

The Experimental/Experiential Stage: Extreme States of Being of and Knowing in the Theatre

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The theatre and the branches of knowledge that the umbrella term ‘science’ subsumes share common ground. In both there is a commitment to the observable and the repeatable as human activities of knowledge. Wedded to these activities of creating new theatre, or science, is a sense that the experimental or novel brings knowledge that is reproducible or ‘rehearsable’. The pairing of drama and science itself is not new, however: Christopher Marlowe’s alchemical *Doctor Faustus* and the melancholia of Shakespeare’s Hamlet, grounded in humoral theory, suggest that theatre has a history of fascination with knowing about the physical world, and together, theatre and science have the potential to create fresh ways to communicate novel ideas.¹

Theatre’s preoccupation with science is significant in the twentieth century when it and technological change shaped the world. Modernism’s distorted, subjective representational theatrical worlds reflected the pace of change through fetishization by the Italian Futurists; the irregular and distinctly unnatural lighting states of German Expressionism; and in Soviet Russia, the systemized actor training of Meyerhold’s biomechanics. Moreover, Bertolt Brecht, arguably the most influential theatre modernist, theorized a ‘theatre for a scientific age’.² These theatricalized engagements explored how the scientific can shape human experience. Toward the end of the twentieth century, theatre showed a marked concern for scientific ideas, with doing science, and with scientists. This chapter traces theatre’s preoccupation with science through three of the more pressing topics of the time: molecular structure, genetic testing in medicine, and climate change. It draws together widely discussed plays in theatre and science with newer and little-analysed pieces to investigate how theatre has explored science through the experience of doing it or living it. It is how this relates to the ideas of experimentation and the experimental (including experiential aspects of performance), in the theatre at the end of the twentieth and beginning

¹ See Kirsten Shepherd-Barr, *Science on Stage: from Dr Faustus to Copenhagen* (Princeton, 2006).

² Bertolt Brecht, *Brecht on Theatre: The Development of an Aesthetic*, ed. John Willett (London, 1964), 183-6.

of the twenty-first centuries that links these pieces and is significant as an analytical focus. In this act of exploration, the chapter interrogates notions of the experimental beyond coupling it purely with notions of avant-garde or novel art into an understanding that adds to it the sense, more familiar in science, of a procedure carried out to discover something or to test a hypothesis.

Millennial Dis/ease

As the turn of the millennium approached, Shelagh Stephenson's *An Experiment with an Air Pump* (1998) explored some of the moral aspects of genetic and reproductive technologies that were a preoccupation of the moment, extending the scrutiny to a metaphor for the theatrical event itself. Stephenson's striking drama adopts a technique common to several British science plays of the 1990s, including Tom Stoppard's *Arcadia* (1993) and Timberlake Wertenbaker's *After Darwin* (1998), in which action is split between two time frames (in Stephenson 1799 and 1999) in a manner that Gyllian Raby has described as 'a simple technique of epic theatre that has been popular among socially aware writers in England for the last half century'.³ Similarly, Claudia Barnett styles the play a 'moral dialectic' that is founded upon oppositional pairings.⁴ Barnett and Raby allude to the play's indebtedness to Bertolt Brecht's notions of dialectical and epic theatre and, hence to its political dimension, through non-linear structure and plot founded on a dialogue between the two centuries it opts to stage. The title of the play refers to Joseph Wright of Derby's 1768 painting *An Experiment on a Bird with an Air Pump* which hangs in the National Gallery in London and Stephenson's play opens with a *tableau vivant* of the painting. Wright was a noted artist associated with the famous philosophical circle the Lunar Society, whose members included Charles Darwin's grandfather Erasmus Darwin and Joseph Priestley, and was thus at the centre of the scientific advances of the Enlightenment. In an article contemporaneous with the play, Sandra Harding warns that 'the Enlightenment entrenches a faulty philosophy of nature. Nature is not a cornucopia, available to satisfy limitless desires [...]. Moreover, sciences and philosophies of nature, like all other human creations, are *in*

³ Gyllian Raby, 'From Pre-Luddites to the Human Genome Project: Smashing Frames in Shelagh Stephenson's *An Experiment with an Air Pump*,' *Studies on Themes and Motifs in Literature*, 74. Eds. Leslie Boldt-Irons, Corrado Federici and Ernesto Virgulti (New York, 2005), 142.

