Quantum Theatre

Quantum Theatre:
Science and Contemporary Performance

By

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PREFACE

This book began with a proposal to write about three things: theatre directing, feminism, and modern science. I had worked in the theatre before going to study for an undergraduate degree in physics, from which point I ended up studying both theatre and physics. These two halves of my degree were entirely separate, and initially I saw no connection between them. Towards the end of my course I began to notice similarities between the ways in which twentieth century science and twentieth century performance were discussed. At that point I was not aware of the growing body of academic work that addressed exactly these similarities and possible connections.

The funding which supported much of the work for this book was originally intended to support research into British women theatre directors. My original proposal was to investigate the ways in which twentieth century science could be used to write about the work of contemporary British women theatre directors, the initial idea being that quantum mechanics could provide a theoretical framework for writing about an *écriture feminine* for the stage. When conducting my research, I discovered that those women whose work I wanted to write about did not want to discuss their gender as a defining factor for their work. Whilst often prepared to discuss the social and cultural implications of making performance work, they did not feel that their work was characterised by gender. Consequently the feminist aspects of the book were diminished. Similarly I found that much of that performance work that interested me, and that appeared to offer something to develop the theory, was not produced by companies using a traditional director. Finally the decision was made to focus the scientific area on just quantum mechanics.

Although three of the original components of the research project have been altered or removed, the research still brings scientific theory to bear on performance practice shaped by women, and so still achieves much of what was originally intended, and in perhaps a more coherent manner.

CHAPTER ONE

INTRODUCTION

This book addresses a particular meeting of art and science: that of the theatre of end of the twentieth and start of the twenty-first century and the physics of quantum mechanics. Quantum mechanics is used to construct a rigorous framework for use as a tool for examining performance practice and the theatrical event, and live performance is used as a means of exploring the implications of quantum mechanics. This discussion operates on two levels, initially that of metaphor, and at times moving beyond metaphor to suggest a more intrinsic connection between quantum mechanics and performance. Consequently there will be two modes of proof required for these two very different types of claim, and the text will make clear which type of connection is being suggested. There is a significant and growing body of work that addresses the interaction between the arts and sciences. This includes academic writing in the humanities that tracks the correlation between developments in the sciences, such as chaos theory, relativity or quantum mechanics, and artistic work that can be seen to reflect or respond in some way to science.[1]

There is an historic link between the view of reality implied by science and the expectations of art. For Aristotle, as W.K. Guthrie argues in *The Greek Philosophers*, philosophy "was an attempt to explain the natural world", and this explanation came partly from the definition of natural objects as containing "within themselves a principle of motion and rest". [2] The dynamic view of nature developed through the concepts of *dynamis*

[1] See for example W. W. Demastes, *Theatre of Chaos* (Cambridge: Cambridge University Press, 1998), N. K. Hayles, *Chaos Bound* (Ithaca: Cornell University Press, 1990), J. Pitches, *Science and the Stanislavski Tradition of Acting* (London: Routledge, 2006), N. C. Schmitt, *Actors and onlookers* (Evanston, IL: Northwestern University Press, 1990), L. Shlain. *Art and Physics* (New York: Morrow, 1991), M. Vanden Heuvel *Performing Drama/Dramatizing Performance* (Michigan: University of Michigan Press, 1993).

[2] W.K. Gutherie *The Greek Philosophers* (London: Routledge, 1967), pp. 125, 132.

and *energeia* dominates Aristotle's system "and is of most use to its inventor in formulating theories in every branch of knowledge", including the *Poetics*.[3] As for Aristotle both tragedy and comedy are "in their general conception modes of imitation" where "the imitation is produced by rhythm, language or 'harmony,'" and "the objects of imitation are men in action", then it follows that tragedy and comedy should display that same motion.[4] Aristotle's view of nature has influenced what are seen as desirable qualities in the dramatic arts long after that view of nature had been superseded.

The second scientific development to have such a profound influence on theatre is the Newtonian physics formulated in the seventeenth century, which has provided the dominant ideological paradigm for naturalism, and many of the twentieth century responses to naturalism. Newton derived his physical laws from an examination of phenomena, declaring that "although the arguing from Experiments and Observations by Induction be no Demonstration of general Conclusions, yet it is the best way of arguing which the Nature of Things admits of".[5] Newton's method of analysis and synthesis had far reaching effect not only in the natural sciences but also in the realm of culture.

Naturalism and realism provide a mode of performance that is most appropriate for analysis within this Newtonian paradigm. Martin Esslin, contrasting the Theatre of the Absurd with the "good play" claims that the latter is defined by "a cleverly constructed story,…subtlety of characterisation and motivation,…[and] to hold a mirror up to nature"; if this is the case then the nature reflected is clearly of a well ordered, linear, continuous, Newtonian nature and the 'good play' lends itself to a particular type of analysis.[6] Much of the programme of theatre studies and performance studies in the second half of the twentieth century has been to find a paradigm to judge the new types of performance that had emerged and continued to emerge. Esslin himself describes the purpose of *The Theatre of the Absurd* as, to "clarify and define" the new standards by which the new performance can be judged. The new physics can provide a framework for these new standards, as classical science did for Naturalism.

