

A Crucible of Two Cultures: Timberlake Wertenbaker's *After Darwin* and Science in Recent British Drama

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In 1998, three plays opened in Britain which focused explicitly on science and the history of scientific discoveries: Shelagh Stephenson's *An Experiment With An Air Pump*, Michael Frayn's *Copenhagen*, and Timberlake Wertenbaker's *After Darwin*. I do not take this as mere coincidence but as a symptom of a special situation of renewed interest of playwrights (and the theatre world) in science. Other plays could be named in this context, most importantly Tom Stoppard's *Hapgood* (1988) and *Arcadia* (1993), but also plays like *Observatory* (1999) by Daragh Carville and *Oxygen* (2001) by Carl Djerassi and Roald Hoffmann. Obviously, playwrights have added in recent years to the long tradition of dealing with science in the theatre, a tradition which goes back at least to the various dramatisations of the Faust myth.

The relationship between science and drama has been predominantly one of opposition. Physics, astronomy, biology – science in general – on the one hand and drama on the other can and have been defined as two diametrically opposed poles of human activity. Between science and literature run

[...] those rigid (and purely conventional) lines of demarcation that have hitherto been drawn between the natural and the human sciences, or again, between 'science' as a mode of knowledge accountable to rigorous (cognitive) standards of enquiry and art as a realm of creative or imaginative freedom. (Norris 103)

If drama is taken as representative of literature or art in general, the opposition boils down to the well-known confrontation of the "two cultures" as defined by C. P. Snow in his "Rede Lecture" (1959). In addition, drama can be seen as the very embodiment of show, fictionality, emotion – an art form which creates an illusionary world dominated by human emotional interaction. If de-

finied thus, drama can be said to mark the contrary of scientific reasoning, logic, and representation of reality.

Drawing parallels between drama and science on a general basis might be a challenging play of ideas but even the obvious spatial similarity of scientific lecture halls and theatres cannot dissolve the fundamentally antagonistic relationship which exists between drama and science today. The positions in the struggle of the “two cultures” (if drama is taken as *pars pro toto* for literature) are so well-known that they have achieved common-place status. Certain chains of arguments and counter-arguments can be referred to automatically. An example is the dialogue from Tom Stoppard’s *Arcadia* between Bernard (a lecturer in English Literature, champion of Byron and consequently of literature) and Valentine (a mathematician who serves as a spokesman of science):

Valentine: The questions you’re asking don’t matter, you see. It’s like arguing who got there first with the calculus. The English say Newton, the Germans say Leibnitz. But it doesn’t *matter*. Personalities. What matters is the calculus. Scientific progress. Knowledge. [...]

Bernard: Why does scientific progress matter more than personalities? [...]

Valentine: Do yourself a favour, you’re on a loser.

Bernard: Oh, you’re going to zap me with penicillin and pesticides. Spare me that and I’ll spare you the bomb and aerosols. But don’t confuse progress with perfectibility. A great poet is always timely. A great philosopher is an urgent need. (60-1)

Usually, the connection between the “two cultures” is defined in terms of dominantly martial metaphors such as “clash of cultures,” “war,” “opposing camps,” “attacks,” “defence,” “battle for higher ground” and the like.¹ As the so-called “Sokal Affair”² has shown in 1996/97, the intellectual antagonism can easily turn into real and embittered fights (even if the battle is fought only verbally) over public opinion and, consequently, funding.

To remain within the area of war metaphors, science has gained ground immensely over the last centuries due to its effectiveness in solving a great number

1. See for example Vanderbeke’s comment on the ongoing fight between (cultural) relativists and (scientific) objectivists about the character of science as a (social and rhetorical) construction similar to literature or science’s claim to represent the world objectively:

“The critique of science as literature quite regularly appears in the garb of a head-on assault and quickly turns into ‘literary criticism versus science’s fictions.’ The concepts of the various proponents of the relativism and the social constructivism of science have become the stock repertoire of critics, serving as ammunition for the latest skirmish in the war of the literary and scientific worlds” (253).

