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Liliane Campos

"This is not science. This is storytelling:" The Poetics of Science in *Arcadia*

- 1 The title of my paper is borrowed from the end of *Arcadia*'s final scene, when Septimus reads Thomasina's essay and criticizes the unscientific form of her explanations. "This is not science," he points out, "This is story-telling" (Stoppard 127). Although it is meant as a faint reproach, his remark points to the originality of the play's relation to science: linking science and story-telling is exactly what *Arcadia* achieves in its marriage of mathematics and drama. Scientific theory is presented through narrative, and conversely mathematical ideas structure the story told by the play. *Arcadia*'s science pleases us precisely *because* it is storytelling rather than lecturing, and because it is more than conceptual: Stoppard not only appropriates mathematical models and ideas, but turns them into narrative tools.
- 2 Septimus, however, is not the only character who is reading Thomasina's maths at that precise moment of the play. Moments earlier, Valentine has identified her drawing as a diagram of heat exchange. He declares that "She didn't have the maths, not remotely. She saw what things meant, way ahead, like seeing a picture" (127). Thomasina's ideas are also pictures, and this too reflects the role of science in Stoppard's dramaturgy, since the swirling chaos of entropy or the "islands of order in an ocean of ashes" provide structuring images for the play. They become, in fact, metaphors.
- 3 The aim of my paper is to examine this relation between science, storytelling and pictures in *Arcadia*, in other words to analyse the superposition and correspondences between scientific models, narrative structure and visual images. I argue that the metaphorical appeal of these scientific models, which Stoppard borrows from thermodynamics and chaos theory, is precisely that they provide narrative metaphors. Because they describe the behaviour of dynamical systems over time, they have inherent affinities with the process of *emplotment*, by which I mean the playwright's creation of a dramatic plot, but also, in reference to Hayden White's *Metahistory*, the historian's emplotment of past events¹. The presence of these metaphors in the drama adds a self-reflexive dimension to the act of emplotment, allowing us to visualize its process – a mathematical plot is, after all, a graph – and to emphasize the play's questioning of our relation to time.
- 4 I begin by comparing *Arcadia* to two earlier texts: the screenplay *Professional Foul* and the play *Hapgood*, in order to show that the different sciences explored by these plays have similar epistemological consequences, as they allow the characters to rationalize and systematize the fundamental uncertainty and instability of the knowledge they seek. I will then examine the poetic role of science in *Arcadia*, which is to provide structuring images for the plot. These metaphors are strikingly visual – as in the case of Thomasina's rice pudding or Valentine's ocean of ashes – and yet purely verbal, describing diagrams and graphs that we never actually see. This is why I will suggest that we consider them in relation to the idea of *ekphrasis*, or verbal descriptions of visual representations.

Rationalizing Uncertainty: Professional Foul, Hapgood, Arcadia

- 5 Whenever it appears in Stoppard's playtexts, mathematics represents the possibility of structure and coherence. Being able to formulate reality, to describe it through equations or figures, is an attempt at narrative control, and in *Rosencrantz and Guildenstern are Dead* the eponymous heroes were already trying to "apply logic" to their fate. As Guildenstern explains, "the scientific approach to the examination of phenomena is a defence against the pure emotion of fear" (4).
- 6 Between the 1960s and the 1990s Stoppard's interest in science evolved and focused increasingly on the physics and mathematics of instability and unpredictability. In the 1977 screenplay *Professional Foul*, the main character, Anderson, is a professor of ethics who

has been invited to Prague for a conference. He is contacted by one of his former students who has become a political dissident and asks him to smuggle his thesis out of the country. Although Anderson initially refuses to help him or to criticize the government in any way, since he is an official guest of the state of Czechoslovakia, he finally changes his mind, gives a politically incorrect speech and smuggles the thesis out to the country. Two metaphors work in parallel for this behaviour: on the one hand the game of football and the idea of a professional foul, on the other the paradoxes of catastrophe theory, which Anderson has heard one of his colleagues apply to ethics. Catastrophe theory is a branch of the study of dynamical systems which produces mathematical models describing discontinuous phenomena, characterized by sudden shifts in behaviour due to small changes in circumstances: the "catastrophe point" is the point at which the behaviour of the system suddenly changes. When he explains this concept, Anderson's colleague McKendrick draws a graph for him on a table cloth, and applies it metaphorically to moral behaviour in order to prove the necessity of occasionally breaking ethical principles:

McKendrick: ... The mistake that people make is, they think a moral principle is indefinitely extendible, that it holds good for any situation, a straight line cutting across the graph of our actual situation – here you are, you see – (*He uses a knife to score a line in front of him, straight across the table cloth, left to right in front of him.*) 'Morality' down there; running parallel to 'Immorality' up here – (*He scores a parallel line.*) – and never the twain shall meet. They think that is what a principle means.

