like the picture of a meteor in my astronomical atlas. But if you stir it backward, the jam will not come together again. Indeed, the pudding does not notice and continues to turn pink just as before. Do you think it is odd?
(*Arcadia*, 12)

In other words, she asks why one cannot stir things apart. Thomasina's question leads to a discussion about Newton's Law of Motion. She believes that if one could stop every atom in motion, a person could write a formula for the future. On the other hand, her seemingly simple observation points to the Second Law of Thermodynamics, which is a statement about the increasing disorder in the universe. While working on their separate projects (in the present day) Valentine reminds Hannah that her tea is getting cold. Tea, like the swirl of the jam in rice pudding, cannot be warm again. There Valentine realizes the fact that Thomasina's diagrams were of heat exchange. Thomasina, was, in fact, theorizing ideas central to "chaos".

Later on, in the fourth scene, time switches to the present and Hannah after reading from Thomasina's portfolio, gives it to Valentine to look at. The pages of Thomasina's book are filled with iterated equations, that is, equations that feed solutions of one equation into the next. Valentine is surprised that Thomasina would be doing this because iteration has only been practiced for the last twenty years. Valentine tells Hannah that if each algorithm fed into itself a thousand times, each dot would land in an unexpected place. In other words, the unpredictable results of iteration are like the unpredictability of nature. He says:

The unpredictable and the predetermined unfold together to make everything the way it is. It's how nature creates itself on every scale, the snowflake and the snowstorm. It makes me so happy. To be at the beginning again, knowing almost nothing. (*Arcadia*, 68)

It is very ironic of course because while studying on these equations, Thomasina was unaware of her approaching death, she was going to die soon after these studies. Future was certainly unpredictable. Chaos Theory describes a world in which there is chaos in order, but also order in chaos. Stoppard comments:

Chaos mathematics is a reconciliation between the idea of things not being random on the one hand and yet unpredictable on the other hand. [1]

For Fleming, this combination of apparent randomness yet underlying order epitomizes the structure of many of Stoppard's plays and seems to be congruent with Stoppard's worldview in which there is a high degree of relativity yet also moral absolutes.[1]

As Heuvel puts it, in *Arcadia* Stoppard finds in chaos science the perfect metaphor to convey his deliberations on the strange dance between order and disorder using the principles of thermodynamics mimicing the postmodern notion of the "entropy of

discourse”. [2] “Entropy” means the measure of the degree of disorder in a system. ‘The measure of the degree of disorder’ calls to mind the idea of chaos and randomness whereas ‘system’ indicates the order and harmony. They are intermingled notions.

‘Deterministic chaos’ deals with systems of unpredictable determinism; however, the uncertainty does not result in pure randomness but rather in complex patterns. Not only is the content of *Arcadia* an experiment with the chaos theory, but the structure of the play itself radiates this theory. Deterministic chaos is grounded in non-linear mathematics; Stoppard constructs *Arcadia* in a non-linear manner: the scenes alternate between the early 1800s and the present. Furthermore, the very structure of the play as Stoppard says to Fleming in an interview “mimics the way an algorithm goes through bifurcations into chaos”. [1] There are seven scenes where the periods mix. Stoppard attempts to create the structure of the play like an algorithm that feeds into itself through iterations which are central to the algorithm of the chaos theory. There is initial order between the scenes, switching back and forth from historical to present day scenes, until the last scene in which the two periods are shown synchronically. Some scenes are four pages and others are over twenty. (The only stable element is the environment. The setting of both time periods is the same, although Sidley Park changes considerably over two centuries.) The audience cannot predict the progression of the plot nor suspect Thomasina’s untimely end. Stoppard, thus, creates a random and chaotic play that tests and crumbles in an effort to create reality (the notion that the audience has built up in the course of watching the play). In short, Stoppard has made ‘deterministic chaos’ the chief metaphor of the play.

Another starting point for *Arcadia* was Classicism and Romanticism as opposites in life style, task, temperament and art; Stoppard also wanted to show that these two opposite tastes are interdependent notions. The yoking of the differences between classicism and romanticism (as manifested in the evolution of landscape gardening and in the persons of Bernard and Hannah) to deterministic chaos provided a recognizable parallel to describe the paradigm (i.e. the unpredictability and predeterminacy) of chaos theory. The new design of the garden prepares the ground upon which these two different views of life could be discussed and compared. Mr. Noakes was responsible with the new design of the garden in transforming it from the classical to picturesque (i.e. romantic). The classical shape of the garden stands for the regularised form of nature which is conforming to a human vision of what God’s creation should be. This classical view is parallel to Newton’s deterministic laws. As Demastes aptly argues, the ironic reality, however, is that nature uncontrolled does not produce such regularity; rather, it obeys fractal necessity, irregularity created by an “order” that allows small points of unpredictable and unexpected deviations to effect an infinity of self-similar opportunities. [3] The classical view conforms with Lady Croom’s *Arcadia* (a heaven-like garden) which implies the assistance of humanity to nature in fulfilling God’s design. Mr. Noakes, on the other hand, tries to reform the garden from a romantic perspective in picturesque style giving the garden a wild (but not random) shape. Romanticism is central to the play in introducing the idea of irregularity dominating the nature.