2. A detailed account of ‘Sokal’s Hoax’ and its significance can be found in Guillory.

of problems, which has been heightened by its allegiance with technology. The co-operation of science and technology has effected an enormous advance in both fields, which has fundamentally reshaped the world. Consequently, science's claim to explain the world truthfully and more effectively than other approaches has gone widely unchallenged and this means that science has enjoyed a more and more privileged role. Art on the other hand has experienced growing pressure and a need to justify its traditionally privileged position. One answer to this dilemma has been that art has taken a critical and moralising stance against science.³ In the field of drama, plays have mainly concentrated on commenting on the discrepancy between the growing scientific and technological possibilities and the (apparent) lack of growth in moral responsibility.

This long dramatic tradition, for which the various realisations of the Faust-myth stand as the most obvious example, can by no means be discussed here but it is important to keep it in mind when we look at the new plays on science. Although most of the plays mentioned above might easily be subsumed under the usual oppositional approach of the two cultures (e.g. Stephenson's *Experiment*, which takes a critical look on the genome project or Frayn's *Copenhagen*, in which the characters are haunted by moral questions arising from research in physics under the shadow of the A-bomb), I shall argue here that the plays go beyond the war of the two cultures in placing the relationship between science and drama explicitly at the centre of attention. Thus, they take a new, metascientific approach which goes beyond the simple opposition of "beneficial science" and "moral implications" and explores the connection between the postmodern condition (in the Lyotardian sense),⁴ history, drama, and scientific theories. They dramatise how scientific discoveries of the past have shaped the present perception of the world. These historical paradigm changes serve as ideal dramatic situations since they centre on conflicting world views. Yet, the plays do not remain in the area of presenting a historical conflict but connect historical discoveries with the present both by introducing a present-day plot which is connected to the historic events and by implicitly and explicitly constructing a connection between the form of the dramatic texts and the various paradigm changes in scientific theory. The dramatic text thus becomes an exemplification

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3. "The feelings of one pole become the anti-feelings of the other. If the scientists have the future in their bones, then the traditional culture responds by wishing the future did not exist" (Snow 11).
 4. "The object of this study is the condition of knowledge in the most highly developed societies. I have decided to use the word *postmodern* to describe that condition. [...] it designates the state of our culture following the transformations which, since the end of the nineteenth century, have altered the game rules for science, literature, and the arts. The present study will place these transformations in the context of the crisis of narratives" (Jean-François Lyotard, *The Postmodern Condition*, quoted after Jenkins 36).

of scientific theories in content and structure. In turn, science becomes a metaphor for contemporary concerns in the dramatic text such as the impossibility to reconstruct the past or the situation of theatre groups in contemporary post-Thatcherite Britain.

An Experiment With An Air Pump, *After Darwin*, and *Copenhagen*, but also *Arcadia*, *Observatory* and *Oxygen* thus share three important elements. Firstly, they all deal with science as a central topic and especially with the influence of scientific theories as models of thinking. Secondly, they deal with history: They stage science in historical perspective by focusing on significant scientific discoveries of the past. But they also explore the process of how history is constructed in the present and can therefore be termed metahistorical plays. Thirdly, they share some formal traits, e.g. the use of metadrama and the juxtaposition of scenes set in the past and scenes set in the present.⁵ In drawing these three elements together they construct an illuminating cross-connection between science, history and drama, between content and form, which allows a new approach towards science in drama.

In the following, Timberlake Wertenbaker's *After Darwin* shall serve as an example of this process, yet parallel observations, with slight variations, could be made on the other plays. Studies of the role of science in *Arcadia* abound even if the importance of the historical perspective (which becomes obvious in comparison to Stoppard's unhistorical science-play *Hapgood*) is usually overlooked. It is *communis opinio* that *Arcadia* is very much a dramatic representation of chaos theory and connected scientific approaches. Similarly, *Copenhagen* can be seen as a fusion of Werner Heisenberg's "Uncertainty Principle" with the historical discussion about his behaviour in World War II and the metahistorical question of the inability to reconstruct an objective version of the past, all represented in a dramatic form which mirrors the scientific and historical concerns.