Anderson: And isn't it?

McKendrick: No. The two lines are on the same plane. (*He holds out his flat hand, palm down, above the scored lines.*) They're the edges of the same plane – it's in three dimensions, you see – and if you twist the plane in a certain way, into what we call the catastrophe curve, you get a model of the sort of behaviour we find in the real world. There's a point – the catastrophe point – where your progress along one line of behaviour jumps you into the opposite line; the principle reverses itself at the point where a rational man would abandon it. (77-78)

7 By playing on the polysemy of the word "behaviour," which can refer both to the evolution of a mathematical system and to human action, McKendrick thus provides Anderson with a rational model for moral contradictions.

8 The reference to science is more developed in the espionage thriller *Hapgood* (1988), in which quantum mechanics is used to rationalise the fundamental duality of the play's characters. The main character, Hapgood, is a British secret agent attempting to uncover a double agent in her team. As she searches for the traitor, she discovers that all her colleagues, including herself, have hidden sides to their personalities, and that they could all be described as "double agents." One of her spies, Kerner, is a former physicist, and Stoppard uses him to compare the plot of the play to the construction of an experiment in a physics laboratory. When he is interrogated about his political allegiances, he uses the dual nature of light, which behaves both as a particle and as a wave, as a metaphor for the fundamental indeterminacy and duality of human identity:

Kerner: ... Every time we don't look, we get wave pattern. Every time we look to see how we get wave pattern we get particle pattern. The act of observing determines what's what.

Blair: How?

Kerner: Nobody knows. Somehow light is continuous and also discontinuous. The experimenter makes the choice. You get what you interrogate for. And you want to know if I'm a wave or a particle. (501)

9 As outlined in these brief summaries, the role of science in *Professional Foul* and *Hapgood* has much in common with Stoppard's use of chaos theory in *Arcadia*, since catastrophe theory and quantum mechanics also provide theoretical frameworks for instability and unpredictability. The various sciences that Stoppard has selected are thus remarkably similar to epistemological definitions of postmodernism given by philosophers such as Jean-François Lyotard or Gianni Vattimo,² because they emphasize unpredictability and the branching of one system into multiple paths of behaviour. His interest in these theories can be linked to his poetics of instability, which prefers uncertainty and multiple perspectives to stable or unique truths. In

all three plays, science provides metaphors for the characters' behaviour, and particularly for the ways in which they escape the determinisms of their situations or personalities.

The Metaphorical Role of Science

10 I shall now examine this idea of scientific metaphors more closely, and the rest of my analysis will focus on *Arcadia*. There are various analogies between human situations and scientific principles that can be found in the play, and these can often be read in two different directions. On the one hand *Arcadia*'s plot enacts ideas like entropy or chaotic behaviour,³ on the other these ideas provide us with patterns through which to view the action. These analogical patterns can thus be described as *performative metaphors*.

11 A metaphorical use of scientific terms introduces ambivalence into a language which is usually characterized by monosemy. Throughout the history of modern science, its language has aimed at a direct, unambiguous relation to reality. When the Royal Society was created in 1660, its founding members declared their intention of creating a rigorous language, "to separate the knowledge of Nature from the colours of Rhetorick, the devices of Fancy, or the delightful deceit of Fables" (Sprat 62). Since then the aim of this language has been to have a direct, transparent relation to the world it describes. But the insertion of scientific terms into fictional discourse produces what Gillian Beer calls "a changing of contractual terms of belief" (Beer 787) between the reader and the author: since we read or hear them in a fictional context, we are open to any connotations, double meanings, or analogies that might arise from their interaction with the rest of this text. In *Arcadia* the past participle "determined," for example, is used in both mathematical and philosophical senses, and each scientific use of the word carries a metaphysical resonance.

12 Let us now focus on three key metaphorical threads that can be followed in the play: "*the action of bodies in heat*" (in other words, thermodynamics), *unpredictable determinism* (chaos theory) and *plotting and iterating* (both tools of chaos mathematics and fractal geometry). These ideas and techniques are discovered by Thomasina, and are all ways of describing systems characterized by disorder and irregularity.

