Repositioning the Role of the Lighting Artist in Live Theatre Performance

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Abstract

The role of the theatre lighting designer has traditionally been conceptualised using a model of 'designer' as someone who makes a prior imaginary act *before* the moment of performance, which is subsequently realised in performance through an essentially procedural, non-creative, process. In the present thesis I propose a partial reinvention of theatre lighting as a professional arts practice, emphasising the live operation or 'performance' of lighting, rather than its design prior to the performance event, and conflating the existing roles of the lighting *designer* and the lighting *operator* into what I term the *lighting artist*.

To make this shift, I establish a series of strategic interventions into the conventional practice of theatre lighting: to rehearse the lighting in the rehearsal room, starting from a randomised lighting palette; to defer certain design decisions until the moment of performance; to position the lighting artist in the performance space to establish certain kinds of relationship between lighting artist, stage activity, and spectators; and to design a lighting control interface conceptually structured in terms of affects and temporal dynamics, and that provides a playable, expressive instrument.

I test and evaluate these interventions through a custom lighting control interface, and through a devised theatre performance. I argue that the shift that I have made can bring about: closer working relationships between lighting artist, other personnel, and the performance event itself; an enhanced potential for lighting as an element of performance, particularly regarding the timing of lighting changes and the mutual responsiveness of lighting and other performance elements; a heightened sensitivity of the audience to the role of lighting in the performance, and to their own role in the theatre encounter. I argue that, whilst some aspects of what I propose have been done previously, my strategic, systematic shift of the role and process of the lighting artist away from that of the 'designer' and towards that of the 'performer', together with its description and evaluation in scholarly terms, is an original contribution to the field, with implications of urgent importance to performance scholarship and practice.

Acknowledgements

DEDICATION

To Fred – an engineer with the heart of an artist

I want first of all to thank Professors Susan Melrose and Gary Hall, without whose supervision this project would simply not have happened. Such academic rigour as may be found in this thesis is largely due to Susan's refusal to let me get away with things, while her unerring sense of when to intervene, and how, and when *not* to, has taught me much not only as a researcher but also as a tutor. Gary's pragmatism has meant that the project has been completed within my own lifetime, while they have both at different times kicked my thinking into new and not always comfortable directions, saving me from the hubris of believing that I knew what I was doing.

I must also thank all of the students and staff of Rose Bruford College who contributed to the making of the *Passages* project, and whose generosity in just accepting the research imperatives of the project and absorbing them into their own work and study made the project not only possible but an undiluted pleasure. Special thanks are due to Rachel Nicholson, both for her practical assistance during the development and testing of the Theolux console, and for her insightful questions and comments throughout. It's your turn next, Rachel.

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Finally, and most importantly, I want to thank my parents, Bill and Gisela, my wife Hilary and my son Theo, who have been supportive in every way possible, and who have shown the patience and forbearance of saints over the years this thesis has taken. I'll be down from the study in just a couple more minutes, I promise.

Contents

My thesis is mixed-mode, comprising two practical elements and the present written element. The two practical elements, the 'Theolux' lighting control interface and the Passages *live theatre performance, together with their evaluations, comprise Part III of the thesis, and are documented in the digital appendices on the two DVDs. Please note that while documentation and descriptions of the two practical elements are provided here for convenient reference, it is the practical elements themselves, as artefacts, that are submitted for examination.*

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Introduction

In this research investigation and thesis I propose a partial reinvention of theatre lighting as a professional arts practice, emphasising the live operation or 'performance' of lighting, rather than its design prior to the performance event, and conflating the existing roles of the lighting *designer* and the lighting *operator* into what I term the *lighting artist*. I go on to test the proposal through two practice-research elements – a custom lighting control and lighting for a performance – both created at Rose Bruford College, London, following the principles I develop and evaluate in this written element of the project. As I proceed to demonstrate, my research is of urgent importance not only those interested in theatre lighting specifically but also to performance scholarship and practice much more widely. To outline the context, motivation and scope of my project I want to begin with two observations – the first regarding the role and practices of the professional theatre lighting designer, and the second regarding changing ideas of what theatre can be and how it might be made.