⁴ Claudia Barnett, 'A Moral Dialectic: Shelagh Stephenson's *An Experiment with an Air Pump*,' *Modern Drama* 49 (2006), 2: 206-7.

nature, not autonomous from it.’⁵ The play similarly draws out what Harding terms a ‘faulty philosophy’ and presents a contemporary view of Enlightenment as a contested and problematised term to make a comparison between science in the period and the questionable benefits of late twentieth-century scientific knowledge and technology.

An Experiment with an Air Pump creates comparisons through those oppositional pairings between the experiences and experiments of 1799 and 1999. Stephenson constructs this through doubling roles in specific combinations, allowing associations to be made between characters and situations across the centuries. For instance, the main characters in 1799, the scientist Joseph Fenwick and his wife Susannah, are doubled by the performers cast in the central roles in 1999, the geneticist Ellen and her husband Tom, thereby highlighting the changing roles of women in the public sphere in the intervening period. The integration of role doubling is a significant facet of the opening:

*Chiaroscuro lighting up slow revolve tableau involving the whole cast (except Susannah/Ellen), which suggests An Experiment on a Bird in the Air Pump. [...] Strategically placed over the audience are four large projections of Wright’s painting. Ellen, dressed casually in loose trousers, T-shirt, deck shoes, is looking up at them. Two dressers come on with her costume, wig, shoes etc for the part of Susannah.*⁶

It is Ellen who introduces the play. Tellingly, she observes, ‘it has a scientist at the heart of it [...] where you *would usually find God*’.⁷ With the assistance of the two dressers, the performer playing Ellen transforms into Susannah and steps into the frame of the *tableau vivant*, theatrically achieving what Brecht termed the *Verfremdungseffekt* by drawing attention to the live reproduction of the painting as constructed and mutable. In addition, Ellen’s potential status as an objective observer is negated by this technique, which implicates her in the spectacle.

Stephenson’s placement of the scientist centre stage is an equivocal one: the stage directions suggest that Ellen’s perspective should not be taken at face value. As Eva-Sabine Zehelein suggests, ‘Ellen’s version seems to be a very idiosyncratic reading of [Wright of]

⁵ Sandra Harding, ‘Gender, Development and Post-Enlightenment Philosophies of Science,’ *Hypatia* 13 (Summer 1998), 3: 153.

⁶ Shelagh Stephenson. *An Experiment With An Air Pump* (London, 1998), 3.

⁷ *Ibid*; emphasis added.

Derby's painting'.⁸ The tetradic projection of Wright's painting makes it difficult for an audience to miss what is not immediately apparent from the play's text: that the painting does not place the scientist at its centre. Instead, a pool of light focuses the attention away from the experimenter to the reactions of the observers and in particular to the girls (Maria and Harriet are Stephenson's counterparts), one of whom is looking away while the other has a fearful expression on her face. Susan L. Siegfried has argued of the painting that Wright 'used women to explore this area of ethical uncertainty. The two girls at the center of the *Air Pump* are conspicuously distraught at the prospect of their pet bird dying'.⁹ This is true of Stephenson's play which anticipates just such a reading of the painting when she dramatizes this moment as one of 'ethical uncertainty' in the opening sections:

MARIA. Will he die, Papa?

FENWICK. We'll see, won't we?

MARIA. I don't want him to die.

ARMSTRONG. It's only a bird.

HARRIET. It's Maria's pet.

ARMSTRONG. The world is bursting with birds, she can get another –

MARIA. *bursts into tears.*¹⁰

In the play as in the painting, the girls provide the moment of experiential dis-ease: an ethical fulcrum to the action in contrast to the men of science, Fenwick and Armstrong. Maria and Harriet's concerns for the bird's welfare present an emotional and moral perspective at counterpoint to scientific knowledge and experimental method.

Stephenson resolves her scene with the bird fluttering out, unharmed. Wright's painting does not offer such closure, letting its viewers dwell in the moment of terror, apprehension, and uncertainty over the bird's fate. The play draws on Brecht's practice, but it is not completely indebted to his ideas as Raby notes. According to her, Stephenson's 'suspense, climax and audience identification with the tragic fate of Isobel's rebellion all place her in a tradition more cathartic than epic': the form of theatre associated with Brecht.¹¹

⁸ Eva-Sabine Zehelein, *Science: Dramatic. Science Plays in America and Great Britain, 1990-2007* (Heidelberg, 2009), 150.