"The Action Of Bodies In Heat"

13 Thomasina's first discovery, glimpsed in Scene 1 and confirmed in Scene 7, is the second law of thermodynamics. Whereas Newton's equations considered transformations of energy to be reversible, studies of heat in the early 19th century led researchers to assert the irreversibility of heat exchange. The second law is also known as the principle of the *degradation of energy*: whereas the first law states that the quantity of energy in the universe remains constant, the second states that the quality of energy is "degraded" irreversibly over time. Physical, chemical and electrical energy can be changed into heat, but the reverse is not true without outside help or the loss of some of the energy into irretrievable heat, which cannot be used to produce work. The transformation of energy into heat, which corresponds to an increase in disorder within a system, is measured by the system's *entropy*.

14 However, when Thomasina finds confirmation of her intuition concerning the second law, her wording is voluntarily ambiguous. In Scene 7 she has just read an essay about the "propagation of heat in a solid body" (110), but when her mother asks her what she is studying, she describes it as "The action of bodies in heat" (114). This formulation is not innocent: her mother has just walked into the schoolroom after playing the piano passionately with Count Zelinsky. Their "heat" has been noticed by both Septimus and Thomasina, and underlined by the "*distant regular thump of the steam engine*" (111). The words "bodies in heat" are thus chosen for their figurative potential, and Thomasina emphasizes her metaphorical double entendre by remarking that "the Chater would overthrow the Newtonian system in a week-end" (114). These ambiguous statements connect thermodynamics to sexual attraction, and the idea of a dissipation of energy into heat, which is described by both Thomasina and Valentine in Scene 7, links together the play's many images of heat and fire. Heat loss can even be found in the contrast between the 19th- and 20th-century scenes, since the passion of the former seems weakened and parodied in the latter. Bernard is only a pale copy of Byron, and while Hannah's

lack of interest in sex provides a comical contrast with his obsession, it also underlines a loss of heat after the witty eroticism of the 19th-century scenes – a loss that is made palpable by the final juxtaposition of the two dancing couples.

- 15 The second law states that the entropy or disorder of an isolated system (for example the universe) never decreases: it is either constant or increasing. This inevitable increase is expressed metaphorically in Thomasina's image of rice pudding, which Septimus describes as the mixing of "disorder out of disorder into disorder":

Thomasina: 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 backward, the jam will not come together again. Indeed, the pudding does not notice and continues to turn pink just as before. (8)

- 16 This irreversible increase in disorder is embodied by the garden, which loses its pastoral order at the hands of Mr Noakes and becomes a series of variations on "mud" in Lady Croom's lines in Scene 7. The table, which by the end of the play supports "*a considerable mess of papers, books and objects*" (127), can also be seen as a metaphor of entropy. And Stoppard's stage directions indicate that the play has come full circle when the opening image of the "meteor in my astronomical atlas" is echoed in the final scene by the "*fireworks – small against the sky, distant flares of light like exploding meteors*" (126). Although the word "entropy" is never pronounced, the metaphor through which it is initially presented thus serves as a structuring image, finally enacted by the double waltz.

Unpredictable Determinism

- 17 The second metaphorical thread I would like to examine is the unpredictable determinism of chaos theory, also known as the "butterfly effect" (in which a butterfly flapping its wings can trigger a chain of consequences leading to a storm on the other side of the world). While Valentine is trying to create the mathematical model that will describe the chaotic evolution of his grouse population, we can describe Bernard's efforts as an attempt to write the historical model that will explain the events of 1809. But in chaos mathematics as in the 19th-century sentimental imbroglio, "the smallest variation blows prediction apart" (65). The duel between Septimus and Chater does not take place because of the accidental encounter of Mrs Chater and Lady Croom on the threshold of Byron's bedroom, and this duel was only caused in the first place by Mr Noakes's chancing to observe the gazebo at the wrong moment. In the opening scene, Thomasina's description of the chain of confidences and overheard conversations that has brought the information from Noakes to herself is a comic illustration of the inevitable butterfly effect of gossip.