As available literature and mainstream theatre practices have demonstrated, the role of the lighting designer has been established in British professional theatre practice for some fifty years, and – despite rapidly changing lighting *technologies* – has settled into a comparatively stable pattern of artistic and other responsibilities, working relationships with production personnel, methods, protocols, and contractual arrangements. For the great majority of professional theatre performances to be seen in Britain on any given evening, the lighting will have been designed by a lighting designer who has worked in conjunction with the other members of the 'creative team' (that might include: director, set-, costume-, sound- and video-designers, musical director or conductor, choreographer) to create a lighting scheme for the production. This scheme will have been realised by a team of personnel responsible for its technical and logistical aspects, together with its operation during the performance. With one exception I draw attention to below, this organisational distribution of roles and responsibilities was established at the time the distinct specialism of 'lighting designer' emerged in the nineteen-fifties and nineteen-sixties, and has not fundamentally changed since.

However, wider theatre-making practices at the start of the second decade of the twenty-first century, while still largely rooted in twentieth century traditions, have begun to change in certain respects that are relevant here. New conceptions of what theatre might be, notably but not only what Hans-Thies Lehmann has theorised as 'post-dramatic theatre' (2006), fuelled in part by the

growing use of digital media and the advent of artistic and technical specialists to design and manage these 'new' materials, have begun to change the processes by which (some) theatre is made. Designers of all kinds are increasingly to be found in the rehearsal room, contributing directly rather than merely observing the work of the director with the actors in order to subserviently respond to it, as I would argue has often been the case in traditional models of production. In their examination of what they call 'contemporary theatre', Jen Harvie and Andy Lavender – referring to the work of companies such as Complicite, The Builders Association, Forced Entertainment and Robert Lepage's Ex Machina – observe that 'this theatre pays consistent attention to fixing meaning or leaving it open; in other words, to authorship, its democratic dispersal and autocratic control' (Harvey 2010, 13). This concern with authorship and control is reflected in

> a shift in the nature of relationships between participants, though neither director nor author is "dead". Rather, our productions suggest that the nature of the creative transaction has evolved. We observe working processes that entail multiple inputs on a more level basis, usually with a director as facilitator – so creation is distributed, "evenly hovering". (14)

It is notable, however, that across Harvie and Lavender's survey of the rehearsal processes of eleven companies lighting rarely figures in their analysis, and – as far as I can establish from their and other accounts and my own experience – is far less well established as a part of rehearsal practices than sound and video, or even set and costume. While the work of the companies and practitioners Harvie and Lavender examine might not be regarded as 'mainstream', in the sense that commercial theatre and the majority of the work of the major subsidised theatre companies could be so described, neither are they entirely 'experimental' or 'avant garde', since in many cases they perform in large theatres on an international touring circuit to a well-established audience, as well as collaborating with mainstream companies (Robert Lepage, Simon McBurney/Complicite with the National Theatre, London, for example).

It is in relation to these two observations, regarding changing ways of theatre-making being developed by some practitioners, and the lack of a commensurate shift in lighting practices specifically, that I propose, as a professional practitioner-researcher with significant experience in the field of lighting design and pedagogy, to locate the present intervention. I want to return here to the exception I identified above to the essentially unchanging definition and distribution of responsibilities amongst various lighting personnel. The exception is the emergence over the last couple of decades of the role of the lighting *programmer*, as distinct from that of the lighting *operator*. The traditional lighting operator's role is, at least on the surface, an essentially

procedural one of following instructions initially from the lighting designer (during lighting, technical and dress rehearsals) and then from the stage manager cuing the performance.[1] The newer role of the lighting programmer has emerged in response to the widespread adoption of automated lighting. The far greater complexity of operation of automated lights has placed new demands on both lighting operator and designer, and as a result the working relationship between them has, in some cases, shifted, with the operator (now re-titled as 'programmer') having some creative responsibility for the implementation of the lighting designer's scheme. Whereas with the operator, the lighting designer typically gives detailed instructions in a precise technical language ('channel 26 and 54 at 60%; record as cue 4 in 5 seconds'), with the programmer the instructions may be more open to creative interpretation ('let's see a sharp breakup gobo from stage right' – leaving the specifics of which lights, which gobo, and what intensities to the judgement of the programmer). The programmer will use both a technical and an artistic expertise to decide on exactly how to realise the designer's request.[2] Nevertheless, this shift in roles applies only during production rehearsals – during the performance lighting is controlled by an operator who works procedurally to follow instructions, and who at that point has no *creative* involvement in the lighting or the wider performance. This approach has not changed since the advent of the almost fully automated lighting replay systems of the nineteen-seventies, and has been almost entirely unaffected by the newer role of the lighting programmer.