⁹ Susan L. Siegfried, 'Engaging the Audience: Sexual Economies of Vision in Joseph Wright,' *Representations* 68 (1999), 45.

¹⁰ Stephenson, 4.

¹¹ Raby, 143.

The scene is also remarkable because it shares with the painting the Baconian separation between knowing and the knowable as described by Evelyn Fox Keller in relation to scientific thought.¹² These two aspects point to a play that contains tensions between a classically-constructed drama and its political content. The object of the artistic enquiry is not the scientist or his discovery but the reactions of those around him. Furthermore, they respect the paradigm's gendered organization of the knower as masculine and the knowable as feminine, as the inscrutability of the male scientist in Wright's painting is, to risk an anachronism, readable by Stephenson's late twentieth-century audiences. The use of chiaroscuro heightens the sense of mystery: Wright's scientist is mysterious and morally ambiguous. Ellen steps into the frame presenting the perspective of the scientist and, by extension, her own actions as questionable right from the start, since the performer playing her is absorbed into Susannah's role of the passive observer. This questioning of Ellen as a contemporary scientist becomes especially significant to the 1999 strand of the plot, which is driven by her professional dilemma over whether to take a job that risks her work being misused for commercial ends.

If Stephenson's scientist is not at the physical centre of the stage, (s)he is at the core of the moral ambiguities. Ellen is only wrong in her reading of the scene in visual terms: the scientist takes the place of the absent, unknowable God, who decides whether the bird lives or dies. The opportunity to map Ellen onto the masculine template of Baconian science is partially resisted by Stephenson's questioning narrative, but staging science as an equivocal and morally uncertain enterprise is not. In 1799 and 1999, Stephenson presents scientists compromising their ethical standpoints for scientific advantage. In so doing, the events she depicts reveal scientists in both eras at the centre of moral dilemmas in God's stead. In 1999, Ellen develops a test for foetal abnormalities and is offered a lucrative job in industry, and after much deliberation about the pros and cons, in the penultimate scene, she decides to take it. The job means greater opportunities and more money but the company are likely to exploit her findings for profit. Since the information gained from the tests might be of interest to employers and insurance companies, as the other twentieth-century characters point out, Ellen's work could become yet another way of discriminating against people rather than helping them. Ellen herself recognizes the moral aspect to science and her choice to

¹² Evelyn Fox Keller, *Reflections on Gender and Science* (New Haven, 1985), 79.

take the job when she reflects, 'I don't think science is value free, I don't think its morally neutral'.¹³

The moral quandary presented in the 1799 strand of the plot is even more disturbing. Young scientist, Armstrong, feigns love with the Fenwicks' maid, Isobel Bridie, hoping to get close enough to her to study her pronounced spinal deformity. In a counterpoint, Isobel believes that he loves her in spite of her deformity and, in the penultimate scene (the same one in which Ellen takes the job), she hangs herself in despair after discovering his heinous deceit. Maria discovers Isobel, her pulse weak. Stage directions and dialogue work in tandem to suggest Armstrong's shockingly dispassionate behaviour. With Maria safely offstage he calls 'Isobel? Can you hear me?'.¹⁴ On receiving no response, Armstrong 'hesitates. Then puts his hand over her nose and mouth, and presses down. Her heels flutter almost imperceptibly. In a second it is over. He feels her pulse again.'¹⁵ In this final scene, Armstrong's words are stripped away and devalued as he murders her.

The final act of the play offers comparison between Armstrong's immoral behaviour and those of the characters from the 1990s through several strategies. The first of these is through plotting that allows characters from 1799 and 1999 to share the same stage and the second is through dialogue and action applicable to both contexts and centuries. The stage directions at this juncture request 'Music, distant sounds of what could be celebrations, or could be riots suggest both the New Year's celebrations in each century and the riots taking place in 1799'.¹⁶ Second, Isobel is present in both time frames: as the servant who falls in love and attempts suicide in 1799 and as the partial skeleton of a woman discovered in the house by Tom in 1999. Finally, the parallels between the scientists are brought into sharper relief in Act II, Scene IV when Tom tells Ellen's colleague, Kate, that she is 'unscrupulous, ambitious, and you'd dissect your own mother if you thought it might give you the answer to something'.¹⁷ Rather than stark dialectic there are subtle differences and near parallels drawn between the unscrupulous Armstrong and his 1999 counterpart, Kate, Ellen's friend and colleague. Kate is not entirely lacking in morality; as Barnett pithily puts it, 'she would not kill, so unlike the immoral Armstrong, she is merely amoral'.¹⁸ A scene later, at the play's close, Armstrong pushes this amorality to its extreme in his final act of betrayal: his

¹³ Stephenson, 88.