- 18 Several metaphorical paths are opened up by Valentine's explanations of chaos theory and fractals in Scene 4:

Valentine: If you knew the algorithm and fed it back say ten thousand times, each time there'd be a dot somewhere on the screen. You'd never know where to expect the next dot. But gradually you'd start to see this shape, because every dot will be inside the shape of this leaf. It wouldn't be a leaf, it would be a mathematical object. But yes. 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. People were talking about the end of physics. Relativity and quantum looked as if they were going to clean out the whole problem between them. A theory of everything. But they only explained the very big and the very small. The universe, the elementary particles. The ordinary-sized stuff which is our lives, the things people write poetry about – clouds – daffodils – waterfalls – and what happens in a cup of coffee when the cream goes in – these things are full of mystery, as mysterious to us as the heavens were to the Greeks... (64-65)

- 19 Valentine's choice of examples is significant, since he refers to the "ordinary-sized stuff" that are "clouds – daffodils – waterfalls," all of which connote Romantic literature and can be found in the poems of William Wordsworth. As he explains the maths of iteration to Hannah, he combines two series of images, the first of which is linked to movement – "[p]ictures of turbulence – growth – change – creation" (64) – and the second to sound, when he explains the difficulty of prediction in terms of "interference," "noise," and the "tune" he is attempting

to find (62). These different terms can all be applied to the play's double plot: the first group, which describes the systems under study, can describe the 19th-century action, in which the "growth" and "change" of love and the "creation" of the garden are both extremely turbulent, disorderly affairs. As for the second group of terms used by Valentine, they can be applied to the 20th-century action, since Bernard's research into the past of Sidley Park is hindered by the "interference" and "noise" of unexpected factors, particularly Mrs Chater's multiple sexual relationships and his own desire to uncover a scandal.

Plotting and Iterating

- 20 The parallel between human and dynamical systems thus provides metaphors for Bernard's emplotment of historical events, but also for the shape of the play. The third metaphorical thread is therefore a metadramatic one, which provides us with ways of reading the dramatic structure: it is inspired by the mathematical processes of plotting and iterating.
- 21 In mathematics the action of *plotting* is a translation of written symbols into visual representation: once plotted, an equation becomes a graph. When Thomasina announces that she will "plot this leaf and deduce its equation" (52), she reverses this process, working backwards from a set of points to find the equation that it represents. Her use of the word "plot" is strictly mathematical but its dramatic context adds other connotations, suggesting a narrative structure (the plot of a story) or a secret plan (plotting). Her mathematics will, indeed, be described as "storytelling" by Septimus, and share some of the secrecy and excitement of the illegitimate connotations of a "plot." The word also links mathematics and drama to its original, topographical meaning as a piece of land. Mr Noakes's plans thus involve another form of plotting: placing points on a map and drawing plans for a plot of land. The grounds of Sidley Park, the diagram that Thomasina draws for Septimus, the graph that Valentine deduces from her equation, the story that Bernard imagines and the drama that Stoppard constructs are all linked by this central action of plotting.
- 22 When she plots her leaf, Thomasina uses the mathematical process of *iteration*, which consists in repeatedly feeding the results of an algorithm back into itself. This feedback mechanism has obvious metadramatic potential. It is, like a theatrical performance, a process based on repetition. And its reliance on feedback echoes the palimpsestuous vision of art suggested by *Arcadia*, in which artistic creation feeds on its own past in an endless rewriting and transformation of forms and ideas, and both art and history are structured by transformative repetition.
- 23 Iteration allows mathematicians to produce graphs of fractal shapes and of the unpredictable behaviour of chaotic systems. In both cases, order can be said to arise out of disorder, since self-similarity appears in fractals, and "attractors," or windows of stable, predictable behaviour, appear in chaotic systems. In Scene 7, when Valentine describes his graphs, the expression "Patterns making themselves out of nothing" (103) refers to this phenomenon. It can however also be read as a metadramatic comment on the patterns that emerge from the twists and turns of the plot, since the audience gradually perceives the parallels and picks out the "tunes" – to use another of Valentine's metaphors – that recur in the play. Stoppard has suggested in interviews that *Arcadia*'s dramatic structure imitates the bifurcations that can be observed in graphs representing the evolution of chaotic systems (where each bifurcation doubles the number of paths that this behaviour can take, and continuous bifurcation makes the system unpredictable).⁴ But the play's "chaotic structure" also includes the regularities that occur within bifurcating patterns: in the final moments of Scene 7, the possibility of order within disorder is not only enacted by Gus's retrieval of information, but visualised in the final waltz, which opposes a structured pattern of movement to the turbulence that has preceded it.