Fleming states that since comprehending scientific concepts can sometimes be difficult, Stoppard aids his audiences’ understanding by the analogous transition from classicism to romanticism -that is, classicism metaphorically corresponds to Newtonian science and romanticism to deterministic chaos. [1]

In contrast, while acknowledging unpredictability, Stoppard focuses on what is stable and ordered. Because he constructs the play by stressing the process of recognising the order within disorder and seeing the fine structure hidden within the seemingly random.

Stoppard's emphasis on those regions of order and stability is balanced with a celebration of uncertainty with which Valentine is genuinely pleased. There are still many mysteries that may never be solved. Indeed, the play as a whole acknowledges the difficulty of truly knowing anything. Even Hannah says "it is wanting to know that makes us matter". (*Arcadia*, 106) There is an urge in human beings to understand the mysteries of the universe, to fully describe the order hidden behind the chaos. At this point the name of the play, **Arcadia**, gains importance, because landscape gardening is a strong metaphor in that it gives order to wild nature in human terms. Even the garden's transformation to the romantic, gothic and picturesque design of Mr. Noakes indicate the inevitable evolution towards disorder which was best exemplified by Thomasina's Second Law of Thermodynamics. Later on Valentine provides an explanation of it by very plainly saying that "the hot tea gets cold, but the cold tea never gets hot by itself". (*Arcadia*, 110) Time is irreversible.

Hannah thinks romanticism is a sham. She investigates the history of the gardens of the park and is particularly interested in the transformation brought about by Richard Noakes, who obliterated the classical pastoral landscaping and replaced it with the gloomy and romantic features of the gothic novel: crags, waterfalls, thickets, artificial ruins and a "hermitage". For Hannah the "mad hermit" (Septimus) of this hermitage represents the end of not only classicism but also a cultural decline that began with the elimination of the symmetrical layout of the gardens and continued with successively irregular redesigns. Since the innocent child of nature ("the father of man") passed away, the necessity to escape to nature arises. Thomasina's death and Septimus's escape to the hermitage in Sidley Park symbolically allude to the romantic understanding of escaping with the hopes of regaining the lost innocence and reunification with nature. But this time the unification would be a more realistic one. Because Septimus would dedicate himself to a life long struggle to prove Thomasina's theories (on second law of thermodynamics, fractals and iterations; i.e. on chaos).

The play progresses on the binary opposition of reversibility and irreversibility of time. The play has many instances proving the irreversibility of time. The garden is changed, the game of Lord Croom are slaughtered, the letters of Byron and Septimus are burnt and reduced to ash, candles and oil lamps burn, most tragic of all, Thomasina herself is burnt. But on the other hand, we see Septimus claiming that the prior condition will return again. Very ironically all the present day scenes are proof of Septimus's belief in the repetitive quality of time.

Most strikingly we will see in the scenes of the present day that Thomasina's lesson books or diagrams are not lost, they challenge time although neither Thomasina nor none of the other characters of the past are alive due to their mortality.

For Thomasina time is still irreversible according to the second law of thermodynamics. Once the energy is dissipated into diffusion it cannot be recovered. As Edwards states, the final scene of the play shows us an image of perfect harmony, time overcome through the co-presence of past and present as the modern couple Hannah and Gus dance alongside Thomasina and Septimus to the tune of a waltz. The audience knows that Thomasina will take a candle and be burnt to death. She cannot be brought back to life –certainly not by algebra. The overcoming of time at the conclusion of *Arcadia*, for Edwards, is a triumph of art, not of science, and like all such triumphs it is momentary, fragile and all the more poignant for being quite useless.[4] In a way Stoppard manages to reconcile all the opposite hypotheses, scientific laws and historical discoveries through art, and thus creates order out of the chaotic framework of the play.