The physics of the twentieth century is characterised by two great discoveries: relativity and quantum mechanics. Quantum mechanics, the science of the very small, is described by physicist J.C. Polkinghorne as

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[3] W.K. Gutherie *The Greek Philosophers*, pp. 184-5.
[4] Aristotle *Poetics* (London: Nick Hern Books, 1999), pp. 7,11.
[5] I. Newton, *Opticks* (New York: Dover, 1952), p404.
[6] M. Esslin *The Theatre of the Absurd* (London: Pelican, 1968), pp21-22.

"much the more revolutionary of the two."[7] Whilst relativity profoundly altered understanding of the nature of space, time and simultaneity, Einstein's work can also be seen as "the last great flowering of the classical tradition in physics."[8] Relativity maintained the determinism of classical physics, while quantum mechanics was instead a clear break with the past, and produced results so uncomfortable that the interpretations and philosophical implications remain under debate.

Quantum mechanics produced, in the words of Roland Omnes, "the assassination of classical physics".[9] The origins of quantum mechanics were experimental, in trying to find a solution to the black-body radiation problem, where to avoid the so-called 'ultraviolet catastrophe' of classical models predicting radiation of infinite power being emitted (which clearly wasn't the case), the assumption was made that energy was not continuous. From this initial solution to a relatively minor thermodynamic problem the "birth pangs of quantum theory" began, and Polkinghorne describes the characteristics of quantum mechanics "to replace the continuous by the discrete, the smoothly varying by the fitful", as description that could be applied just as well to the developments in twentieth century performance.[10]

Quantum mechanics has proved to be an extraordinarily successful set of theories, and has a huge range of practical applications in areas as diverse as lasers, superconductors, transistors, microchip processors, and is used in many branches of physics and chemistry. As Polkinghorne states, "concerning the successfulness of quantum theory there can be no dissent."[11] Quantum theory, since "it reached its fully articulated form" in the 1920s "has been used daily by an army of honest toilers with consistently reliable results."[12] Despite this success as an account of the small scale structure of the world, quantum mechanics has been the subject of ongoing debate regarding its interpretation and philosophical implications. Polkinghorne divides the problems of interpretation into two areas: "the nature of reality and the nature of measurement."[13] These unresolved issues provide part of the appeal of quantum mechanics as a paradigm for this type of interdisciplinary work.

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[7] J.C. Polkinhhorne *The Quantum World* (London: Penguin, 1984), p. ix.
[8] J.C. Polkinghorne *The Quantum World*, p. ix
[9] R. Omnes *Quantum Philosophy* (Princeton: Princeton University Press, 1999), p. 140.
[10] J.C. Polkinghorne *The Quantum World* (London, Penguin, 1984), p. 6.
[11] J.C. Polkinghorne *The Quantum World*, p. 1.
[12] J.C. Polkinghorne *The Quantum World*, p. 1.
[13] J.C. Polkinghorne *The Quantum World*, p. 1.

Quantum theory has consequently proved influential in areas outside its immediate frame of reference. Works such as Fritjof Capra's *The Tao of Physics* and Gary Zukav *The Dancing Wu Li Masters* both link quantum physics with eastern philosophy and religion. There are also numerous works of fiction, such as P.K. Dick's *The Man in the High Castle* and Benford's *Timescape* that make use quantum mechanics, especially the Many Worlds theory. The influences of new physics more broadly has been felt by a variety of artists, from Hugo Ball to Stanislaw Lem to performance group Desperate Optimists, with varying degrees of comprehension, accuracy and authenticity.

Theatre Practitioners

Quantum mechanics will be used in this book to develop an interdisciplinary approach to writing about the work of a number of British theatre practitioners. Some of these practitioners are directors in the sense that developed in the late 19th century, one who provides an overall interpretation and guides the 'making' of the performance. According to David Bradby and David Williams, in their book *Directors' Theatre*, the director "claims the authorial function even though he has not written the original play."[14] However the single authorial voice often ascribed to the twentieth century director is not necessarily appropriate for the analysis developed and many of the practitioners examined in this study work in very different ways. Some work in a more collaborative mode, perhaps writing, devising and performing with a director providing an outside critical eye, and the relationships and tensions between these different ways of working will be explored at various points through this book.

The practitioners studied in this book do not fit neatly into any one established category. All the key performances studied were performed in Britain in the period between 1999 and 2005. None of the practitioners studied have been the subject of extensive academic inquiry in the past, though some, such as Carran Waterfield and Charlotte Vincent, have been analysed to an extent. The work has been performed in a range of venues, from university to art theatre to regional repertory theatre, sometimes for short runs of two or three nights, sometimes for several weeks, sometimes for wide-ranging national and international tours. Other than temporal and spatial correspondence, the work under investigation shares other features in terms of rehearsal methodology or performance so that it appeared a priori suitable primary research material for the quantum mechanical

[14] D. Bradby and D. Williams, *Directors' Theatre* (London: MacMillan, 1988), p. 1.

theatre theorist. The theory used in this study was developed through a feedback loop of writing about performances that seemed to have 'something to do' with quantum mechanics, then analysing the results of that writing so to further develop the theory. This necessitated a somewhat responsive approach to field work, and some productions which perhaps fit less well into the quantum performance model have been included as examples of the boundary conditions of the model. Quantum mechanics is not presented as a totalizing methodology for the analysis of performance, and it is as important to understand the limits of the application this theory as it is to explore the benefits.

