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**“I AM BRITANNIA, THE SPIRIT OF OUR AGE”:  
TIME SHIFTING AS A STUDY OF THE IDEA OF PROGRESS  
IN TOM STOPPARD’S *ARCADIA* AND SHELAGH  
STEPHENSON’S *AN EXPERIMENT WITH AN AIR PUMP***

The article compares two plays by contemporary British playwrights, *Arcadia* (1993) by Tom Stoppard and *An Experiment with an Air Pump* (1998) by Shelagh Stephenson. It focuses on the use of time changes in the two plays and shows how they contribute to developing the detective-style plots and what role they play in presenting the included scientific topics. It shows how ethical issues influence the view of scientific progress in the plays and how decay is dealt with on the stage.

There are several reasons for dealing with Tom Stoppard’s *Arcadia* and Shelagh Stephenson’s *An Experiment with an Air Pump* together, and comparing the ways in which they use the technique of time shifting. The plays belong to the same genre (which may be called theatre of science), they were produced within the span of five years in 1993 and 1998, respectively, and their plots take place in two almost identical periods of time in history. The ways in which time shifts are used in the plays have a crucial role in the construction of the characters’ personalities as well as the development of the plots. While *Arcadia* leaps between two time periods to help elaborate the intellectual play with scientific and literary topics, *An Experiment with an Air Pump* uses them to contrast two different scientific eras and develop the detective plot; both plays, however, show through their use of time shifts that ideas – such as scientific concepts – change, but people remain the same, progress or decay notwithstanding. In other words, the characters’ decisions concerning their moral values and scientific integrity are of a personal nature, independent of time or stages of scientific development.

*Arcadia* by Tom Stoppard was written in 1993 and is the second play in which the playwright deals with scientific issues (see Kelly 2002). In the first, *Hapgood* (1988), Stoppard cultivates the artistic potential of quantum mechanics, and in the five years younger (while five years more mature) *Arcadia* he broadens the field to primarily deterministic chaos, but does not evade mathematics nor other disciplines of physics, such as thermodynamics (see Demastes 1998); disciplines of the humanities present in the play are, among others, literary history and the

history of landscape architecture. The plot unfolds in two periods divided by two centuries: in 1809 in the past, and in the – less clearly specified – “present”.

*An Experiment with an Air Pump* by Shelagh Stephenson appeared five years after *Arcadia* in 1998. To a great degree, the play may be considered a response to Stoppard’s successful work. As a recent reviewer puts it: “[It] brazenly pays homage to Mr. Stoppard’s masterpiece in its silken shifting between centuries and is breathtakingly similar in its mingling of erudition and emotion” (Blanchard 2006). The scientific issues that *Air Pump* employs are medicine and genetics, and questions of medical research ethics. Its plot also covers a span of time similar to that of *Arcadia* – two centuries exactly. The scenes from the past take place in 1799, while the “present” is specifically set to the then future in 1999.

Besides the time setting, the space where the action takes place is another unifying element of the two plays. Both plays switch eras, but each of them takes place in one space. The plot of *Arcadia* is enacted in “a very large country house in Derbyshire” (*Arcadia*, 1), in Sidley Park. Similarly, everything happens in one house in Newcastle for the whole of *Air Pump*. It is “a big, plain, solid house, [that] is not quaint or charming” (*Air Pump*, 29). Both settings can pride themselves with a distinguished fictional history concerning their past visitors. Lord Byron was among the guests of Sidley Park in 1809 with his name well recorded in the game books and his figure’s presence and departure being a source of one of *Arcadia*’s plot lines. Lavoisier and Tom Paine made visits to the Newcastle edifice and, most significantly, Peter Mark Roget, “later of Thesaurus fame,” as the list of characters describes one of the main characters of the play, is present in the 1799 plot line of *Air Pump*.