¹⁴ Ibid, 92.

¹⁵ Ibid.

¹⁶ Ibid., 95.

¹⁷ Ibid., 88.

¹⁸ Barnett, 213.

dissection of Isobel. Her value to Armstrong as an object of scientific enquiry is enhanced by her death. Stephenson links this personal betrayal with the immorality implicit in Armstrong's lack of restraint towards his own scientific curiosity by placing Isobel's body in a coffin so that the final tableau becomes a re-vision of the painting, placing her in the bird's stead as the scientists subject her body to dissection. This mutated tableau theatricalises the gendered dynamic of Baconian science identified by Keller. At this moment, the play's critique of science and scientists is at its strongest. Thus, the final, gendered image is a reproduction of the painting with a difference: it places the experiential, human, and female cost of scientific discovery and its attendant objectification centre stage.

Life Story as Experiment

Deborah Gearing's 2006 play *Rosalind: A Question of Life* takes its audiences right back to the fundamentals of the gene by exploring the discovery of the structure of DNA. Her play is one of a number of twenty-first century theatre pieces featuring twentieth-century women crystallographers, including Georgina Ferry's *Hidden Glory* about Dorothy Hodgkin, Anna Ziegler's *Photograph 51* about Rosalind Franklin, and Esther Shanson and Curved Experience Theatre Company's part-scripted, part dance, and part devised *The Nature of Things*, which interweaves the scientific lives of Franklin, Hodgkin and Kathryn Lonsdale. Franklin's X-ray images of DNA crystals were a significant part of how the molecule's structure was elucidated in 1953. Franklin died of ovarian cancer in 1958 while she was still in her thirties and her role in the discovery of DNA has only recently begun to be more acknowledged, though she has yet to receive formal posthumous recognition.

On the page, *Rosalind* looks dramaturgically conventional: a series of scenes with speeches given to clearly demarcated characters. Yet Gearing plots her onstage actions by drawing on theatrical techniques that are features of other science plays like Wertenbaker's *After Darwin* (1998), Stoppard's *Arcadia* (1993), and Stephenson's play discussed above. All of these utilize scenes to make distinctions between narratives of past and present characters. Gearing's play is introduced through twenty-first century characters, the genetics undergraduate Esther and her brother Joe. The performer playing Rosalind is onstage during this sequence, but she has no part other than observer. In the subsequent scene, Rosalind has a monologue, at which point, Esther, the present-day scientist, remains onstage but unaware of her, mirroring the previous scene's conventions. The dialogue immediately contextualizes the difference, giving Esther's birth date as the 1980s: nearly thirty years after the death of Franklin. Rosalind, the character, is foregrounded by this monologue's content: she tells the

audience that she was Esther's age (approximately 19) when World War II broke out. Thus, although Gearing makes it evident that the two women were born at opposite ends of the twentieth century, she complicates matters by questioning whether the onstage action is a representation of reality at all:

A life begins at the beginning and ends when it must.

Afterwards: what remains? What remains of me?

With a story you begin at the beginning but, this isn't a story.

Let's say it's an experiment.

The idea with an experiment, is that afterwards you know a little more than before.

You are on your way to finding the truth.¹⁹

This speech is central to understanding the play's subtitle, 'a question of life'. Its deictic language draws attention to the life being more than how DNA replicates, for which understanding its structure is pivotal (and by extension also crucial for the audience). Gearing's play asks what remains of this iconic heroine. Is she only reachable through the work she carried out on the molecule's structure? The speech illuminates the artifice of performance through Rosalind as a representation and the possibility that, as a fiction, the story is a thought experiment. Here, in Gearing's version, Rosalind is like Schrödinger's cat: existing in an uncertain state of being because onstage she is both alive and dead. Gearing opts not to resolve the issue of what century Rosalind the character exists in: a postmodern move that treats Franklin's time as one of the ludic aspects of the performance. Within the stage world of *Rosalind*, characters signal themselves as fictional representations: as dead, or alive, or both. Moreover, it stages past and present as occurring simultaneously or in juxtaposition, depending on the situation. Thus, Gearing's play-world, for all its experimental feel, is an experiential, fictional realm; it is a temporality in which consciousness, perception, and history collide.