The hypothesis is that quantum mechanics can provide a valuable framework for the analysis of live performance, and this is tested through writing about a range of performance events. As the investigation of each case study began before the product was produced there was an inherent uncertainty in how successful each case study might be both artistically and in terms of developing the theory. The data gathering for the research required not only viewing of performance but also interviews, observation of rehearsals, and occasionally access to other documentation such as rehearsal recordings or diary material, meant that some interesting performance work was not included as part of the study if these other research methods were not possible. The practitioners here are generally practitioners interested in this particular method and interdisciplinary approach, and so to a certain extent were a self-selecting sample as well.

Although all of the practitioners studied are women, that is not the defining feature of their work, and it is not a defining feature of this book. Though there is some engagement with feminist theories, particularly with regards to the relationship between science and society, and in the construction of identity, the intention is not to write an explicitly feminist piece of work. Rather, these are all practitioners who have had little attention in academic writing and whose work is deserving of closer and more rigorous attention.

The key practitioners examined are Collette Murray, Carran Waterfield, Debbie Isitt, Josephine Le Grice and Charlotte Vincent. These practitioners represent a range of the performance work taking place in the UK between as the twentieth century moved into the twenty-first. Key influences and collaborators considered include the Dadaists, Enrique Pardo and Pan Theatre, Eugenio Barba and Odin Teatret, Gardzienice Theatre Association, Richard Talbot, and Mark Reaney. All of the practitioners worked with numerous other artists, including designers, actors, dancers, writers, musicians.

Quantum mechanics and Performance Studies

This book addresses a range of work that could be classified as theatre, dance, performance, or combinations of these terms. Text is used, to greater or lesser degrees, and many of the works examined have an interest in exploring the performers' bodies in space and the interaction with the environment. Much of the theory come from the discipline most commonly known as Performance Studies, and hence the umbrella term performance will be used inclusively, including not only performance work in the live art tradition but also more traditional theatre and dance work. As Barbara Kirshenblatt-Gimblett argues, "Performance Studies starts from the premise that its objects of study are not to be divided up and parcelled out…The prevailing division of the arts by medium is arbitrary", and so this book has not been constrained by those divisions.[15]

There are a number of surface similarities between modern physics and modern, or what is perhaps more commonly termed, post-modern performance. If, as will be argued, some form of naturalism represents the dominant theatrical mode of much of the twentieth century then Brecht offers one of the most consistent challenges to that dominance. Brecht famously contrasted the dramatic theatre with the epic theatre, and many of the shifts in accent he notes could be describing the move from classical physics to quantum mechanics and relativity, most clearly in the moves from growth to montage; from linear development to moving in curves; and from evolutionary determinism to jumps.[16]

If politically oriented Epic Theatre provided a challenge to bourgeois realism, then post-modernity has provided a challenge of a totally different kind. Many of the features ascribed to post-modernism are also shared by the quantum mechanical paradigm, but the distinctions are more significant than the superficial similarities. Ihab Hassan famously drew up the schematic differences between modernism and postmodernism in a set of binary pairs, some of which are repeated here:

modernism	postmodernism
form (conjunctive, closed)	antiform (disjunctuve, open)
purpose	play
design	chance
art object/finished work	process/performance/happening

[15] B. Kirshenblatt-Gimblett quoted in R. Schechner *Performance Studies* (London: Routledge, 2002), p. 3.
[16] B. Brecht 'The Modern Theatre is the Epic Theatre' in B. Brecht *On Theatre* (London: Methuen), p. 43.

root/depth	rhizome/surface
lisable (readerly)	scriptable (writerly)
origin/cause	difference-difference/trace
determinacy	indeterminancy[17]

Whilst those concepts contained in the postmodern category are certainly similar and sometimes identical to the ideas discussed in relation to the quantum mechanical paradigm, so are a number of those in the modernist category. These types of schemes are of course simplifications and, as David Harvey observes in *The Condition of Postmodernity*, there is a danger in depicting "complex relations as simple polarisations, when almost certainly the true state of sensibility, the real "structure of feeling" in both the modern and postmodern periods, lies in the manner in which these stylistic oppositions are synthesized."[18] Perhaps the quantum mechanical paradigm offers a method for negotiating not only between modernism and postmodernism, but also between the mental and the physical, and the individual and the collective.