The same elements (science, history and a matching dramatic form) feature strongly in Wertenbaker's play. *After Darwin* centres on the history-making voyage of Charles Darwin to South America and the Galapagos Islands on board of HMS *Beagle* (1831-36). The play shows how this voyage "made history" in terms of scientific development (as it gave rise to Darwin's theory of evolution). Yet the play also shows how this "history is made" by depicting the efforts of a present-day theatre group to stage the events as a play. Thus it connects scientific

5. *Copenhagen* is an exception since it contains no direct metadrama and does not build (as the other plays) on the opposition of two time levels and plot-lines. Frayn's play is set in a non-defined space and time with ghost-like presences rather than persons discussing the mysteries of Heisenberg's (in)famous meeting with Niels Bohr and of his uncertainty principle. Yet, the play so obviously shares the interest and the approach of the other plays in science that it is justified to include it here even if the metahistorical and the metadramatic aspect are rather implicit than explicit.

Act I:

Scene	Title of the scene	Set in	Content
1	Despair	1865	FitzRoy's suicide (version I)
2	Hope	1831	Darwin gets on board of the <i>Beagle</i>
3	Emotion		rehearsal, Millie appears
4	Tenderness	1832	Darwin is seasick
5	Friendship		rehearsal
6	Doubt	1832	Brazil, first idea of Darwin's theory
7	Camouflage		rehearsal
8	Change	1832	Darwin contradicts FitzRoy
9	Fear		rehearsal
10	Idealism	1832	Tierra del Fuego, gifts for the Fuegians
11	Identity		rehearsal, Lawrence appears
12	Cruelty	1835	Galapagos, a new species
			change to rehearsal

Act II:

1	Jealousy	1839?	FitzRoy visits Darwin numerous interruptions
2	Truth	1843	FitzRoy leaves for New Zealand change to rehearsal
3	The Origin of Species	1857	Darwin has written his book change to rehearsal
4	Sexual Selection		rehearsal, Millie and Ian
5	The Struggle for Existence	1857	continue II/3 change to rehearsal / back to I,12
6	Natural Selection	1835	Galapagos → renunciation change to rehearsal / crisis
7	Evolution	1865	FitzRoy's "suicide" (version II) past and present simultaneously

discovery directly with drama.

An analysis of the structure of the play reveals an elaborate pattern (see figure) and shows how the two plot lines become more and more entangled.⁶ “Historical” scenes (white), which focus on the conflict between Charles Darwin and the Captain of the *Beagle*, Robert FitzRoy, set during and after Darwin’s famous voyage are contrasted with “rehearsal” scenes set in the present (black), in which the theatre group is rehearsing the play on Darwin and FitzRoy. Darwin is played by an actor called Tom, FitzRoy by Ian. In some scenes (grey), the historical action and the rehearsal interact closely. Scenes I,1 and II,6 stand out because they disrupt the otherwise chronological development of the historical action. The first and the last scene of the play are set off from the rest of the play because they function as a kind of prologue and epilogue.

The juxtaposition of past and present is introduced after I,2 when Millie, the Bulgarian director of the production, suddenly intervenes. Up to this point (for two scenes) the play has appeared to be a conventional history play. Then the costume drama is supplemented with a metadramatic “frame.” Towards the end of the first act (in I,11) both the play and the play-within-the-play reach a first climax. At this point Lawrence, the author of the play-within-the-play, appears, which adds a new level of metadrama: The frame from then on also includes the process of playwriting as well as the level of theatre production.

Historical (play-within-the-play) scenes and rehearsal (present-day) scenes alternate regularly throughout the first act until the last scene (I,12), which foreshadows the closer interaction of past and present in Act II. In the second act the changes between past and present are not as clearly marked as in the first act, where entire scenes either belong to the past or to the present.

The first scene of the second act, which depicts FitzRoy visiting Darwin in 1839 and trying to convince him not to publish his findings, has several metadramatic interruptions. Then the pattern goes back to a regular alternation of past and present.⁷ Yet, as opposed to the first act where past and present are separated by scene changes, the scenes now change directly from the historical scene into the rehearsal situation, which makes the interaction between past and pre-

6. The highly constructed character of the play has been seen as a serious drawback by several critics such as Michael Billington (*Guardian*) who found the play “overschematic” and containing “too many neat parallels between the past and the theatrical present.” Shirley Morley (*Spectator*) wrote that there were “moments when you wish that Wertebaker had stuck to just one plot” and Charles Spencer (*Daily Telegraph*) complained that “the genuinely moving story of Robert Fitzroy becomes secondary to Wertebaker’s tiresome dramatic twists” (Middeke 166-67). Apart from posing the justified question whether a highly metadramatic, metahistorical, and metascientific play might not get lost in all its metalevels, these reactions also bear witness to the importance and dominance of the metalevels in Wertebaker’s play.