Ekphrases

- 24 Although they play a central metaphorical role in *Arcadia*, the graphs and diagrams remain invisible, as invisible as the paintings and engravings that are mentioned by the characters, and indeed as the garden itself. Both art and science are thus presented through *ekphrasis*, or the verbal description of a visual representation.

25 When Thomasina decides in Scene 3 to work outwards from “the middle of the maze,” she announces that she will find the equation that corresponds to the shape of a leaf. There must be, she asserts, an equation for a rose, since nature is written in numbers. This mathematical credo, through which Thomasina unwittingly quotes the father of modern physics, Galileo, asserts that everything that is visible is expressible, thanks to the language of maths. Mathematicians, therefore, seem to share the ekphrastic dream: the perfect rendition of the visual shape into the written sign. We are not, however, given the equations themselves, but descriptions of the graphs and diagrams, and this is where the parallel with the other *ekphrases* of the play is striking. Mathematical graphs are explicitly compared to pictorial art in Scene 4, when Hannah calls iteration “a way of making pictures of forms in nature,” and, after analysing Thomasina’s graphs, Valentine compares maths to modern art and Picassos. In Scene 7 his description of his graphs becomes completely metaphorical:

Valentine: ... In an ocean of ashes, islands of order. Patterns making themselves out of nothing. I can’t show you how deep it goes. Each picture is a detail of the previous one, blown up. And so on. For ever. Pretty nice, eh? (103)

26 Whereas Thomasina’s reference to “bodies in heat” revealed a metaphorical potential that was already latent in the language of physics, Valentine’s “ocean of ashes” creates a new metaphor based on the visual shape of a fractal graph. This expression links the fractal to the play’s many images of water and fire: the “ashes,” for example, echo Shakespeare’s Cleopatra whose barge “burned on the water” in Scene 3, and announce Thomasina’s death by fire. But the reference to the ocean, which will be repeated a few minutes later when Septimus describes himself and Thomasina as “alone on an empty shore” (128), also echoes another founding figure of modern physics, Newton, who famously compared himself to a child playing on a beach: “a boy playing on the sea shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.”

27 These ekphrastic descriptions of the graphs have two effects. First of all, they enhance the metaphorical potential of scientific images. Secondly, like any *ekphrasis*, these are self-reflexive passages: instead of art describing art, we have art describing science, but in both cases this produces a redoubled *mimesis*, thus drawing attention to the act of representation.⁵ Moreover, these *ekphrases* add to our general sense that reality and representation are indistinguishable in *Arcadia*. Maths represents nature, but nature is already “written in numbers.” When Valentine describes iteration, although he is initially describing the actions of a mathematician, he goes on to tell us that “it’s how nature creates itself, on every scale” (64). Nature seems to be writing its own equations, and the mimetic relation between reality and its model becomes reversible, just as the “real England” that Capability Brown sought to recreate had already been written by Virgil.

Conclusion: Layers of time

28 *Arcadia*’s scientific concepts can thus be read both as models and as metaphors. Epistemologically, Stoppard’s use of science is double-edged, a way of reconciling uncertainty and rationality, contradiction and coherence, the unknown and the consoling framework of an overarching system. Poetically, science is a source of images in the stronger sense of the word, a source of visualization. It strengthens the ekphrastic thrust of the play, the appeal to the mind’s eye, and enables connections between different realms.

29 These images also connect the different time frames of the play, since Thomasina’s mathematical genius consists in seeing “what things meant, way ahead.” It is on this question of anachronism that I would like to conclude by returning, via mathematics, to the central question of time and the different ways of perceiving time in the play.