David E.R. George identifies a number of features of quantum mechanics that address themselves to "all three of the forces which make up the theatre", a redefinition of the role of spectator; the indeterminacy and multiplicity of reality; and that these realities are created by their own inhabitants.[19] These are ideas that are explored in the field of Performance Studies, which often addresses ways of knowing, reporting and reproducing, suggesting a potential indeterminacy and multiplicity of reality.[20] Quantum mechanics can be found to have something to contribute to the discussion of all of these categories, sometimes challenging the dominant view in Performance Studies, sometimes in agreement.

There is a further form of interdisciplinarity at work here, shared with much of the work in Performance Studies. In addition to the use of scientific theories to develop a methodology for the analysis of rehearsal and performance practice, where appropriate work in anthropology, psychology, fine art and philosophy are also used. This interdisciplinarity is intended to be part of a broader programme that can best be described as be described as "against the Two Cultures". CP Snow's famous claim for

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[17] I. Hassan, *The Dismemberment of Orpheus: Towards a Post-Modern Literature* (Wisconsin: University of Wisconsin Press, 1982), pp. 123-4.
[18] D. Harvey *The Condition of Post-Modernity* (London: Blackwell, 1991), p 42.
[19] D. E.R. George, 'Quantum Theatre - Potential Theatre: A New Paradigm', *New Theatre Quarterly* 5.18 (May 1989), p. 174.
[20] D. Conquergood quoted in R. Schechner *Performance Studies* (London: Routledge, 2002), p. 19.

the divide and breakdown in communication between the arts and sciences can only be rebuked through actively attempting to engage with the full range of intellectual life.

Research Questions

This book attempts to address a number of research questions, some of which are specific to the particular practitioners and practice studied, some of which engage with the practice of Performance Studies, yet others have a broader relevance to the study of cultural events. The primary research question is if and how quantum mechanics can be used to develop an analytic framework or frameworks that can be used for the analysis of live performance? Attached to this are subsidiary questions: does quantum mechanics have particular inherent connections with contemporary performance? Are all performances equally suitable to this analysis, and if not then what features lend themselves to this approach? How does this particular linking of science and theatre fit into a historical framework of art-science interaction? What features of live performance does this particular analysis highlight?

Structural and thematic links

The first chapter places the work in an historical context, examining the link between science and culture more broadly, and theatre in particular. Comparison is made with Aristotle's view of science and theatre, and with nineteenth century Naturalism's use of Newtonian physics as a guide to developing theories and practices of literature and theatre. The principles of quantum mechanics are established in contrast to classical science, and a survey of work that links science and theatre is made.

Following this is a series of case studies exploring a range of performance work in conjunction with a range of theories developing out of quantum mechanics. The subsequent six chapters each focus on the work of one practitioner, though often discussing their work in relation to collaborators and other influences. For each case study three frames for analysis are used: that of quantum mechanics; that of another applicable performance theory; and the particular approach of each practitioner.

Drawing on the overlaps between the philosophical implications of quantum mechanics and Performance Studies this book focuses on three areas of enquiry: questions of identity; questions of observation; and the nature of play. Two case studies are developed using each of these

theoretical nuclei, though often in rather different ways. These areas provide starting points for addressing points of importance in performance studies as well as an opportunity to test the application of the provisional theory. Any progress does not happen in isolation and the work of a wide range of thinkers has been used where appropriate, although they might at times be taking contradictory positions. None of the positions taken are meant to be exclusive; indeed it is a necessity of the quantum mechanical scholar to attempt to hold contradictory opinions simultaneously.

Identity

Identity has been a significant term in cultural studies for certainly the last quarter of the twentieth century. In performance work questions of identity have typically been linked to performance dealing with biography and autobiography. With quantum mechanics identity becomes analysable only in terms of relationships and not in terms of constituent parts. As David Hodgson observes in *The Mind Matters*, each "person tends to see himself or herself as a single conscious subject or self, with identity and continuity over time" but quantum mechanics suggests that "there might be not just one centre of consciousness in human beings, but rather a collection of conscious subsystems more or less integrated into an overall system."[21] As Danah Zohar argues, the "most basic definition of the self at any given moment" is "the most highly integrated unity of all [the] many sub-unities."[22]

A variety of mechanisms are proposed for this quantum consciousness, most rigorously by Roger Penrose, in a series of three books, *The Emperor's New Mind*, *Shadows of the Mind* and *The Large, the Small and the Human Mind*. The mechanism suggested by Penrose is that microtubules within collections of neurons might sustain the large scale quantum coherence required for a quantum mechanical explanation of integrated consciousness. As Penrose argues, "any physical process responsible for consciousness would have to be something with an essentially global character."[23] This supposition is contested, and Penrose admits that what is required is "a radically new theory…as different from standard quantum mechanics as General Relativity is different from Newtonian gravity."[24]

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[21] D. Hodgson, *The Mind Matters* (Oxford: Oxford University Press, 1991), p. 403.
[22] D. Zohar, *The Quantum Self* (London: Bloomsbury, 1990), p. 96.
[23] R. Penrose *The Large, the Small and the Human Mind* (Cambridge: Cambridge University Press, 1997), p. 133.
[24] R.Penrose *The Large, the Small and the Human Mind*, p.137.