It is precisely this matter of *creative responsibility* that is central to my project: how, when, and by whom are artistic choices in relation to the lighting for a theatre performance made? Motivated by my observation that theatre-making practices are in some respects and in some quarters shifting, bringing some of the physical materials of performance – especially sound and video – into the rehearsal room together with their associated creative specialists, I propose, test and evaluate a partial reinvention of theatre lighting as a professional arts practice. This reinvention places a particular emphasis on the live operation or 'performance' of lighting rather than its design prior to performance, both during the performance event itself and as a part of the development and rehearsal leading to performance. To mark this shift of emphasis, I adopt the term *lighting artist* to refer to a role that does not currently exist within mainstream British theatre practice – a role that is a conflation of the present lighting designer, with creative responsibility for the lighting scheme, and the lighting operator, with responsibility for the realisation of that scheme during the performance event itself.[3]

Adopting the new title of *lighting artist* is a conscious attempt to mark a departure from historically determined current mainstream practice, and to create a role that is, in its capacity to

operate as a performative element within theatre-making, closer in certain respects to that of the performer than to those of the designer and the technical operator. This shift is aligned to the kinds of changes in theatre-making practices identified by Harvie and Lavender, in which a theatre art-work is made from the materials 'in the [rehearsal] room' (243), rather than through a series of design and rehearsal processes in which the material elements of the performance are only brought together in the final stages of production. My project, then, establishes and tests through practice a theoretical, technical and processual basis for introducing light as a 'material' into the rehearsal room, with the aim of reforming the established model of lighting design so as to be a better fit with certain current and emerging theatre-making practices.

Project Scope

I want at this point to make some remarks about the scope of my project and the extent to which it is original. As I have identified above, the kinds of creative practices that I am proposing have existed in some form in various 'experimental' or 'avant-garde' theatre forms, and it could be argued (following Harvie and Lavender) that these different ways of working are becoming more commonplace and influential. However, such practices have not – as far as I have been able to establish – been investigated with the overt, consistent and theorised focus on the role of the lighting artist that I present here. That is, I start with lighting, as a lighting practitioner and theorist (rather than coming from a directorial perspective, for example), and work within the scholarly framework of a doctoral research project, and that motivates my approach and defines the scope of the investigation. Also, the aim of my project is to investigate a method to reform mainstream lighting practices, and in that sense is overtly knowledge-political since I am seeking to shift the status and role of the lighting artist within theatre-making practices – a move towards Harvie and Lavender's description of 'creation … distributed, "evenly hovering"'. (To be clear – I am not seeking to promote the lighting artist *above* other contributors to the creative process, but to even out what I would argue are inequalities between contributors in much current practice.)

I would also note here that my project sets out to reposition the role of the theatre lighting artist, but I have not set out to map fully the consequences of the shift I am attempting for other production personnel such as actors, directors, and so on, beyond the stated aim above of democratising the creative process; nor have I done more than begin to establish the aesthetic potentials that may arise out of the proposed changes. Given the extent of the conceptual 'ground work' and practice-based investigation required for an initial test of my proposal, a full evaluation of its possible consequences and the opportunities that might arise is beyond the scope of a

doctoral thesis, although I do draw some preliminary conclusions and suggest some lines of potential future enquiry at various points in Part III and in my Conclusion.

Thesis Summary

The thesis is presented in three parts, and comprises both written and practical elements. Part I examines the available literature and describes and justifies my methodology. I argue that there is no single body of material or single established discourse – either professional or scholarly – that can act as the discursive platform for the present project. I go on to identify three overlapping and interlinked stages of research: an *archaeology* of historical and current professional lighting practice; a process of discursive *invention* that adopts the heuristic methods of Gregory Ulmer and Brian Massumi and develops a series of *strategic interventions* into the conventional processes and practices of the lighting practitioner; the practice-research that tests, extends and evaluates the efficacy (in terms of my project's aims) of the strategic interventions. Each of these stages has its own methodological approach, but I argue that my overall methodology sits within the complex and multivalent field of qualitative research (Denzin and Lincoln, 2005).

Part II establishes five strategic interventions aimed at giving the theatre lighting artist a role that is more directly involved in the creative immediacy of the moment of performance, conflating the existing professional roles of the lighting designer and the lighting operator into that of the *lighting artist*. This strategy, which we might see as one in which the role of the lighting artist is modelled on creative decision-makers including performers such as actors and musicians, in turn makes possible the deferral of certain artistic decisions until the moment of performance. I argue that the idea of lighting artist as performer has a precedent in the thinking and practice of Frederick Bentham, who made a similar proposal in the nineteen-thirties through his innovative lighting control system the Light Console, and whose work has inspired and to some extent structured the present research. I outline the historical origins of the present professional roles of lighting operator and lighting designer, I argue for a conceptual model of the lighting design as dynamic and unfolding, and I propose a strategic method to engage the *accidental* in the creative process. I proceed to examine some of the historical, technological and cultural factors that determine the relationship between lighting professionals and the performance space. I consider how changing the spatial relationships between the lighting artist, the audience and the stage might promote the lighting artist as performer and establish a 'circuit of energy' linking audience, actors and lighting artist. I look briefly at some of the ways that lighting professionals have of creating conceptual models so as to codify, order and so manipulate the light on stage, and I go on to

consider the relationship between technologies and conceptual models, and how a redesigned control interface might promote such a model that better suits the purposes of my project. I consider how a control interface might be designed to capture an expressive physicality of the operator and transmit that expression to an audience through the light on stage.