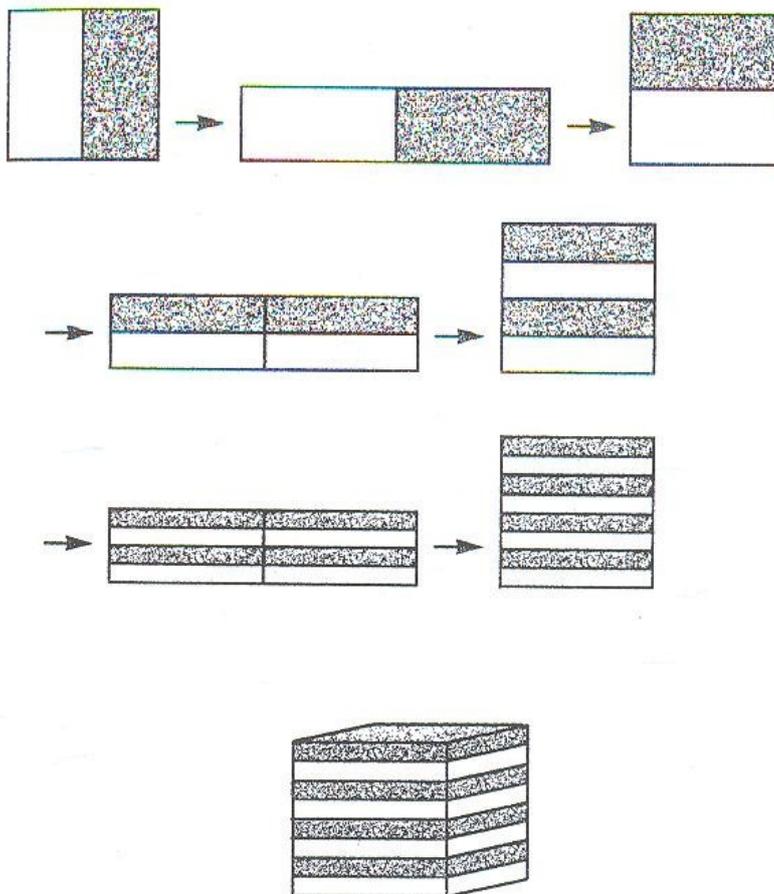
30 Thomasina’s genius or foresight is central to the vision of time presented by *Arcadia*, which contains many cross-overs and points of contact between different periods. But what is interesting about the play’s anachronisms is not only that the fictional Thomasina discovers entropy forty odd years before Clausius, but that Byron’s poem “Darkness,” quoted after a scientific explanation of the second law of thermodynamics, suddenly seems anachronistic, as if Byron had intuited the second law. These sudden correspondences and points of contact,

which modify the past because of its resonance with the present, are part of the nonlinear poetics of *Arcadia* – the term “nonlinear” being yet another metaphorical bridge with chaos equations, which can describe nonlinear behaviours. In order to visualize this nonlinear vision of time, let us borrow a metaphor from Hans Magnus Enzensberger that will take us, appropriately, from Stoppard’s English pudding to French *pâtisserie*, via a German essay.

31 In an essay entitled “ZickZack,” translated into French as “Le Feuilletage du temps” (“the layering of time”), Hans Magnus Enzensberger examines our relation to anachronism and suggests that we should consider it a norm rather than an exception. Rather than seeing time as the straight arrow favoured by those who believe in the ideal of progress, he asks that we see it as a stratified experience, in which only a very thin layer of novelty covers the infinity of past layers that remain as latent possibilities. This temporal structure is not specific to the contemporary world and its love of recycling and remaking, but a more fundamental characteristic of human time.

32 Hans Magnus Enzensberger compares this idea to a mathematical model called the “baker’s transformation,” which produces a chaotic system. This model, which has been used in fluid dynamics and quantum mechanics, is the mathematical equivalent to what happens to a square of dough that is rolled out to double its size, then folded over itself, then rolled out again, and so on, in other words a puff pastry or *pâte feuilletée* (Figure 1).

Figure 1 - The baker’s transformation



33 The movement of any given dot within this transformation – for example a very small raisin – can be predicted exactly if its initial coordinates are known with infinite precision. If not, its movement becomes unpredictable even though it is completely determined. Enzensberger suggests that this is how we should view history, not as a continuous flow but as an ever-

increasing number of layers and folds, in which points of contacts between different layers are numerous and unpredictable:

Si, à côté du temps linéaire de la physique classique, l'on tient pour plausible une structure complémentaire qui serait celle du temps historique, peut-être sera-t-on mieux à même de comprendre que l'histoire va à sauts et à gambades. Dans le feuilletage, la mémoire ne représente pas un élément continu, mais un élément discret. La pâte, pour en rester au modèle pâtissier, se délite en une infinie quantité de points bondissants, qui s'éloignent les uns des autres de manière imprévisible, pour se rencontrer à nouveau sans que personne ne sache quand ni par quels détours. C'est ainsi que se produit un nombre inépuisable de contacts entre diverses strates du temps.