One of the striking features about this work, originally aimed at a teenage-and-older audience, is its approach to Franklin's scientific practice. Gearing's thought-experiment technique combines instruction in scientific ideas and methodologies with a simple role play. The economy of the writing means that, in order to retell the scenes from Franklin's life, the performers playing Esther and Joe have to enact the roles of Watson, Crick, and Franklin's

¹⁹ Deborah Gearing, *Rosalind: A Question of Life*, in *Burn and Rosalind* (London, 2006), 74.

lab mate Wilkins. This is effectively achieved by the performers staying in their initial characters but adding a signifying item of costume (for example, a coat for Wilkins and a lab coat for Watson) and role-playing the characters in Rosalind's scientific life. Through this simple device, the play delivers scientific information to the audience as instruction on how to role-play the other scientists. For instance, Joe says: 'I thought you were taking x-ray photographs of crystals. What are you doing with them?'.²⁰ To which Rosalind replies:

You have to obtain a good crystal before you can even begin to take the photograph [...]. The X-ray beam is shone into the vacuum and channelled through the crystal. The atoms of the crystal diffract the beam [...] so the flecks of light on the photographic plate are not a true image – the scientist's job is to interpret those flecks, to reconstruct the molecule [...] You have to apply equations [...] You have to be able to think in three dimensions [...] Our results suggest a helical structure [...] containing probably two, three or four co-axial nucleic chains per helical unit, and having the phosphate groups near the outside.²¹

The speech, ostensibly an instruction to someone playing the role, imparts clear information about DNA and the skills and techniques required by Franklin to complete her work. It draws on stage properties that might be found in a school or university teaching laboratory and consist of replicas of two models built by Watson and Crick and Franklin's photograph 51, which has a significant role during a scene in which the characters enact Wilkins' high-handed disregard for Franklin by showing it to Watson without her prior knowledge and facilitating the building of the correct Model 2. Gearing underlines this betrayal by having her Rosalind remain unaware of this fact until the scene unfolds before her in a deftly knowing, postmodern articulation of the construction of knowledge. Gearing's fictional play-world documents the life and material conditions under which one of the twentieth century's significant woman scientists worked. What is made crystal clear is the experiential aspects of science: the dedication and painstaking lab practices that made Franklin's work possible and the socio-political dimension of its undertaking.

The Anthropocene: Staging Climate Change

²⁰ Ibid., 87.

²¹ Ibid., p. 87-8.

As the 2010s approached, British playwrights rather belatedly turned their attentions to one of the most pressing issues of the day: climate change. In a brief discussion of the topic in the epilogue to her *Theatre and Evolution from Ibsen to Beckett*, Shepherd-Barr observes that these plays give ‘new meaning to the vexed issue of how individuals relate to their environments’.²² In the face of increasing evidence that the effects of climate change were being felt on a global scale, Steve Waters wrote the diptych *The Contingency Plan* (2009); Moira Buffini, Matt Charman, Penelope Skinner and Jack Thorne presented their combined vision, *Greenland* (2011); Mike Bartlett’s 2010 *Earthquakes in London* pitted a climate change scientist against his fragile family dealing with the daily reality of global warming’s effects; and Duncan Macmillan’s *Lungs* (2011) was similarly bleak in its staging of climate change as a deliberation between a couple about whether to have a child. In 2014, Macmillan teamed up with a climate change scientist, Chris Rapley, to create *2071* which was staged at the Royal Court Theatre in London.

2071 is singular as a theatrical performance in three aspects: the degree to which its subject matter is scientific in content, its subordination of theatricality to narrative, and its textual afterlife. As Vicky Angelaki observes in her study of twenty-first century political theatre:

It is telling that two of the most notable examples of how nature and our universe became a pivot for new writing, *Ten Billion* and *2071*, took on the economic form of the performance lecture. As these works examined how the planet has been led to a combustion point with mathematical precision, the directness of the titles was reflected in their style and content.²³

Though presented in London, *2071*’s afterlife is a global one: its text is available to download free on open access as well as in a print edition.²⁴

²² Kirsten E. Shepherd-Barr, *Theatre and Evolution from Ibsen to Beckett* (New York, 2015), 284.