Part I and Part II together form the discursive platform, and establish the strategic interventions that underpin the practice research elements of Part III. In Part III I take up these strategic interventions and test, further develop and reflect on them through the two practical elements, drawing on my experience – including my embodied, tacit knowledge – as a professional lighting practitioner. The first practical element is a custom-built lighting control system, which implements an innovative (for theatre lighting) data model so as to emphasise the dynamic control of light over time rather than the synoptic control of light in space (Figure 1).

Figure 1: The 'Theolux' console

My data model replaces the conventional 'state/cue' model of static, synoptic lighting pictures and fades that dissolve from one to the next with a 'thread/impulse' model in which 'threads' represent lighting elements (combinations of colour, direction and intensity) that have specific aesthetic or dramatic value and which exist for the duration of the performance. These threads are balanced against each other by modulating their intensity on the impulse of the lighting artist, responding to action elsewhere in the performance or to a sensed need to prompt a response amongst the audience and/or the performers. Such impulses are not completely spontaneous, but are the result

of a rehearsal process that has set – more or less tightly – the overall parameters for the lighting impulses in much the same way that it sets the parameters for an actor's impulses. The control system is also innovative in allowing the lighting artist a choice of physical interfaces, such as levers of different sizes and physical qualities, a percussive pad, foot pedals and piano-style keys, that offer a range of expressive potentials.

The second practical element of my thesis is a performance, making use of the lighting control system and implementing the other strategic interventions established in Part II. The performance is a devised work entitled *Passages*, with myself as lighting artist (Figure 2). I was present throughout the rehearsal period, operating the custom lighting control in the rehearsal room (which was also the performance space). The spatial relationships between audience, stage and lighting artist-operator were configured so as to promote a 'circuit of energy' linking these three elements in performance, with particular attention being paid to the sightlines from each element to the other two. The performance 'script' or 'score' for the lighting artist was arrived at through close collaboration between the professional lighting artist, the actors (training at Rose Bruford College), the professional director, and other members of the production team, from the very start of the project, throughout the rehearsal period, and into performance.

Figure 2: The *Passages* performance

In the written element of Part III, I reflect on and evaluate the outcomes of the practice research, drawing on my own journals, video of rehearsals and performances, post-performance discussions, feedback from a variety of observers, and a debrief with the production team who created *Passages* with me. I conclude with an overall summary and evaluation of the outcomes of my research.

* * *

Readers not familiar with the practice research elements may want to review the documentation in the appendices briefly before proceeding to chapter I.1, and then examine the documentation more fully between reading Parts II and III. The 'Open Me' document on DVD disk 1 gives guidance as to the key documents and where to start.

Notes

[1] I have elsewhere argued that the skilled operator's role is far more complex than its procedural surface might suggest, at least during the rehearsal phase. However, for my purposes here it is the function of the role in performance that is relevant (Hunt and Melrose 2005).

[2] The shift from operator to programmer in the terms that I have described it is not universal: in US practice, designers tend still to be giving specific technical commands even when using automated lighting and working with someone titled 'programmer', and in the UK many theatre shows still use few or no automated lights and so maintain the traditional practices of the 'operator'.

[3] The role of the lighting programmer, as I describe it above, is not relevant to my proposal since – at least as it is generally constructed – it is not involved in the performance, only the preparation for performance.

Part I

I.1 **Literature and Methodology:** The discursive absence of the lighting designer as artist, and a method of invention

In this first chapter, I set out the basis for my project, identifying the literature and discourses that form the platform for my research, and explaining my methodological approach. In order to undertake the reform of certain aspects of lighting practice that I propose, I need to give an account of relevant aspects of the practices that dominate the contemporary lighting scene, and their historical origins. No unified account, I proceed to argue, has been made available in published theatre discourses, and on this basis, I need to patch it together from a number of sources. I should make it clear from the outset that I am attempting here to construct a professional reality discursively, in a professional context of practices that are to a significant extent tacit, embodied or oral, and so difficult to access, as well as tending to lack reflexivity and be poorly contextualised. This is not to say such discourses are without value or sophistication in *professional* terms; instead I am arguing that they do not yet meet my present needs as a foundation for a doctoral thesis.