The reasons why these specific times are set differ in the two plays. In *Arcadia*, the year of 1809 is connected precisely with the above mentioned visit of Lord Byron to the mansion, which is, curiously enough, also the year of his departure from England. Although Byron is not among the characters of the play, he is mentioned on various occasions and substantially influences the story. Bernard Nightingale, a present day Byron scholar, arrives at Sidley Park to meet Hannah Jarvis, the author of a study on Romantic landscape and literature in 1750–1834. Due to the discovery of a note in a copy of a book of poetry written by another guest at Sidley Park, Ezra Chater, Bernard becomes convinced that Byron killed Chater in Sidley Park in 1809 and as a consequence had to leave the country, a discovery that would earn him a name in the circles of distinguished Byron scholars. It can thus be stated that 1809 is a functional time setting that allowed Stoppard to intertwine various other concepts (mainly the scientific issues and the landscape architecture reconstruction of the mansion’s garden) with the Byron motif. The functionality is manifested further in the fact that as soon as the mystery of Byron’s departure is solved (he did not kill Chater after all), the time in the past moves on to 1812 when the main character of the play, Thomasina, dies asleep in flames on the night of her fourteenth birthday. This happens after she has waltzed with her tutor Septimus Hodge, who turns out to be the central figure of Hannah’s interest in the Park’s mysterious hermit of the 19th century.

While 1809 is firmly set and depends on the year of Byron's departure, the present can remain quite undefined. There is only one occasion that approximates the time. Hannah's quasi-fiancé Valentine, who is a mathematician, finds it surprising that Thomasina used iterated algorithm in her maths primer when she was geometrically expressing the shape of a leaf. He says about iteration: "It's the technique I'm using on my grouse numbers, and it hasn't been around for much longer than, well, call it twenty years" (*Arcadia*, 44). Thus, he approximately defines the present. The technique was used for the first time in Los Alamos in 1971 (Gleick 1988: 167). The exact date is only known to the deterministic chaos theory enthusiasts, but should be altered in productions to reflect the ageing of the technique (i.e., in 2007, Valentine would call it "thirty-six years"). The present is thus only approximately set and the present of the play is the present of the performance.

While in *Arcadia* there is only the past of the early 19th century which was precisely defined, in *Air Pump* both the past and the present are firmly set to 1799 and 1999. In the former play, the past is determined by historical fact and the present is unfixed; in the latter, both times have been chosen for symbolic reasons associated with the beginning of new eras, and there are no historical events associated with them: "*Air Pump* swings between two epochs: 1799, the dawning of the Industrial Revolution, and 1999, the eve of a new century in which man has unlocked the secrets of the D.N.A. and holds the power to lord over nature" (Blanchard 2006). There are expectations associated with the two "eves of new centuries" – the outlooks for the future are bright. The mistakes of the past seem soon to be cut off by the imaginary borderline of the coming centuries. But 1999 is in a naturally advantageous position compared with 1799 because it is aware of the latter's drawbacks and of the fact that the future was not as bright as it was envisioned back then. Furthermore, in 1999, a homicidal crime from 1799 is revealed, which casts a shadow on the idealist notion of the glamorous past of the edifice. What looked as a bright future back then is not, as the past, as bright anymore. There is a clear message concerning optimism about the future for 1999 and the characters get it; none of them is a hundred per cent hopeful about the 21st century, although the changes that have taken place between the two periods have contributed to scientific progress immensely.

The notion of progress is another motif which cannot be avoided when dealing with the two plays. On the one hand, progress is a concept inseparable from science and therefore the plays which deal with scientific issues have to reflect upon it. It will be shown how time switches efficiently enable to picture the notion of progress. On the other hand, there are the interpretation of scientific progress (i.e. the answer to the question of what has been achieved?), the means that scientists use to achieve progress (how was it achieved?) and the goals they pursue (why was it achieved?), as well as the effects (what will happen next?). It will be shown that the time switches may function as interpretative keys which help the audiences to find answers to these questions.

The shifts in time allow audiences of both plays to see two different stages in the development of science side by side. They also portray classical fields from the 18th and 19th centuries vis à vis contemporary disciplines. Valentine of *Arcadia* is therefore much surprised when he concludes that Thomasina may have used the technique of iteration.