²³ Vicky Angelaki, *Social and Political Theatre in 21st-century Britain: Staging Crisis* (London, 2017), 110.

²⁴ The text of *2071* is available at www.researchgate.net/publication/272086982_2071_Playtext/download. The print edition is the version referenced throughout this chapter.

What *2071* replicates in theatrical terms is the approach of plays such as Gearing's *Rosalind*, Michael Frayn's *Copenhagen* (1998), and Peter Parnell's *Q.E.D.* (2002) in which a real-life scientist is placed centre stage, as Rapley participates as an onstage incarnation of himself. Where it differs is that Rapley, the scientist, takes the place of the actor in performing the role. His opening lines— 'I've been thinking a lot about the future. As a climate scientist it is part of my job'— introduce the topic by telling the audience what he has done and seen, foregrounding the science in his personal, subjective, lived experience.²⁵ Furthermore, he asserts, 'I have been head of the British Antarctic Survey, and in that role have been to the Antarctic and the Southern Ocean many times'.²⁶ The piece proclaims Rapley's experiential qualification to judge: 'My work has enabled me to travel to parts of the planet visited by only a few and to meet experts from all over the world. This has allowed me to see and assess things for myself'.²⁷ In other words, the journey through climate change starts with Rapley's authority on it: 'A lot has changed in my lifetime.... Major advances [...] made in oceanography, meteorology, magnetism'.²⁸

2071 is less about science or scientists, however, than using scientific discourse and the figure of the scientist to communicate one of the vital issues of the day. When the piece draws attention to scientific ideas, it does so in precise ways and when the arguments about climate change require an understanding of the processes that underpin the reasoning behind them. There are two specific areas in which the onstage Rapley explains some of the science: 1) the carbon cycle and, related to it, 2) dynamic balance. *2071* explains the carbon cycle in simple terms and how it relates to climate change. It:

consists of large annual exchanges between the carbon reservoirs of the atmosphere, the land biosphere, the lithosphere and the ocean.

[...].

For example, as plants grow on land and in the sea in the spring, they draw down carbon dioxide from the atmosphere, which is later released as the green matter dies and decays. [...].

²⁵ Chris Rapley and Duncan Macmillan, *2071: The World We'll Leave Our Children* (London, 2015), 3.

²⁶ *Ibid.*, 5.

²⁷ *Ibid.*, 6.

²⁸ *Ibid.*, 15, 20.

Physical exchanges take place between the atmosphere and the ocean as carbon dioxide is absorbed into cold dense waters that sink to depths, and is released from areas where warmer water upwells.

These exchanges are much greater in magnitude than our own carbon emissions – but prior to industrialization they were in dynamic balance.²⁹

Of dynamic balance Rapley pronounces:

Dynamic balance applies to many features of the system, such as the balance of the carbon between the atmosphere, ocean, land and vegetation [...]

But it especially applies to the energy balance of the planet – meaning that, over time, the amount of energy leaving the planet is equal to the amount entering it.³⁰

They conclude that ‘we are currently burning 10,000 million tonnes of carbon per year – a figure that has been increasing at a rate of 2 per cent per year.’³¹ Textually, the arguments raise alarm in relation to climate change and the wholly experiential assertion of humanity’s influence: ‘Human impact on the planetary system has been so profound that *many feel* we have irreversibly brought the climatic stability of the Holocene to an end and entered a new epoch. The “Anthropocene”.’³² Crucially, this lecture communicates not exclusively to other scientists but to theatre audiences, whoever they may be. The Anthropocene, the era in which humanity shapes the Earth, becomes the *Anthropo-scene* in which all humans are actors in this drama.

2071 poses a conundrum for the theatre. Unlike Bartlett’s play with its arrogant professor and his three daughters whose lives are shaped by climate change, or Macmillan’s own *Lungs* where the couple’s personal life and the effects of climate change are completely merged, *2071* uses the subject as its story. The urgency of its tale relies not on onstage action but on its message: in exhorting its audiences to action. In intertextual terms, *2071* is striking in its permutation of texts: the scientist and the message take precedence over dramatic discourse to the point that they are merged.³³

²⁹ Ibid., 112-4.

³⁰ Ibid., 40-1.

³¹ Ibid., 117.