Mais, comme il s'agit d'un système dynamique, cela ne peut jamais donner de répétition à l'identique. Les bonds que fait un point ne le ramèneront que dans un cas invraisemblable au même endroit exactement : il y aura presque toujours un écart, au moins infinitésimal. En outre, il atterrira toujours dans un environnement qui aura changé. Le contact entre strates temporelles différentes n'entraîne donc pas le retour de l'identique, mais une action réciproque qui produit à chaque fois quelque chose de nouveau, et des deux côtés. En ce sens, le futur n'est pas le seul à être imprévisible. Le passé aussi est soumis à un éternel changement. Il se transforme constamment, aux yeux d'un observateur qui n'a pas une vue d'ensemble de tout le système. (Enzensberger 24-25)

34 With each leap our raisin changes places, never returning to precisely the same coordinates; each new contact between different layers will produce something new, and Enzensberger concludes this analogy by remarking that the future is not alone unpredictable: the past is also ceaselessly transformed.

35 This model provides us with a concluding metaphor for *Arcadia*'s palimpsestuous stage, for its layered vision of time, but also its unpredictable connections, in which, as Septimus would put it, "discoveries glimpsed and lost to view will have their time again" (53). These unpredictable connections are a fundamental aspect of theatre itself, as each performance adds a layer to the pastry and each context finds its own points of concordance with a past text. *Arcadia*'s temporality, then, is not only mathematical, but fundamentally theatrical.

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Notes

1 Hayden V. White, *Metahistory: The Historical Imagination in Nineteenth-Century Europe*, Baltimore & London: Johns Hopkins University Press, 1973. For a comparative analysis of historical emplotment in Byatt's *Possession* and Stoppard's *Arcadia*, see Irene Martyniuk, "'This is not science. This is storytelling': The Place of the Individual and the Community in A. S. Byatt's *Possession* and Tom Stoppard's *Arcadia*," *Clio*, 33.3, Spring 2004, p. 265-286.

2 See *La Condition postmoderne: Rapport sur le savoir* and *La Société transparente*.

3 The enactment of scientific concepts can also be observed in other contemporary plays inspired by science, such as Michael Frayn's *Copenhagen* or Complicite's *A Disappearing Number*. For a detailed analysis of performativity in *Copenhagen*, see Kirsten Shepherd-Barr, *Science on Stage, From Doctor Faustus to Copenhagen*, Princeton UP, 2006, chapter 4.

4 "I have a secret agenda, but I wouldn't lay it on the audience. The play mimics the way an algorithm goes through bifurcations into chaos, as a matter of fact. In a very compressed way" (quoted by John Fleming 52).

5 As Fernand Hallyn points out in *La Structure poétique du monde : Copernic, Kepler*, the aim of science can be described as *mimesis*: « La *mimesis* au sens aristotélicien d'*agencement des faits en système* constitue incontestablement le but premier de l'activité scientifique » (Hallyn 18).

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Résumés

Après s'être inspiré de la théorie des catastrophes et de la mécanique quantique dans *Professional Foul* et *Hapgood*, Stoppard emprunte les concepts clés d'*Arcadia* à la thermodynamique et aux mathématiques du chaos. La mise en regard de ces trois textes permet de souligner la continuité épistémologique de son œuvre, qui trouve dans les sciences les métaphores d'une déstabilisation systématique du sujet connaissant. Dans *Arcadia*, l'entropie, le déterminisme imprévisible et l'itération fournissent des métaphores narratives qui structurent la mise en intrigue de l'histoire et de la fable. L'évocation imagée de ces concepts dans le dialogue participe de la dynamique ekphrastique de la pièce, et vient nourrir sa réflexion sur les rapports entre l'art, le temps et la *mimesis*.

After using catastrophe theory and quantum mechanics in his earlier texts *Professional Foul* and *Hapgood*, Stoppard borrows some of *Arcadia*'s key concepts from thermodynamics and chaos theory. This article explores the strong epistemological continuity of Stoppard's references to science, which provide him with metaphors for the systematic instability

of knowledge asserted by his plays. The analysis focuses on the poetic use of entropy, unpredictable determinism and iteration in *Arcadia*, and their structuring role as metaphors of emplotment. Within the dialogue, the evocation of these concepts follows an ekphrastic pattern, strengthening the play's reflection on the relation between art, time and *mimesis*.

Entrées d'index

Mots-clés : Stoppard, *Arcadia*, science, métaphores, modèles, mise en intrigue, ekphrasis, entropie, déterminisme, itération, temps

Keywords : Stoppard, *Arcadia*, science, metaphors, models, emplotment, ekphrasis, entropy, determinism, iteration, time