There are two implications of this quantum mechanical idea of identity for performance, of respectively local and far reaching significance. The first is that the idea of the divided self provides a metaphor for analysing the representation of identity shown in performance work such as *Looking for the Angel in Flight* and *Looking for the Tallyman*. This provides a more appropriate paradigm for discussing the fractured and contradictory identities presented not only in these productions, but in much contemporary performance. This gives an alternative to the earlier discussions of character which were significantly more teleological in nature. The second and more contentious implication of this work is the suggestion that if the underlying form of consciousness is quantum mechanical then this type of performance has the possibility of reflecting the real structure of consciousness.

Observation

Observation, or the problem of measurement, is one of the key unresolved issues in quantum mechanics, and the site of the fiercest debate. As Polkinghorne comments, "it is notorious that there is an inescapable random element in quantum mechanical measurement".[25] The difficulty comes not in the fact that the position or momentum of each identical electron could be different, but rather how the quantum mechanically uncertain electron interacts with the classical observer. For Polkinghorne this "discontinuity involved in the act of measurement is the one really novel feature which sets quantum mechanics apart from all the physics which preceded it."[26]

The problem of measurement, often along with the theory of general relativity, has often been used in other disciplines has been to make statements about the type of truth claims can be made. William Demastes, for example claims in *Theatre of Chaos* that "the epistemological and ontological frame verified by the new science [quantum mechanics] admits an overriding human subjectivity".[27] Jean-Francois Lyotard claims that quantum mechanics, as part of "parology", which includes chaos theory, Gödel's theorem and fractal geometry, can enable us to "wage a war on totality; let us be witnesses to the unrepresentable; let us activate the differences and save the honour of the name."[28] Evidently the case for

[25] J.C. Polkinghorne *The Quantum World*, p 3.
[26] J.C. Polkinghorne *The Quantum World*, p.4.
[27] W. W. Demastes *Theatre of Chaos*, p. 40.
[28] J. Lyotard *The Postmodern Condition* (Manchester: Manchester University Press, 1984), p. 82.

quantum mechanics as the end of reason has been overstated. The question that remains unanswered in quantum mechanics concern the precise method for the collapse of the wave function, not whether or not the wave function exists.

What this focus on questions of observation and measurement provides for performance studies is a closer focus on the ways in which the audience and performer interact. This will be explored through an analysis of productions of *Hundred and One Dalmatians* and *A Midsummer Night's Dream*. It provides a model and metaphor for discussing performance that enables discussion of the interaction between performer and spectator, rather than focusing on the effect of one on the other.

Play

Play is not a term usually associated with quantum mechanics, but this book argues that play provides an eloquent classification for a whole host of quantum mechanical features, from tunnelling to entanglement to the exclusion principle. Play is also a term with great currency in performance studies, one that is used, often in conjunction with ritual, with reference to performance that share features with the performances discussed here. Of all the analytic categories employed, play as defined here is the one category that could most profitably be applied to any of the performances discussed.

There are two versions of play discussed here, that exemplified by the work of Richard Schechner, and that of Hans-Georg Gadamer. The former will be used in the discussion of Millennophobia, and the later in an analysis of the work of Vincent Dance Theatre. Gadamer's view of plays, as an emergent transformative entity that is beyond the subjective experience of the players is linked with the quantum mechanical concept of complementarity, and a set of complementary relationships in performance are discussed. These include between the pre-text (or play text) and performance text; between the spectator and performer; and between the performer and the character or role.

Here again links can be clearly seen with George's links between theatre and quantum mechanics – the investigation of identity reveals a multiplicity in the supposedly singular objective, observation redefines the role of the spectator and play posits a reality that can, to an extent, be shaped by its inhabitants. The relationship of the theoretical material in the chapters sharing the same theme is that the second chapter often presents a development of the material in the first chapter, at times taking the

material in an entirely new direction. At such times this will be clearly indicated.

Scientific Discourse or Jargon?

Whether cultural or aesthetic arguments formulated using a scientific discourse are merely exercises in obfuscation, or actually add a new dimension to the area under discussion, is open to debate. As Richard Schechner points out, "movement across large disciplinary fields, which should help develop a mutually intelligible language, is one of the causes of jargon".[29] Here there is a double danger of developing jargon which originates in performance studies or that is imported from the sciences. Eugenio Barba discusses a further, related problem with respect to theatre anthropology.[30] The idea he raises is that as one advances into new territory, linguistic inventions are made (for example Freud's use of the term "Oedipus complex" or the use of "electric current" in electromagnetism) which develop into clear, recognised conventions, so that "personal languages become languages of work, and these in turn become common languages."[31] So far this seems in broad support of the appropriation of the terminology of other disciplines but Barba goes on to give a warning that is worth quoting at length:

> One must shun prefabricated definitions, the verbal networks which are only a parasitic imitation of the language of...sciences...The exact language of the sciences, when transposed in order to give the effect of concreteness or the appearance of seriousness to one's own arguments, becomes a screen which is even more opaque than lyrical suggestive or emotive images.[32]

This can particularly be the case when considering areas such as relativity or quantum mechanics, where phrases such as uncertainty principle or even relativity itself have meanings in everyday use that are quite distinct from the contextual technical definition in that field. Here the intention is that the concepts developed in the sciences will be interrogated, the results of those investigations will be used to construct a rigorous framework for the analysis of performance practice, rather than merely transposing unexamined terms.

