Arcadia: an iterated algorithm

Nature is the embodiment of science and mathematics. From Valentine’s grouse to Thomasina’s leaf to human interactions, mathematics transcend the boundaries of mere numbers and symbols to create patterns that function to explain the universe. Yet, paradoxically, the most constant form of nature is its unpredictability. In his play Arcadia, Tom Stoppard examines this enigma: he demonstrates that in the midst of the rigid structure of the patterns and equations, there are inevitable variables that create a chaos that prevents one from completely predicting the future or recreating the past. Through the coexistence of disorder and order in the play, Stoppard incorporates the theory of deterministic chaos in iterated algorithms to depict the limits of human knowledge.

The laws of Newtonian Mechanics dictate a rigid and predetermined structure of the universe. Because an atom lacks many variables in its behavior in space and time, Thomasina claims that if one “ stops every atom in its position and direction,” then a “ formula for all the future” can be obtained (5). Hence, in the absence of noise or errors, the universe follows Newton’s laws; there exists a single formula which calculates and outputs the exact state of the atom at any moment in time with complete certainty. The future and the past can be determined.

Nevertheless, the facets of daily life, “ the ordinary-sized stuff”, are susceptible to the “ noise” of nature; while attempting to develop a universal formula for the grouse population changes, Valentine struggles because “ real data is messy” (46). The algorithm he yearns to acquire is too straightforward; it seeks to predict the grouse population for a specific moment in time. Nevertheless, the algorithm can be affected by a variety of

natural variables, such as the “ interference” of “ foxes” or the “ weather” (45). The foxes can decrease the population by half one year, while a rainy season can double it the next. The grouse population at a moment in time deviates from the expected value of the algorithm, and it cannot be exactly predicted. Although the natural variables may follow the patterns of determinism, each variable follows its own formula; the culmination of these formulas creates uncertainties in the algorithm that destroy the essence of its structure and patterns, creating an unsolvable nonlinear equation. Hence, Valentine “ can’t keep tabs on everything” and his algorithm must provide only a generalized extrapolation and estimation of the grouse population every year (46). He can never predict the actual value of the grouse population at a specific moment in time.

In contrast to Valentine’s search for an algorithm to nature’s grouse population, Thomasina uses her iterated algorithm to produce her apple leaf. As she plots each dot from her equation, she “ never knows where to expect the next dot” (47). Each recursion results in an unpredictable location for the dot. Nevertheless, over time, after thousands of iterations, she would begin to notice an unfolding pattern of the leaf fractal. Despite the fractal patterns, Thomasina will never know where the next dot is going to be; the patterns can only give her a guess, but the truth will always be unknown. Furthermore, due to the unpredictability of the dots, the iterated algorithm can only create patterns that produce the shape of the leaf, but Thomasina can never achieve the full image and representation of the leaf itself. According to Valentine, the patterns only create a “ mathematical object,” one that obeys a strict pattern and law (47). Natural leaves are colorful; they

have rugged blades; they are crinkled; their vein designs are flawed and unpredictable. They are the products of the uncertainties and probabilities of nature's " noise" that Thomasina's equation lacks. Hence, Thomasina can never predict the nature of her leaf.

Furthermore, the structure of Arcadia's scenes and the continuous repetitions of time create a pattern that is also subjected to nature's " noise". In both time periods, Stoppard effectively uses specific objects, such as the Gus' apple, Thomasina's lesson books, the tortoise, and the location of the Croom Estate, to create parallels between the two time periods. The relationships of the characters, such the love affair between the teacher and the Coverly sister, are mirrored between the two time periods. Both Thomasina and her counterpart, Chloe, are intrigued by sex and " carnal embrace" and both inquire, " Am I the first person to have thought of this?" (5, 73). These repeated articles, characters, and phrases create similar patterns throughout the play between the two time periods until they unite in Scene 7.

Septimus assures Thomasina, " What we let fall will be picked up by those behind" (38). As the characters seek the acquisition of knowledge, Stoppard juxtaposes the two time periods: each period becomes a different iteration of a single algorithm, distinct only by the initial condition of time and the effect of natural variables. The past becomes the input of the present. Nevertheless, the different variables expand and culminate into the unpredictability of both time periods, reflecting the properties of chaos theory. Despite the evident patterns of the repetition of time, the play only progresses in unpredictability and chaos. For instance, Bernard engages in

an affair with Chloe, Thomasina and Septimus kiss; Gus fancies Hannah. The “ noise” of love and sex transcends the boundaries of reason and predictability, and the act of “ people fancying people who aren’t supposed to be part of the plan” expands into greater consequences that increase disorder and unpredictability (78). Moreover, Thomasina’s death is abruptly revealed. This chaos of the human mind creates events that the audience fails to predict, despite the structured patterns of time. They can only guess what happens next, but they find their predictions wrong. Stoppard reveals these unpredictable events to highlight the audience’s own lack of complete knowledge. Although Arcadia is an algorithm within itself, each iteration is different and unpredictable due to the different variables present.

In Arcadia, Stoppard implements the iterated algorithms of Valentine’s grouse, Thomasina’s leaf, and the structure of the play itself to underscore the inevitable unpredictability of nature despite the presence of structure and patterns. Unlike chaos theory, the future and the past are not random; they are unpredictable due to the presence of nature’s variables and “ noise.” Although Stoppard highlights the disorder and chaos in the play, these are mere details and narrow aspects of the algorithms. They are “ trivial.” The overall algorithms themselves, in the long run, are inherently patterns that embrace order and harmony. One needs to filter out the “ noise” and disorder to uncover these patterns that explain the universe.

Yet the patterns and order are still incomplete, mere guesses of the truth. Hannah Jarvis claims, “ It is the wanting to know that makes us matter” (70). These mysteries cannot simply be solved. Because of the “ noise,” even accurate predictions can only be determined to a certain degree of

uncertainty, thus resulting in one’s limitations of knowledge. One can only speculate from the patterns, but the individual variables create unpredictable scenarios that cannot be predetermined. This lack of knowledge drives the human race to pursue knowledge and understanding, but our perceptions will always be incomplete.