³² Ibid., 120-1. My emphasis.

³³ Julia Kristeva, ‘The Bounded Text,’ trans. Thomas Gora, Alice Jardine and Leon S. Roudiez, *Desire in Language: A Semiotic Approach to Art and Literature* ed. Leon S

Equally interested in the experiential, but more theatrically experimental than *2071*, Bartlett's *Earthquakes in London* premiered at the National Theatre in London in August 2010, in conjunction with *Headlong*. *Earthquakes in London* relates how climate change brings about metaphorical and literal seismic shifts in human existence. The earthquakes of the title symbolizes the disruption to human civilization from climate change and the organizational structure of the play itself. The story interweaves the lives of climate change scientist, Robert Crannock and his three daughters, Sarah, a government minister overseeing the response to climate change, pregnant Freya, and Jasmine a student and, ultimately to Freya's daughter, Emily. It presents Emily as a Christ-like figure, who can lead humanity to salvation and her grandfather, Robert as a complicated and flawed scientist. Bartlett's work is expansive and ranges between locations and moments in time. In contrast to *2071*, *Earthquakes in London*'s theatricality is deliberately intense, mirroring the climate crisis it comments upon. As Julie Hudson notes, the opening stage directions demand excess.³⁴ Bartlett instructs the director to employ 'as much set, props and costume as possible. The stage should overflow with scenery, backdrops, lighting projection etc. [...]. The play is about excess, and we should feel that'.³⁵ Furthermore, the first two scenes mix into each other in a fluid manner that does not respect dramatic conventions or signal changes in scenery. As Hudson observes, the 'constantly shifting episodic structure comes across to the audience as chaotic, and this is quite deliberate'.³⁶ Throughout, the five acts move seamlessly between locations without clearly demarcated scene changes, creating the theatrical equivalent of a jump cut because, like this form of film editing, the play's simple shifts draw attention to changes in space and time rather than conforming to conventional rules. The effect is rather to create a hybrid form: a supercharged version of Brecht's epic theatre. In the original production, this mingling of the action was reinforced by a twisty thrust stage that snaked around the auditorium as if to mimic Bartlett's dramaturgical choices.

This dystopian, but ultimately redemptive, vision of Britain is set across a number of different time periods: 1967, the 1970s, the play's own near future during the Conservative-Liberal Democrat government 2010-15, and the year 2525. Each act up until, and including,

Roudiez (New York, 1980 p. 36). Intertextuality is characterized as being 'a permutation of texts'.

³⁴ Julie Hudson, "'If You Want to Be Green Hold Your Breath": Climate Change in British Theatre,' *New Theatre Quarterly* 28.3 (August 2012), 265.

³⁵ Mike Bartlett, *Earthquakes in London* (London, 2010), 5.

³⁶ Hudson (2012), 265.

Act Four features a sequence taking place in the play's past as a prologue to it (1967 in Act One, 1973 in Acts Two and Three, and 1991 in Act Four) with an epilogue set sixteen years in the future. Bartlett's choices in plotting his play from the beginnings of climate change science to beyond the present day point his audiences towards seeing causality in the decisions made in the 1960s and 1970s and their consequences for present day characters. Furthermore, its extrapolation to the future suggests how action in the play's present might have consequences for humanity's future. Its speculative 'what if' breaks up the linear inevitability of determinism to invite questioning of those actions.

Whereas in *2071* the scientist conveys an important message because of the legacy he owes to his grandchild, *Earthquakes in London* has its fictional scientist betray his field and perhaps the planet for personal gain, only for it to be saved by his granddaughter. Act Two opens with a prologue set in 1973 in which Robert meets with two airline industry men who commission him to study the effects of air travel and the burning of aviation fuel. They intimate that Robert's research needs to be useful if they are to continue their funding.³⁷ The non-linear plotting of this consciously Brechtian play means that this segment of Robert's story in 1973 is not returned to until the opening of Act Three.³⁸ Robert is sure of his results, but the airline men are concerned that the findings are 'not meaningful'.³⁹ Robert's reply is one of the few passages in which the science is explicit: 'it's clear releasing huge quantities of carbon dioxide into the atmosphere at such a high altitude will cause heat to be reflected [...] potentially causing rising temperatures'.⁴⁰ Rather than present a conflict of interest, Bartlett—in keeping with the play's indebtedness to Epic Theatre form, and perhaps to Brecht's *Life of Galileo*—presents a moral dilemma for the scientist as he is passed a piece of paper and is urged to 'keep going' and 'There's six months before the final report [...] Anything could happen'.⁴¹ Bartlett leaves his audience wondering if Robert has succumbed to temptation at the expense of his science.