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[29] R.Schechner, 'Problematizing jargon' *TDR*, 39.1 (1995), p. 8.
[30] E. Barba, *The Paper Canoe* (London: Routledge, 1995), p. 41.
[31] E. Barba, *The Paper Canoe*, p. 41.
[32] E. Barba, *The Paper Canoe*, p. 41.

Without doubt, however, the language used radically alters the discourse developed. D.W. Theobald, in his *An Introduction to the Philosophy of Science*, states that what "can be said to be real then, whether it is oranges, or α-particles, will depend on the language being used."[33] 'Real' is a term that will need clarification, but it is clear that what is considered significant, or as an element to be analysed, or even visible, in any investigation will depend on the language being used. One of the driving forces for this type of interdisciplinary work is that the development of a new language of analysis will enable previously hidden aspects of performance work or rehearsal practice to become visible, indeed come into existence, as a new language is developed to describe them.

Performance texts

When discussing the work of directors, or other theatre makers who do not leave a trace as permanent as a play-script, there is the inherent difficulty caused by the ephemeral nature of theatre, which is so often hailed as a defining feature. In 1969 Peter Brook was saying that theatrical performance was "for that moment in time, for that [audience] in that place - and it's gone...the only record is what they retained, which is how it should be in theatre."[34] It is easy to sympathise -- few directors would want their work 'judged' on the basis of a single static camera video-recording of a theatrical event, or a prompt book, or newspaper reviews. The dilemma remains, however, of what exactly should be analysed. One could assume that only personal attendance at a performance is satisfactory, but Marvin Carlson highlights a further complication:

> Even those fortunate enough to witness the original are unable to return to it to check the accuracy of their memory or to test subsequent hypotheses against it, and for others there remains only the thinner substance of an experience filtered through the selective consciousness and reportage of intermediaries.[35]

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[33] D.W. Theobald, *An Introduction to the Philosphy of Science* (London, Methuen, 1968), p. 133

[34] P. Brook quoted in A. Melzer ''Best Betrayal': the Documentation of Performance on Video and Film, Part 1,' *New Theatre Quarterly* 13.51(August 1997), p. 148.

[35] M. Carlson quoted in A. Melzer "'Best Betrayal': the Documentation of Performance", p.149.

This is one reason for the orientation towards the study of the text that historically dominated theatre studies; it can be deconstructed, reduced and atomised, and the sum of the signifiers can be noted and tallied. As Ian Watson observes, the reader of a literary text "can browse through the text, s/he can read it many times, ponder sections of it at his/her leisure, even put a copy of it under his/her pillow during the night too see if 'sleeping on it' will help reveal hidden truths."[36] Obviously this is not a viable option with a performance text or with rehearsals, the product and process of performance.

Watson goes on to attempt a semiotic analysis of one part of the performance event, the actor, and concludes that on a synesthetic level (that is, communication that defies signification, such as the 'feel' of a particular scene) there is little dependence on the 'actor's score'. By actor's score Watson is referring to the represented other, the mimetic, or certainly semiotic, area within which some part of the performance operates. He goes on to say that:

> If we are to understand how the performer is read, we have to consider components of the actor's performance such as: stage presence, the indirect interaction between actor and spectator, and the connection between the psycho-emotional experience of the actor and its impact on the spectator.[37]

One could add the relationship between the actor and director created or developed during the rehearsals to this list. While there is no doubting the value and interest of Watson's work, the problems that this type of approach will eventually run into are clear. The isolated performer is a small part of the performance event, and yet this one system alone appears almost beyond analysis. This is further compounded by the temporal influence of the signs under consideration, when and in what order events occur is obviously of crucial importance. With the inclusion of other performers, lighting, sound, the horizon of expectation brought by individual audience members, and, most significantly here, the varied and far reaching influence of the director, as well as the interrelated influence of all these factors, it becomes an impossible task.

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[36] I. Watson, ''Reading' the Actor: Performance, Presence, and the Synesthetic' *New Theatre Quarterly* 11.42 (May 1995), p.135.
[37] I. Watson, ''Reading' the Actor', p. 145.