Moreover, time repeats itself in details throughout the play. As Innes puts it, the

relationships between characters in each time frame mirror each other, with variations that expand during the play.[5] Thus, Stoppard uses some stage properties to strengthen the idea of time's repetitiveness. The apple that Gus gives to Hannah (an allusion to the apple falling on Newton's head leading him to the discovery of the law of gravity as well as to the apple of Eve's seduction of Adam in Eden) is the same apple that in the past Septimus bites; the tortoise only changes its name from Plautus to Lightning; Valentine is working on exactly the same mathematical problem as Thomasina; the characters of today are all replaying an updated version of what really took place in Derbyshire on that fateful April day in 1809. In each family there is a teacher who has a love affair with the daughter of the house, in each period, one of the members of the family is fascinated by 'the behavior of numbers'. Although we feel the repetitiveness of time we are yet not allowed to foresee what shall happen next. Each character goes about his/her business of writing poems, learning maths, criticising literary critics, planning meetings in offstage gazeboes, doing research on different kinds of knowledge and striving to attain self-knowledge. But time, as Brater puts it, surreptitiously assigns them forever to their harsh and unpredictable fates. Limited by time, place and petty ambition, their fate is to know only a small part of that enormity that is the truth.[6] The play contains yet another binary opposition plus the binary oppositions like classicism/romanticism, chaos/ determinism, reversibility/irreversibility of time. It is the one between fate/free-will.

For Septimus free-will is nothing more than an obligation, since we are not allowed to move time backwards:

Time must needs run backward, since it will not, we must stir our way onward mixing as we go, disorder out of disorder into disorder until pink is complete, unchanging and unchangable, and we are done with it forever. This is known as free-will or self-determination. (*Arcadia*, 12)

Septimus thinks that we all have to live within "disorder out of disorder" and time is irreversible. According to Newton's Law of Motion everything happens according to a law and so is predetermined. At this point we may stop and ask Newton's Law's connection with the idea of fate and/or free will. If one observes the position of, say, a newly discovered comet for several nights, one can solve the equations and compute its orbit for months and years into the future, or (working backwards) figure out where it had been months and years earlier, with the certainty of mathematics. This deterministic situation, that the present state of the world determines the future precisely, dominated scientific thinking for two centuries. This belief was based on certain laws of physics, Newton's equations of motion, which describe the trajectories in time of states of nature. These equations have the mathematical property that the initial condition determines the solution for all time. If it is to be so, according to Sirwah, Newton's deterministic laws can be taken, even symbolically, for **free will** (at least now in principle), since one can easily and logically according to them get the accurate results or determine the events one wants to happen, by putting the initial conditions needed for them, and can further know what had happened in the past, given the same initial conditions.[7] Thus, one *metaphorical* manifestation of Newton's deterministic laws is the implication of free will and the refutation of the belief in fate or chance. This is what Thomasina and the philosophers and theologians of the Enlightenment—who embraced Newton's influence—held:

Thomasina: If you could stop every atom in its position and direction, and if your mind could comprehend all the actions thus suspended, then if you were really, *really* good at algebra you could write the formula for all the future. (*Arcadia*, 13)

Thomasina's adherence to this Newtonian conception of the universe is an echo of the several writers of her time, the early 19th century, who propounded it. But if "Chaos mathematics is," as Stoppard tells Fleming, "a reconciliation between the idea of things not being random...and yet unpredictable" [1] and if this Chaos Theory accordingly holds, as the play reveals, that one can neither predict the future nor even reconstruct the past, this theory can be *metaphorically* referring to **Fate**, since one has nothing to do with choosing the next step one has to take and, in turn, can get no certain results.

On the other hand, Chloe says that we may fancy the people whom we are not supposed to fancy, and this breaks the law of Newton. Thermodynamics makes the world chaotic and in a chaotic world every person, idea or historical fact is doomed to be displaced. So fate/chance brings the chaotic quality of existence which, in a way, refutes Newton's deterministic understanding of free-will.

Chloe: That's what I think The universe is deterministic all right, just like Newton said, I mean it is trying to be, but the only thing going wrong is people fancying people who aren't supposed to be in the part of the plan. Valentine: Ah. The attraction that Newton left out. All the way back to the apple in the garden. Yes. (*Arcadia*,104)

Here Stoppard connects the whole idea of chaos to human feelings (i.e. romanticism) and shows that human mind/reason (i.e. classicism) is not enough to understand existence and the system of universe. Newton considered the universe as the machine and God as the Great Engineer, but he forgot to mention Satan (which stands symbolically for all the human feelings, passions and ambitions digressing him from the safe paths of reason). Or in Pascal's view, hearts will always have their reasons which minds cannot fully understand. Existence or the system of universe can never be explained as if it is only something about engineering. When looked from a proper distance there is a perfectly designed system which really contains all the merits of engineering. But from a closer look everything seems chaotic and disordered. In a way chaos and determinism coexist.