There is a family secret at the core of *Earthquakes in London*: Freya is pregnant but is behaving in a manner that suggests the child (Emily) is unwanted. At the beginning of the play her husband travels to see Robert to ask him why Freya also visited. The conversation

³⁷ Bartlett (2010), 42.

³⁸ Mike Bartlett, 'Interview,' in T. King, T., and Headlong Theatre Company, *Earthquakes in London: Education Pack* (2011), 7.

³⁹ Bartlett (2010), 66.

⁴⁰ *Ibid.*, 67.

⁴¹ *Ibid.*, 68.

between the two men unravels slowly over the course of the play. It is only in Act Three that the reason for Freya's distress is revealed in a long exchange that ranges over the Gaia theory, disruption to Earth's dynamic balance, and climate change. Musing on the topic of human over-population, Robert suggests that there will be a correction that would result in 'Five billion people wiped from the Earth in a single lifetime. Mass migration away from the equator, world wars, starvation' and reveals that he told Freya, 'her child will regret she was ever born'.⁴² Robert's message is proximal to the pretext of Macmillan's *Lungs* a year later. Where *2071* is urgent and apocalyptic in its reach, Bartlett's work is hopeful and less concerned with the scientific message than its urgent human implications.

Theatre's connections with science help create a rich thematic mixture of ideas in all of these pieces. Theatrical daring, too, is a feature. Each draws on the idea of experiment and explores the human dimensions to science by documenting the experiential. Often, as these pieces demonstrate, that means reshaping dramatic form in experimental ways or turning over the theatre to science or experimentation directly, as with *2071* or *Rosalind*. These works look to the scientific concerns of their day to explore humanity at extremes or through crisis and dilemma and, in the case of the climate change plays, to ask "what next." Theatre's mimicry of form is a common characteristic here: these pieces inhabit their theatrical ideas pairing and coiling historical periods around each other like a double helix of DNA or the inflamed structures of the Anthro(po)s(cene).

⁴² Ibid., 96.

Suggested Reading

Angelaki, Vicky. *Social and Political Theatre in 21st-century Britain*. London, 2017.

Barnett, Claudia. 'A Moral Dialectic: Shelagh Stephenson's *An Experiment with an Air Pump*'. *Modern Drama* 49 (2006), 2: 206-222.

Keller, Evelyn Fox. *Reflections on Gender and Science*. New Haven, 1985.

King, T., Headlong Theatre Company, (2011) *Earthquakes in London*: Education Pack.
https://headlong.co.uk/media/media/downloads/Earthquakes_in_London_-_Education_Pack.pdf

Harding, Sandra. 'Gender, Development and Post-Enlightenment Philosophies of Science.' *Hypatia* 13 (1998), 3: 146-67.

Hudson, Julie. '“If You Want to Be Green Hold Your Breath”': Climate Change in British Theatre.' *New Theatre Quarterly* 28 (2012), 3: 260–71. doi:10.1017/S0266464X12000449.

Raby, Gyllian. 'From Pre-Luddites to the Human Genome Project: Smashing Frames in Shelagh Stephenson's *An Experiment with an Air Pump*.' *Studies on Themes and Motifs in Literature*, 74. Eds. Leslie Boldt-Irons, Corrado Fdeerici and Ernesto Virgulti. New York, 2005. Available <http://spartan.ac.brocku.ca/~graby/pdfs/airpumppaper.pdf>

Rapley, C., and Macmillan, Duncan. *2071: The World We'll Leave Our Children*. London, 2015.

Shepherd-Barr, Kirsten. *Science on Stage: from Dr Faustus to Copenhagen*. Princeton, 2006.

Shepherd-Barr, Kirsten. *Theatre and Evolution from Ibsen to Beckett*. New York, 2015.

Siegfried, Susan L. Engaging the Audience: Sexual Economies of Vision in Joseph Wright. *Representations* 68 (1999): 34-58.

Zehelein, Eva-Sabine. *Science: Dramatic. Science Plays in America and Great Britain, 1990-2007*. Heidelberg, 2009.