7. The only exception is II,4, which is entirely set in the present and focuses on the relationship between Millie and Ian.

sent closer than in the first act. This interaction of past and present culminates in II,7 when past and present finally command the stage simultaneously. The structural development thus starts with a single (historical) plot, moves to an alteration between historical scenes and rehearsal scenes, then to a closer interaction of past and present and finally to a simultaneous presence of both time levels.

The succession of both the historical and the rehearsal scenes is chronological with two exceptions (I,1 and II,6). With these two a-chronological scenes, two non-linear links between the scenes are established. The closing scene (II,7) mirrors the opening scene of the play (I,1). The end of Act II is similar to the end of Act I as the first part of II,6 is identical with (a repetition of) I,12. Then both scenes are interrupted by metadramatic comment and develop into different directions.

Not surprisingly, this elaborate structural pattern mirrors the content of the play. The play is both a linear narrative (of Darwin's discovery and his relationship to FitzRoy and of the progress of the theatre group) and a circular story marked by the repetitions and variations of a rehearsal process. As the two plot lines become more and more entwined, the struggle of the two historical characters is repeated and mirrored in the struggle between the two actors Ian and Tom. When Ian is asking Tom to postpone his decision to leave the theatre production to act in a film (in II,1), this forms a direct parallel to a preceding dialogue between FitzRoy and Darwin, in which FitzRoy tries to convince Darwin not to publish his theory. Tom explicitly makes the connection when he says: "You don't sound convinced. Look how pinched you are –like FitzRoy" (44).

From a very early stage onwards, the actors find it harder and harder to distinguish clearly between themselves and the roles they are playing. Ian is saying about himself: "It is 1831. I am a captain in Her Majesty's Navy, I am an aristocrat and I am English, I am not playing an evolving mammal" (9-10). The first and second "I" clearly refer to FitzRoy, the third could refer to both FitzRoy and Ian, whereas the fourth "I" clearly refers to Ian only.

This interconnectedness of actors and roles runs through the play as an implicit statement on the connection between past and present, between Darwin's theory and the present situation, between science and drama. As the actors identify with their historical personas, the rehearsal scenes also comment directly on the influence of Darwin's theory on the present situation. By using Darwin's theory as a metaphor, theatre is shown as a threatened environment (threatened by financial problems and the power of the film industry). It is an all too small ecological niche for survival in a world dominated by cruel Darwinist and capitalist struggle. Ian states: "In contemporary Britain, Millie, the moral dilemma is an overspecialized refinement that leads rapidly to extinction" (54). This coincides with Millie's insight that "[t]he truth is not a good survival tool. It makes you vulnerable" (51), but "tenderness gave mammals an evolutionary advantage" (9).⁸ The number of direct links created between Darwin's theory and

8. Moral commentary, it has to be said, leaps in through the back door here as Darwinism becomes connected with Social Darwinism and the theatre is depicted as opposed

the situation of the theatre production is extremely, sometimes irritatingly, high.⁹

The most obvious and overreaching parallel drawn between the scientific theory and the theatre rehearsals lies in the fact that the crisis of the relationship between FitzRoy and Darwin (in the play-within-the-play) coincides with the crisis of the theatre production. As Tom is willing to upset the world of the theatre production with his decision to leave for Hollywood, Darwin shatters FitzRoy's ordered world with his discoveries. FitzRoy threatens to kill Darwin and then commits suicide. Ian resorts to the unfair trick of pretending towards Tom's film studio to be Tom's HIV-positive lover, and thus he saves the theatre production by destroying Tom's career.

Wertenbaker adds more levels to this already highly interrelated complex by introducing the stories of Millie and Lawrence. Millie's story is one of survival in the twists and turns of Bulgarian history (Darwin, history and identity become connected again). Lawrence's tale of his past is one of survival as a member of a threatened group by the force of canon (dominant) literature as his mother separated him from his African-American fellows to live on Shakespeare and other white authors only:

She took me out of school when I was eight –I was beginning to go wild, beyond anger as you say– and she locked me up with books, everything she could lay her hands on. Here, she said to me, here's your friends; Shakespeare, Milton, *Moby Dick*, that's the only gang you're ever to hang out with. She put in extra hours to hire tutors. No black writers. No writing on slavery. When I told her about Caliban she tore out *The Tempest* from my collected Shakespeare. I wouldn't do it to my children, but it worked, I guess. (57)

Quite consequently, he majored in Biology and English, became a university teacher and teaches a course called the "Metaphysics of Cultural Genealogy." At the same time, he has turned to writing plays. Thus, Lawrence is a living example of the interrelation between science and literature.