**Valentine:** [...] When your Thomasina was doing maths [in 1809] it had been the same maths for a couple of thousand years. Classical. And for a century after Thomasina. Then maths left the real world behind, just like modern art, really. Nature was classical, maths was suddenly Picassos. But now nature is having the last laugh. The freaky stuff is turning out to be the mathematics of the natural world. (45)

Further, Valentine explains why he considers it impossible that Thomasina used iteration – and not only because this technique was not around at that time. The necessary technology was not available at that time either. Valentine explains the role of electronic computing devices for the development of the technique: “The electronic calculator was what the telescope was for Galileo” (51). The play also visualises the technological development; the audiences can on many occasions see Thomasina sitting with her primer and a notebook and a pen – the less developed instruments of theoretical science; then, in the same room nearly two hundred years later, there is Valentine doing an identical mathematical operation using his laptop computer. His work is faster and much more effective due to scientific progress. Both Thomasina and Valentine are, though, driven towards the same goal – to come up with an equation which would express an irregular pattern in nature; Thomasina is plotting out a leaf, Valentine is mapping the grouse population. As such, they are partners in the human race’s striving for discovery, connected by the idea and separated by a time gap; the stage is the laboratory they share.

There is not such a direct stage image of progress in *Air Pump*. However, a clear image of the advancement of medicine is central to the play. In 1799, Armstrong longs to perform a dissection on the hump back of maid Isobel; that would in his view ensure progress in the field of anatomy. In 1999, medical science has shifted in its research pursuits to genetics and cloning; Ellen is the contemporary scientist dealing with the genetic diagnosing of the fetus. Her friend Kate sees a great deal of progress in Ellen’s latest invention and tries to persuade the down-to-earth Phil of its worth:

**Kate:** If, very early in your wife’s pregnancy, you were able to discover in your child the gene for, say, Alzheimer’s disease, or asthma, or maybe something more alarming like schizophrenia, would you be grateful for that information?

**Phil:** Er... I’m not sure.

**Kate:** Ellen’s team have perfected a technique that does this. It’s completely

safe, and it can be done very very early. And the most important thing is it's non-invasive, so there's no risk to the foetus. It's pretty radical stuff. Wouldn't you say this was a good thing?

**Phil:** Aye, I suppose so. (36–37)

Progress thus entails that the results of the sciences are better, more accurate, friendlier to life and truer to nature. Scientists of both eras believe in progress, but the ones of the present era are not as naive in their expectations as their predecessors. (But this again is progress – of ideas; the loss of naivety is a sign of progress in itself.) *Arcadia's* Thomasina is absolutely sure that her "New Geometry of Irregular Forms" will lead to the desired goals – the possibility to express natural shapes more accurately than classical geometry can:

**Thomasina:** [...] God's truth, Septimus, if there is an equation for a curve like a bell, there must be an equation for one like a bluebell, and if a bluebell, why not a rose? Do we believe nature is written in numbers?

**Septimus:** We do. (37)

By contrast, Valentine in the present is more skeptical about his abilities and about the possibilities of his mathematical technique. He even considers giving up his research:

**Valentine:** [...] I've given up on the grouse.

**Hannah:** You haven't, Valentine!

**Valentine:** (*Leaving*) I can't do it.

**Hannah:** *Why?*

**Valentine:** Too much noise. There's just too much *bloody noise!* (62)

Bernard, a literary scholar, is the most radical in his views of the meaninglessness of scientific progress in *Arcadia* – he is skeptical about its nature and its significance. "Not everyone [...] is impressed: 'Quarks, quasars – big bangs, black holes – who gives a shit?' asks the literary academic [...]. 'If knowledge isn't self-knowledge, it isn't doing much, mate.'" (Karwowski 2005: 163). The reason that he is not as enthusiastic about progress is that he works within the humanities – it is thus understood that a little of restraint from the hard sciences is almost compulsory in his case.

Fenwick is the main propagator of the Enlightenment in *Air Pump* in 1799. He is a true believer in progress. He "cannot contain his hopes for scientific advance, even if his faith in the future involves immediate neglect of his wife" ("The Pitfalls of Progress", 20). He awaits the new century with hope and enthusiasm. Such is too the very last line of the play on the occasion of the New Year's Eve: "Here's to whatever lies ahead... here's to uncharted lands... here's to a future we dream about but cannot know... here's to the new century" (96). Although his toast has a double meaning to the audience who knows about the moral duplici-

ties of the scientific progress as of 1999, it is certain that he means it in a positive way.