On the other hand, if we return to Septimus, the irreversibility of time and "disorder out of disorder" do not mean that things are irrecoverable and order cannot be regained. Septimus does not see life as a short procession which is only limited to individuals, but rather as a "long procession" and "what we let fall will be picked up by those behind". For him "we all die on the march. But there is nothing outside the march, so nothing can be lost to it" (*Arcadia*,57). Everything will have its time again. Time will repeat itself in other ways or other occasions. Yes, time is irreversible but it is repetitive. Stoppard exploits the dualism of fate and free will in order to ask how future can be unpredictable if time repeats itself. This repetitive quality of time (similar to the iterations in the fractals) does not bring us to an order, rather it creates chaos and unpredictability.

These factors all indicate that in a narrow scope things can seem displaced and chaotic, but in the long run or from a bird-eye view there is order, harmony and synthesis. For Stoppard, however, it is a dialectical process and the order, harmony and synthesis will soon become the thesis of another anti-thesis forever, endlessly. The play is technically a proof of this understanding. Although it gets more difficult to find a coherent meaning as the action progresses, still Stoppard has produced a well-constructed play. The play itself is a harmony created out of chaos. Universe has a well composed music, the tune of which is not comprehensible from a narrow distance because of the distortions and interferences. What we can hear is noises. Valentine says:

It's all very, very noisy out there. Very hard to spot the tune. Like a piano in the next room, it's playing your song but unfortunately it's out of whack, some of the strings are missing, and the pianist is tone deaf and drunk- I mean the noise, impossible!...You start guessing what the tune might be. You try to pick it out of noise. You try this, you try that, you start to get something –it's half baked but you start putting in notes which are missing or not quite the right notes...and bit by bit...(he starts to dumdi-da to the tune of 'Happy Birthday'.) Dumdi-dum-dum, dear Va-len-tine, dumdidum-dum to you- **the lost algorithm!**

Hannah (*soberly*): Yes, I see. And then what? (*Arcadia*,67)

Hannah, here, wants to learn what the next step of the scientist will be in trying to find out the lost tune/algorithm. Once again we witness the genius of Stoppard in finding the analogy between all the chaoticians and artists in their effort to understand the invisible system/design behind the visible chaos. Valentine's answer to Hannah's "And then what?" is also very ironic when we think of the very essence of this 2006 Chaos Symposium. Because Valentine's answer to 'And then what?' is "**I publish**"!

To conclude, in *Arcadia*, Stoppard combines English landscape gardening with the history of aesthetics, Classical ideals with Gothic Romanticism, Lord Byron with academic biography in order to create one of his most multi-layered plays. In all the ongoing endless discussions, he manages to deliver his moral absolute: "it is only wanting to know that makes us matter". Although the nature of knowledge is chaotic the efforts of grasping the probable deeper meanings are not at all useless. Truth can be a work of the imagination and this very possibility equalizes the work of the artist and the scientist. That's why Stoppard's own account of the Chaos Theory in which he handles the issues of repetitive, irreversible, deterministic yet unpredictable qualities of time finds its place in both art and science.

References

- [1] Fleming, John, (2002), *Stoppard's Theatre: Finding Order Amid Chaos*. University of Texas Press. Austin, USA.
- [2] Heuvel, Michael Vanden, (2001), "Is Postmodernism?: Stoppard among/ against the Postmodernists". *The Cambridge Companion to Tom Stoppard*. Katherine E. Kelly (ed). Cambridge U.p. Cambridge, pp.213-227.
- [3] Demastes, William, (1998), *Theatre of Chaos, Beyond Absurdism, into Orderly Disorder*. Cambridge UP.
- [4] Edwards, Paul, (2001), "Science in *Hapgood* and *Arcadia*". *The Cambridge Companion to Tom Stoppard*. Katherine E. Kelly (eds) Cambridge University Press. Cambridge, pp.171-184
- [5] Innes, Christopher, (2002), *Modern British Drama: The Twentieth Century*. Cambridge UP.
- [6] Brater, Enoch, (2001), "Tom Stoppard's Brit/Lit/Crit". *The Cambridge Companion to Tom Stoppard*. Katherine E. Kelly (eds) Cambridge University Press. Cambridge, pp.203-212
- [7] Sirwah, Khaled, (2005), *Irreconcilable Opposites: A Study of Tom Stoppard's Theatre*. PhD Dissertation, Faculty of Arts, Cairo University, 2005, Egypt.
- [8] Stoppard, Tom, (1999), *Arcadia*. (Tom Stoppard Plays Five). Faber & Faber Limited. London.