Scientific approaches to analysis

What Watson is attempting, like a wide variety of other semiotic approaches to analysis, has its roots in linguistic theory, from the Prague Linguistic Circle in the nineteen thirties or Pavice, Kowzan and Ubersfeld in the seventies. Much of the work on the semiotics of performance can be shown to have a strong positivist slant, and implies that the semiotic facts can be determined impartially. Maria Shevtsova, in the third part of her *New Theatre Quarterly* series on the sociology of the theatre discusses a range of semiotic approaches and claims that "creators, makers, and interpreters of signs, segments, codes, etc., on or off stage, are made redundant so as to ensure that an absolutely objective 'analysis' takes place, semioticians thereby turning into the observers cherished by positivism."[38] Shevtsova's deliberately provocative statement is further qualified: semioticians have questioned the 'scientific' (read: positivist) aspirations of this type of study of the theatre, and the point is also made of the existence of a strange suspicion of empirical evidence generally found in semiotic theories, despite the influence of the 'hard' sciences. As Shetsova says, "What else can a methodology that actually pays so little attention to theatre practice be[?]"[39] The construction of the model being seemingly of more importance than the accuracy with which it models.

Shetsova discusses a variety of semiotic styles, but the important issue is that these approaches are then shown to have preordained mechanisms and properties, resulting in a "deterministic and even mechanistic notion of culture".[40] There is little distinction between the cultural and the conventional, and in some ways they can be seen to create each other. Shetsova suggests that in attempting to construct a new methodological approach for the analysis, the result is merely a more complex closed system.

Many advocates of 'post-structural' semiotics would refute these claims that the semiotic systems used for/under analysis are so strongly reductive. Aston and Savona, in *Theatre as Sign-System*, make a strong case for the claim that their project in that book has moved on from a reductive structuralist position, through an awareness of the decoding process actively carried out by theatre audiences.[41] However the point

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[38] M. Shevtsova, 'The Sociology of the Theatre, Part Three: Performance' *New Theatre Quarterly* 5.19 (August 1989), p. 287.
[39] M. Shevtsova, "The Sociology of the Theatre", p. 287.
[40] M. Shevtsova, "The Sociology of the Theatre", p. 288.
[41] E. Aston and G. Savona, *Theatre as Sign-System* (London: Routledge, 1991), pp. 15-16.

remains that the decoding of the performance text can only occur according to the codes contained within it, in a series of self-reflexive mechanisms, so the closed system remains.

The problem with this reductive (classical scientific) approach is that it constructs its models on the basis that the physical can be represented in theory by an elemental aggregation of simple properties, each of which can be assigned a unique small region in space-time. That is, that events occur in a clearly defined way in a specified place at a specified time (space and time being have since turned out to be more intimately related than Newton could ever have envisaged). That the world could behave otherwise seems extremely counterintuitive. This local-reductionist account is equally applicable to Ian Watson as it is to Isaac Newton, and yet has been shown by modern science to be severely flawed. If quantum mechanics results in a profound process of reconceptualisation within classical science, can it have a similar effect within the humanities, and, more specifically, within the analysis of theatre and performance?

Quantum mechanical analysis of performance

In quantum mechanics there is the idea of wave functions, which are the only real descriptions of systems, collapsing into narrow, fixed particle states under observation; and that there are often numerous possible states that can be taken, and the outcome is chosen in a non-deterministic manner. One can perhaps think of the pre-text in similar terms to the initial wave function, well defined but with numerous possibilities of interpretation, one (or many?) of which is (are) realised in the act of performance. In the case where no pre-text exists then whatever framework for shaping the performance, whether this performance is a Happening, or devised theatre, or physical theatre, provides the initial wave function. Obviously there are a number of factors which also shape this function, such as the performers, the audience and the space in which both of those interact.

The difficulty in this analogy is with where the ‘collapse’ takes place and whose observation is the dominant one? The process of rehearsal can be seen as, amongst other things, the process of legitimation as discussed by Julian Hilton.[42] What is meant by legitimation can be applied equally to a specific theatrical model or in a much wider context. It is the “process whereby a given society makes decisions about itself”, which means that if a decision seems successfully to solve a given problem, with awareness of

[42] J. Hilton, *New Directions in Theatre* (London: MacMillian, 1993), p. 10.

all the given current variables, then it is legitimated. Rehearsal is this exact process; provisional decisions are taken, experimented with and then either rejected, or modified and retested, or accepted in a more permanent way, and performance can be seen to behave in the same manner. It could be argued that this process of legitimation in theatre is the one in which the crucial act of observation takes place. If this is indeed the case then it seems to raise interesting questions about the relationship of performance to rehearsal, and, once again, process and product. This perhaps indicates the role of the director, to provide these provisional observations, which raises question about self-direction, and the observation of the self as other.

Natalie Crohn Schmitt perhaps gives an indication of the different nature of performance as opposed to rehearsal, linking scientific notions of relativity, where "the idea that there is a single true account of any event is challenged" and the importance of "the recognition that the audience in theatre consists of multiple observers, not a unified mass".[43] She seems to suggest that it is the multiple readings of a theatrical event that is crucial to the theatrical nature, the audience is what makes theatre gain some reality. This idea supports and is supported by other areas of theatrical study, which suggest that the communal nature of theatre is of vital importance.