Fenwick's guest at the house, Armstrong, is a physician who is also convinced about the idea of scientific progress and he goes further than just believing. He is willing to take action in the name of scientific progress despite the possibility of it being unethical. In fact, he does not consider ethics to be a relevant issue if "tottering out of the Dark Ages" is in question. When he knows that a person is a suitable object for a dissection after their death, he tracks them until they die in order to get hold of their body:

**Armstrong:** We've got an eye on an undersized fellow, about three foot tall. He's not at all well. He'll not see out the winter.

**Roget:** You seek out potential cadavers before they're even dead? [...]

**Armstrong:** Needs must. We can have any number of average, everyday corpses. They're two a penny. Literally, at this time of year, when people are dropping like flies. But an unusual specimen must be ordered in advance. I thought you knew that?

[...]

**Roget:** D'you never have qualms? D'you exist solely in the burning fires of certainty?

**Armstrong:** Digging up corpses is necessary if we're to totter out of the Dark Ages. You can dissect a stolen body with moral qualms or with none at all and it won't make a blind bit of difference to what you discover. Discovery is neutral. Ethics should be left to philosophers and priests. (70–71)

In 1999, the two female characters are the ones who deal with hard science: genetics. Kate is absolutely convinced that scientific research – which is a prerequisite for progress – is a good thing irrespective of its moral dimension (Tom tells her: "You're unscrupulous, ambitious, and you'd dissect your own mother if you thought it might give you the answer to something." Kate: "Yeah, I probably would. But only if she was dead already." (88)). In her own words, Kate is "hooked on the future" (89). In fact, it is ethics – or, rather, uncertainty about the value of the results of genetic research – that causes Ellen's doubts and leads her to consider leaving her job in the field of prenatal genetics. Her boyfriend, Tom, a literary scholar and a lecturer of English, has doubts about her discipline, which makes her doubt the sense of her work even more. She says to Tom: "But you stirred up questions in me and I blamed you for it. I'd never felt unconfident before. Not about work anyway. The bottom line is: I don't think science is value free, I don't think it's morally neutral" (88). The switches between different times in the play's scenes allow the audience to see the differences between the scientists' approaches towards progress, especially in its moral dimension. While in 1799, Armstrong does not consider it unethical to act against morals in the name of scientific progress, Ellen of 1999 has a serious moral qualm about her work. Armstrong would find his unscrupulous counterpart in Kate in the present, and

Ellen would find a doubtful partner in Septimus in 1809. Development in the sciences does not mean a radical change in people's thinking about them – there are proponents as well as adversaries. The characters' positive or doubtful ideas concerning progress are not connected with their scientific fields; rather, they are of a personal quality. An individual's attitude depends more on his/her personality than on the activities he/she is engaged in.

The plays also succeed in showing decay – in a sense the opposite of progress – which depends on the progression of time. While the sciences have come a long way and have progressed a great deal over the two centuries in both plays, the places have taken the opposite direction towards decay. Neither houses are so magnificent anymore. They have lost their past importance; only mediocre scientists/researchers – e.g. Valentine and Bernard in *Arcadia* – and unsuccessful or terminating ones – Tom and Ellen, respectively, in *Air Pump* – are there in the present parts.

Sidley Park in *Arcadia* began to change in 1809, when Mr. Noakes, a landscape architect, was invited to the mansion to change the classical layout of the garden into a "picturesque" one. That meant to change its organized shape into a disorganized, and irregular one. Captain Brice expresses his horror at the change: "Is Sidley Park to be an Englishman's garden or the Haunt of Corsican brigands?" (10). Lady Croom describes the decay which is about to happen to the garden's organization:

Where there is the familiar pastoral refinement of an Englishman's garden, here is an eruption of gloomy forest and towering crag, of ruins where there was never a house, of water dashing against rocks where there was neither spring nor a stone I could not throw the length of a cricket pitch. My hyacinth dell is become a haunt for hobgoblins, my Chinese bridge, which I am assured is superior to the one at Kew, and for all I know at Peking, is usurped by a fallen obelisk overgrown with briars[.] (12)