Yet another story of survival is included with the account of FitzRoy's experiment with the Fuegian Jemmy Button, who is transported from South America to Britain, educated according to Western custom, and then transported back to

to the Darwinian struggle outside. But Wertenbaker ultimately suspends moral judgement as Ian, the champion of the theatre world, resorts to using unfair means to save the theatre production.

9. This intricate connection which is constructed between Darwin's theory and all kinds of present-day problems made the critic of the *Sunday Telegraph*, John Gross, complain that "you can put a Darwinian gloss on just about anything" (898). Yet it seems to be exactly the point of the play that Darwin's theory of evolution can be used as a metaphor for both present and dramatic concerns.

Patagonia. In his story, the fight for survival becomes connected with the “stresses of biculturalism, a condition which was to reach epidemic proportions in the late twentieth century” (32). Jemmy Button’s problem, biculturalism, is repeated in Millie’s and Lawrence’s life. Thus a number of links with postcolonialism are created and Darwin’s theory becomes a metaphor for present concerns.

From all this (and more, e.g. details like the Tamagotchi and its wish to survive, could be added), it becomes clear that *After Darwin* as a whole is a complex theatrical image which merges content and form. Scientific theory and its influence on the present, history and the process of history production, the costume drama of the play-within-the-play with the metadramatic rehearsal frame, the different plot lines – all these elements are connected and mirror each other.

The ambiguity of the play’s title is another instance of closely knit layers of meaning. Whereas the classical critical exercise of interpreting the title of a play sometimes appears futile or very strained, it here proves very fruitful. The importance of the title is underlined by the fact that Wertebaker also gives highly evocative titles to the individual scenes (see figure). The titles, both of the play and of the scenes are obviously more than simple labels for identification or summarising descriptions.

The word “Darwin” in the title of the play can be understood to refer to different matters:

- a) the historical person *Charles Darwin* (born 1809, died 1882, etc.).
- b) the books published by Darwin: *The Origin of Species*, but also the accounts of the voyage written by Darwin (and FitzRoy) and published in 1839.¹⁰
- c) the historical and scientific legend *Darwin*: “a simpleton who only accidentally stumbled on one of those theories that change the world” (Wertebaker 16), “a superstar of history, Mr Millennium man himself” (16).

10. The composition of these travelogues is at length discussed in the play in I.6. By contrasting FitzRoy’s approach (“Observe and note down. Observe again. Never trust memory” 15) with Darwin’s (“Such enthusiasm. So few facts.” 14), the difficulty of producing a truthful account of reality is touched. At the same time the image of Darwin as the natural scientist par excellence is toppled, and FitzRoy is introduced as the true scientist. With this scene Wertebaker draws attention to the fact that science is, despite its devotion to “exact methods,” subject to rhetorical and ideological substructures which determine the outcome of scientific research. It is interesting to note here, that especially Darwin’s writings have been subjected to scrutiny for their rhetorical (sub)structures and narrative qualities in recent years (cf. Buhlhof). A connection with Hayden White’s account of narrative and rhetoric patterns in the works of 19th century historians in *Metahistory* could obviously be drawn.

d) the scientific theory which is connected with the person Darwin, i.e. *Darwinism* (and, by implication, also connected theories such as Social Darwinism).

e) the play on Darwin which is rehearsed by the theatre group, which might well carry the title *Darwin* (or might at least be referred to as *The Darwin Play*).

In Wertenbaker's title all these readings coincide and the play displays their various connections as sometimes one, then another, and finally all these meanings are stressed. In the same way, the word "after" can be interpreted in several ways, which all highlight similar aspects of the play and add to the interrelatedness of the different meanings of "Darwin."