If the performance is taken as the area when the quantum nature of theatre is fully displayed, then there are different ways in which the multitude of states can be realised. Are the different aspects realised on different nights, and therefore repeat viewing will give multilayered interpretation of a performance text, or is it that "each of us is capable of multiple (and contradictory) perceptions at one time" so the conglomerate audience draws many possible readings out of a single production, all of which contribute to the whole but are capable of standing alone.[44] It seems most likely that, appropriately enough, these are all constituent parts of the truth. Schmitt points out that audiences are omniattentive, and so perhaps an omniattentive critical theory is needed. In theatre then the autonomous critic becomes more of an anomaly and analysis of art and representations themselves must include an awareness of the active nature of analysis. Schmitt remarks that we "cannot analyse theatre without self-consciously examining the means by which we do so" and so an understanding of the historical link between science and theatre is essential for this.[45]

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[43] N. C. Schmitt, 'Theorizing About Performance: Why Now?' *New Theatre Quarterly* 6.23 (1990), p. 231-234.
[44] N. C. Schmitt, "Theorizing About Performance", p. 233.
[45] N. C.Schmitt, "Theorizing About Performance", p. 233.

CHAPTER TWO

THEATRE AND SCIENCE

Science and theatre potentially occupy a number of similar intellectual domains, and often work in one field is reflected, albeit in a distorted way, in the other. This discussion is developed with reference in particular to Aristotelian poetics and to the Naturalistic theatre of the late nineteenth century. Quantum mechanics is the pivotal scientific paradigm shift in the twentieth century, and the broader philosophical implications of this shift are examined in this book. The repercussions are particularly significant in the move from classical science, where the objects of inquiry generally can be examined by ordinary sense perception and remain unchanged by that examination, to quantum mechanical systems that can only be described in terms of statistical behaviour, and where the very act of observing the system can cause changes to it. Twentieth century theatre has also often been considered in broadly scientific terms, such as Brecht's 'theatre for the scientific age' or Grotowski's 'theatre laboratory'.[1]

The new science offers, at first glance, an appealing ideological position for the theatre theorist, with its talk of relativity and uncertainty, and investigation of identity and perception. Theatre offers a particular appeal to the interdisciplinary science-art theorist, as it is concerned with so many of the same issues as twentieth century science, such as the significance of attempts to gain an understanding of the act of observation. This dialogue between science and art can be used as a critical tool for examining specific rehearsal processes and performance events. Through an examination of the historical interplay between science and art it can not only be seen that science can be used productively in the analysis of art, but that many of the underpinning assumptions of existing methodologies are themselves drawn from other scientific paradigms.

One must acknowledge that interdisciplinarity is not a modern phenomenon, but rather a re-acceptance of a previously axial idea. Indeed,

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[1] B. Brecht, 'A Short Organum for the Theatre' in B. Brecht (1994) *On Theatre* (London: Methuen) and J. Grotowski (1975) *Towards a Poor Theatre* (London: Methuen).

as Raymond Williams observes, science and art were used "often interchangeably, to describe a particular body of knowledge or skill."[2] Williams goes on to argue that as "the simplifications of the conventional divisions, and especially those between science and art and objective and subjective become more evident" it is necessary to acknowledge the limitations of both "complementary" positions taken by science and art.[3]

Aristotle, Art and Science

The conjunction between cultural and scientific endeavour can be traced back directly to the influence of Aristotle's thought on the production and analysis of theatre. That theatre has remained influenced by Aristotle's thinking seems clear, to the extent that, as Natalie Crohn Schmitt observes "audiences, wholly innocent of theoretical consciousness, continue to demonstrate Aristotelian expectations."[4]

As Jonathan Barnes argues in 'Life and Works' in the *Cambridge Companion to Aristotle*, "Aristotle holds a position of unparalleled importance in the history of philosophy"[5]. Aristotle undoubtedly influenced his contemporary world, and through the *Poetics* shaped later thought and practice concerning tragedy, and performance more generally. According to Kenneth McLeish:

> Although *Poetics* is one of Aristotle's minor works, its fame and influence in later centuries far exceed this position. Both in ancient Rome … and in the Renaissance and beyond, it was treated as a seminal text of aesthetic and dramatic criticism, and Aristotle's observations, mistaken views of them or reactions to those views influenced the discussion and practice of 'serious' Western drama for over two millennia.[6]

Aristotle's work has historically been placed into an Aristotelian system, and Barnes claims that traditionally, most scholars "would have unhesitatingly affirmed that [Aristotle's] thought formed a unified whole."[7] Contemporary thought would now claim another, more dynamic

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[2] R. Williams, *Keywords* (Glasgow: Fontana, 1976), p. 232.
[3] R. Williams, *Keywords*, p 235.
[4] N. C. Schmitt, *Actors and onlookers* (Evanston, IL: Northwestern University Press, 1990), p. 2.
[5] J. Barnes, 'Introduction' in J. Barnes (Ed) *Cambridge Companion to Aristotle* (Cambridge: Cambridge University Press, 1995), p. xv.
[6] K. McLeish, *Aristotle* (London: Phoenix, 1998), p. 8.
[7] J. Barnes, 'Life and Work' in J. Barnes (Ed) *Cambridge Companion to Aristotle*, p. 22.