There is another metaphor that Stoppard used to illustrate the destructive effect of time. The objects that are brought in the room are gradually as the play goes on piled up on the table and around the stage. This is a visual metaphor to the second law of thermodynamics, which the play deals with (see Demastes 1998). The law says that the general level of entropy (i.e. disorganization) increases, that is to say that on a general level things fall apart. Thomasina calls it "The French Mathematick" – according to the law, physical processes cannot be expressed in equations without the element of the flow of time as expressed in Newton's (i.e. English) physics. She tells Mr. Noakes the "bad news from Paris": "It concerns your heat engine. Improve it as you will, you can never get out of it what you put in." (86). Similarly, the influx of objects into the room causes an increase in disorganization. As objects pile up on the table, entropy rises on the stage. The intention is made clear in the stage directions to Act I, Sc. 2: "By the end of the play the table has collected an inventory of objects" (15). Things stay there and

should be present in their “old and new versions” (15). Thus, the illusion of the disintegration of organization is achieved visually realm, too.

The play’s structure follows the second law of thermodynamics, i.e. it “decays” due to the influence of time. The scenes gradually fall apart. While at the beginning of the play the cuts between the two periods are clear, as the play proceeds they become more and more abrupt and at some points towards the end, characters from both periods are present on the stage. “Having worked out the ultimate equation – for the disintegration of order, for cosmic chaos – Thomasina invites Septimus to dance, and now past and present merge as couples from each era waltz around the room” (Steyn 1995). There is an ominous prospect in the peaceful dancing scene; as we know from the present scenes, Thomasina is dancing with Septimus on the night when she is about to burn to death (and thus die a symbolic “heat death” which, according to the second law of thermodynamics, the whole universe may end with – a state when entropy predominates and the sum of all energy relatively descends below a critical limit).

The ravaging effects of time are present in a scene from 1999 in *Air Pump*, where the house is undergoing deteriorative changes. From a stylized picture imitating Joseph Wright’s painting *An Experiment on a Bird in the Air Pump*<sup>1</sup> (at the end of the first scene, the characters are situated on the stage around the experimental equipment as in the picture), the room changes into an uncomfortable storeroom for boxes, as suggested by the stage direction: “A single electric light bulb casts a thin light. Tea chests are scattered round the room, some full, some still in the process of being packed. Piles of books and clothes” (27). Later, it is shown that the house is about to be sold, because its inhabitants are not as wealthy as their predecessors and cannot afford to keep the house anymore. The equipment of the house is devastated; the pipes in the basement need to be changed. The future owners plan to renovate the house completely:

**Ellen:** What’s the plan for this room, then?

**Phil:** Corporate hospitality. Private bar in here, private conference facilities through there, private gym. Private sauna for the Scandinavians. [...] (28)

The glamorous past of the house presented in the scenes from 1799 is thus completely demolished.

The switches between 1799 and 1999 present two alternative futures of the house. 1799 offers a glamorous one, full of intellectual development; 1999 is full of despair and no future for the house serving as a symbolic manifestation that distinguishes the two time periods. The house owners’ expectations of the future – Fenwick’s optimism and Ellen’s pessimism – apply both to the future of scientific development at an abstract level and to the future of the house in the material world.

*Arcadia* and *Air Pump* both contain elements of a detective story; in fact, the detective element dominates the plot of the latter. Times shifts help to clarify the crimes of the past. Passion for new discoveries may lead people astray, make

them blind in the past as well as in the present. *Arcadia*'s Bernard sets out on an investigation of a supposed murder that in his opinion took place at Sidley Park – Lord Byron, he says, killed Ezra Chater in a duel in 1809. The play unfolds the mystery of Byron's supposed crime with masterful precision, letting Bernard (and the audience) remain convinced for a long time that the duel scenario is plausible. Again, it is the time switches that make this possible. When Bernard of the present starts elaborating upon his ideas, the following scenes from 1809 contain lines confirming Byron's presence at Sidley Park as well as his liking for guns. On the other hand, it is made clear to the audiences that the clues which Bernard considers persuasive – that Byron corresponded with Chater about a duel as a reaction to the infidelity of his wife – are false. Septimus is shown writing the notes. There is a strong comic potential in this: the scenes of 1809 serve as evidence for the audience that Bernard is wrong and that he is inevitably heading towards academic disgrace. Only after Bernard sends off his revolutionary article to the Byron Society's journal, is the truth revealed – the truth already known to the audiences who could watch the development before their own eyes. Thus Hannah, who learns from the house's papers what the audiences know from the scenes from the past, can prove to Bernard that Chater was not killed by Byron in 1809: "It means that Ezra Chater of the Sidley Park connection is the same Chater who described a dwarf dahlia in Martinique in 1810 and died there, of a monkey bite" (89). Bernard's argument remains "[v]ery possible, persuasive, indeed" (89), but at the same time very wrong. The crime that he was investigating never took place. Just like Chater in 1809, Bernard suffers from a personality distortion – he is so self-assured about his infallibility as Chater is about his artistic genius that he cannot accept mistakes. Neither can see the wood for the trees. Both are considered fools by their contemporaries.