"After" is, at first glance and in its most common meaning, to be understood as "following Darwin in chronology" and thus describes the historical perspective on Darwin. Yet, "after" also includes an aspect of hierarchy in the sense of "following in place or order." As a whole, the play is "after Darwin" in the sense of being a (theatrical) image of the real events and thus secondary. Yet, "being after Darwin" also implicates the wish to find the real Darwin, to search for and reconstruct the historical person. This aspect is central to the play as a history play and there are numerous references to the "making of Darwin" as a construction of history. Tom states: "I'm in a muddle with this guy. He is like one of his fossils in the next scene: put the bits this way you get a giant snake, that way, a furry mammoth" (17). Millie and Ian are even more explicit on the fictionality of Darwin in the play (and about the power and importance of that fiction – again speaking in Darwinian metaphors of evolution):

Millie: Ian, you are creating him.

Ian: He is an historical character, I am finding him.

Millie: You say yourself he is unknown. He will evolve into what we make him here. (8)

Beyond the fixation on Darwin, the hierarchical meaning of "after Darwin" can also be understood as referring mainly to FitzRoy, who is, himself a scientist of considerable influence (e.g. on the system of weather forecasts), marginalised by history in comparison to Darwin: "FitzRoy has disappeared from history because he is on the side of the losers" (65). In the conflict between Darwin and FitzRoy, Darwin's theory is the winning paradigm (in the Kuhnian sense¹¹).

11. Thomas S. Kuhn made clear in his influential book *The Structure of Scientific Revolutions* (1962) how he saw the process of scientific progress. In his terminology a paradigm is a near dogmatic way of explaining the world which informs scientific work. Sometimes old paradigms (like the Ptolemaic view of the cosmos) fall into crisis, are challenged and finally replaced by a new paradigm (such as the Copernican world view). Yet, Kuhn insists that all paradigms are in essence limited and that no para-

Yet, FitzRoy the secondary scientist is to be reinstated into history by the play. Lawrence explains that he is more interested in FitzRoy than in Darwin: "Playwrights are the anatomists of the failed character" (33).

Another meaning of "after" is encapsulated in the sentence "You cannot be tragic after Darwin" (65). This describes the effect of Darwin on the present and stresses the fact that his theory has shaped a new understanding of the world which has its effect also on drama. In a different, more practical sense, the influence expressed in "after Darwin" can also be understood as "with the name of Darwin" or "in the manner of Darwin." Thus, Tom can be said to be "acting" (in both senses of the word) in the manner of Darwin – meaning the historical person, the historical image of this person, and the theory of the "survival of the fittest."

Combining the various meanings of "after" and "Darwin," the title encapsulates the central elements of the play (scientific theory, history, history play and metadrama) and shows how they connect in a complex web. *After Darwin* stresses the similarities between all these elements and shows how drama can become both a metaphor for and an exemplification of scientific theories. Vice versa, scientific theory is presented both as a metaphor for and as the origin of contemporary concerns. In this way, the gap between the "two cultures" is bridged by laying aside exclusive truth claims in favour of shared insight. A character in Shelagh Stephenson's *An Experiment With an Air Pump* puts this overriding concern of the new plays on science in a nutshell (again by resorting to a metaphor borrowed from science):

So we are not that much different after all. Art and science are part of the same thing. Like waves and particles. You need both to define the whole. (87-8)

This sort of sweeping generalisations on the grounds of the relativity of scientific truth claims have, naturally, met fierce opposition in the scientific world. Philosophers of science like Christopher Norris have not grown tired to oppose the Lyotardian claim that scientific theories are a rhetoric construction just like all other discourses and can therefore not claim any greater significance than other discourses. "Cultural relativist" (as Norris calls them)¹² attackers of scien-

digm can fully explain the world despite their claim to represent the world truthfully and despite their status as scientific dogma. A paradigm shift is thus not necessarily a step towards universal truth. Kuhn also pointed out that a history of science which simply concentrates on the breakthrough of winning paradigms and which represents the development of science as a direct road towards truth is highly distortive.