Time changes help to unfold the detective plot of *Air Pump*, too. A skeleton is discovered when the pipes in the basement are renewed, . It is described as one with a deformed spine – it is a skeleton of a hunchback, possibly of a short woman or a child. There is one character in 1799 that fits the description, the Scottish maid Isobel. The switches in time serve to raise the suspense. The audiences become more sure that it is indeed Isobel's corpse. Armstrong's proclaimed wish to perform a dissection on her cadaver makes the audiences pity the girl, who is portrayed as a very likable character unhappy in love and destiny. Although she is gifted with language skills (she contests with Roget, the future thesaurus maker, in the number of synonyms of maid she knows and eventually wins the battle) and thus would make a perfect match for Roget, she surrenders to the dishonest desires of Armstrong and is hurt:

**Armstrong:** You gave me a ravishing smile.

**Isobel:** Now you are most definitely making fun of me.

**Armstrong:** But it is a most beautiful, transforming smile, like sunlight on a glacier –

**Isobel:** Stop it, please. I am not used to such remarks. They do not make me happy, as you no doubt believe, they make me confused –  
*He takes hold of her, turns her round, covers her twisted back with kisses and caresses, fascinated and bewitched by it. (51)*

But the audiences know this is a pretence. He is not in love with Isobel; he is fascinated with her back as a potential object for his study. So the question of how the skeleton appeared in the basement becomes urgent. Not only do the characters of 1999 ask the question, but the increasing suspense causes the audience to become ever more certain that it must be Isobel's corpse. Their sympathy for Isobel and their awareness of Armstrong's wish to dissect her were she dead cause the audience to become suspicious about how exactly she died. Unfortunately, as soon as the 1999 characters come to the conclusion that it is simply a corpse used for scientific purposes – a conclusion that the audiences are also willing to adopt – Isobel attempts suicide, because she learns the true nature of Armstrong's affection. Armstrong finds her on the rope. She is still alive, but then he "puts his hands over her nose and mouth, presses down. Her heels flutter almost imperceptibly. In a second it is over" (92). The suspense has reached its climax. The question of whether a physician is capable of murder in the name of scientific interest, which indeed is one of the central questions of the play, is answered in an alarming way and the fear that it is so proves correct.

Both plays skilfully and effectively portray scientific progress and its inevitable counterpart, decay, using a detective-like backdrop and switches in time to illustrate them. However, the characters are portrayed in such depth that it becomes obvious that the ultimate moral message of both plays lies in showing that people's abilities do not progress together with the sciences, nor do they deteriorate in the passing of time. In *Arcadia*, the mathematical technique of iterated algorithm has evolved immensely, yet Valentine's quest for the equation is comparable to Thomasina's. Bernard is a scholar of the contemporary period and yet he is no less naive about his own abilities as Chater. The message that there is a threat within the progress is clear in *Air Pump*. Armstrong is capable of murder in the name of the bright future he imagines, and Ellen quits her job because she is afraid she would eventually follow in his murderous footsteps in her own field of genetic engineering. People do indeed learn from the past and progress helps them to achieve greater goals. Computing is incomparably faster and medical research has moved from the dissecting room to DNA laboratories. Still, when confronted with their day-to-day realities, the characters make their choices based on their personal preferences and natural inclinations. Moral issues are independent of scientific progress. As the plays switch back and forth in time, they picture how the libraries of human knowledge grow and how time deteriorates the material world; however, people act according to their inner inclinations which are independent of these circumstances.

### Note

- <sup>1</sup> Wright, Joseph. *An Experiment on a Bird in the Air Pump*. National Gallery, London.

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