12. "The past few years have witnessed some heated debate about various forms of cultural-relativist (or social-constructivist) thinking that would appear to undermine all accepted standards of truth, objectivity and reputable method in the natural sciences" (Norris vii).

tific truth claims have constructed an argument that even within the sciences themselves an awareness of the relativity of truth has grown. It is not astonishing to see that exactly those areas which they (the cultural relativists in the wake of Lyotard) bring up as examples of eroding scientific positivism (Einstein's relativity, quantum mechanics, Heisenberg's uncertainty principle, chaos theory, fractals, and Kuhn's theory of scientific revolutions or paradigm shifts) feature strongly in recent plays on science¹³ because they naturally form the basis for a new connection between science and literature.¹⁴

A similar cross-connection between postmodern literature and contemporary science is the core point in the writings of N. Katherine Hayles, who connects chaos theory, deconstruction, and contemporary literature: "The parallels [between chaos theory and postmodern literature], then, are extensive – so extensive that the most likely is not a single site but the cultural matrix as a whole" (Hayles 1991: 11). Accordingly, the arguments of Hayles lead to the assumption that the changes in science toward relativity and chaos are not only connected to similar developments in literature but do actually stem from a shared "cultural matrix," which can be identified with the "postmodern condition" of Lyotard.¹⁵

In a similar way, the plays explicitly draw the connection between science and drama because it appears that the postmodern condition coincides with a crisis in scientific positivism.

[F]or Lyotard contemporary science – or his favoured branches of it, those concerned with 'undecidables, conflicts, [...] "fracta", catastro-

13. Heisenberg's uncertainty principle is at the centre of Frayn's *Copenhagen*, quantum mechanics also serve to explain the plot of Carville's *Observatory*, chaos theory and fractal geometry are main ingredients of Stoppard's *Arcadia*, the wave and particle paradox of light is the central metaphor of Stoppard's spy-thriller-play *Hapgood* etc.. Quite interestingly, *After Darwin*, *Observatory*, *Arcadia*, *An Experiment with an Air Pump* and *Observatory* juxtapose a present-day level of action with a historical level of action which is set at the turn between the 18th and 19th centuries or in the early 19th century. This period seems to form an effective contrast to the present situation which invites comparison between the optimism of positivist science and the scepticism identified with the turn toward relativity and chaos theory.

14. "[...] cultural and literary theorists [are] keen to view science ('postmodern' science) in the image of their own concerns. Hence the vague allusions to fashionable *topoi* – chaos theory, fractals, quantum non-locality, Heisenberg's uncertainty principle and so forth – often to be found in the writings of Lyotard and like-minded commentators" (Norris vii).

15. Not surprisingly Hayles establishes exactly the same connection between science and culture as Lyotard (see footnote 2). She notes that James Yorke has "put the emerging science of chaos on a par with evolution, relativity, and quantum mechanics in its impact on the culture" (Hayles 1991: 4).

phes, pragmatic paradoxes', etc. – may be seen as embarked upon the same kind of enterprise that is currently pursued by avant-garde figures in the literary, visual and musical arts. (Norris 103)

Even if this parallel is nothing but a coincidence, or even just a misinterpretation, it allows science to become a theatrical image, the content of new plays and an occasion to employ corresponding postmodern forms of theatrical presentation.

In *After Darwin*, both the life of Darwin and his scientific theory are connected by the play with the scepticism that appears to mark the turn of the millennium and with the situation of fierce struggle for existence the theatre group finds itself in. In a metaphorical sense of analogy, which doesn't build on logical connections of cause and effect but rather on illuminating similarity, drama and science (and history) reflect each other. This metaphorical use of science and history together with metahistorical, metadramatic, and metascientific self-reflexivity is supposed to reveal the complexity, interrelatedness, and relativity of the present situation.

It remains an open (and very general) question whether such a postmodern theatrical take on science is justified philosophically. I have no intention to venture further into the heated discussion that is waged in this field. Yet it is clear, that playwrights have used the door that has cracked open between the separated cultures of science and literature due to the writings of Lyotard, Kuhn, White, and others. *After Darwin* and all the other plays bridge the gap between science and literature and develop away from a confrontation of positivist and moralist truth claims. C. P. Snow postulated in 1959 that the "clashing point of two subjects, two disciplines, two cultures – of two galaxies, so far as that goes – ought to produce creative chances" (16). Whether literature got science wrong again is debatable but at least Snow's statement that "[i]t is bizarre how very little of twentieth-century science has been assimilated into twentieth-century art" (16) proves untrue for *After Darwin* and similar plays. In connecting the two cultures they make drama truly a "crucible of cultures."

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