Scholarly accounts have also, I argue, failed to develop a discourse of lighting design as a professional practice, albeit for different reasons. The academy when examining theatre performance has tended to construct its object of study in such a way that it is largely blind to the professional practices of – amongst other practitioners – the lighting designer. Rather, 'theatre', in academic terms, has been placed in a series of frameworks derived from or inspired by philosophical, social and cultural-theoretical approaches and positions. These have provided a rich diversity of ways to 'read' theatre performance, and have provoked innovative creative practice within or in conjunction with the academy. However, those studying theatre within the academy have often been blind to the specifics of professional theatre practice, and have seldom addressed in any detail the creative, technical and organisational aspects of theatre practitioners other than performers, directors and writers (to whom, in scholarly discourses, is ascribed almost all creative responsibility). The specifics of lighting design as a professional practice has remained almost entirely unexamined.

Given this absence of a ready-made discursive platform, an alternative strategy must be found. This strategy must enable the partial reinvention of the role of the lighting artist, and so be heuristic, not only hermeneutic, bringing theories and concepts from outside the discipline of performance to bear on the specifics of lighting as a professional practice – a strategy of *invention*. Furthermore, as a practitioner-researcher, currently working within the theatre and theatre pedagogical professions, I bring a quite specific set of competences, assumptions and expectations, and judgements of taste and value to the present project. The methods I employ in this research project are made available by and influenced by my professional identity, which I argue is bound up with my first-person identity as a practising artist. Invention is therefore central to my project both in terms of the creativity of lighting as part of an arts practice (that it, it is a theme of my research) *and* as a means of making a strategic shift in that practice (invention as part of my research methodology). In research-strategic terms, this double focus on invention is challenging: the efficacy of this project depends upon my ability to provide a coherent, mixed-mode account of a complex field of practice that combines the creative with a research-methodological enquiry that is transferable in wider research-specific terms.

It is these arguments, regarding the absence in the professional literature of a reflexive and self-critical discourse of lighting design practice, the absence of lighting practice in scholarly accounts of theatre practice, and the methodology I have in consequence adopted for the present thesis, that I develop in this chapter.

The Discourses and Literature of Lighting Practice

I want to begin with a consideration of the body of extant professional lighting literature, to see what characterises it. It is small (perhaps little more than a hundred books published over the last fifty years, together with a handful of journals). The books are almost all written by practising lighting professionals (although they are often also lighting educators) and usually take the form of 'how-to' manuals, describing the processes and techniques of lighting design, in conventional situations and contexts. Published texts – for example, Pilbrow (1979 and 1997), Reid (2001) and Moran (2007) – are primarily aimed at students and early-career professionals, and offer little to established professional lighting designers other than an affirmation of their existing practice. They traditionally attempt to cover all aspects of lighting for theatre and related live performance

forms such as opera and dance, including aesthetics, design rationale, technology and process. They are by definition conservative of established 'best practice'. Case studies, drawing on the author's experience, are an important mode, firmly grounding the other parts of the book in practice, while 'theory', as in 'theoretical writing', is reduced to historical context: Adolphe Appia and Edward Gordon Craig are cited not only as early visionaries of what we now call lighting design, but as the most (or only) significant theorists of the subject – locating the very notion of the 'lighting theoretical' in the early twentieth century. Their ideas are only cursorily discussed, and often without placing them in their historic and conceptual contexts. More recently, books have been published that focus on particular aspects of lighting design (for example, Staines 2000, Offord 2002, Morgan 2005); however, these works have barely extended the range of the body of literature, and have only marginally extended its depth.

Journals concerned with lighting design tend to fall into two categories: members' journals of professional organisations, and commercial publications supported by advertising revenue.[1] These journals (in general better described as 'magazines' because of their inclusion of very short texts, professional information, and advertising) focus on the 'current affairs' of lighting: their content is principally news, articles about particular productions, technologies or practitioners, and other matters of 'professional life' such as fees and contracts. While occasional 'think-pieces' appear that set out to challenge orthodox thinking or provide alternative perspectives on professional practices, these are too sporadic to develop into a critical discourse; neither members' journals nor commercial trade magazines are comparable with academic, refereed journals.[2]

This professional literature only rarely addresses directly existential or philosophical questions, such as, 'what is it to be a lighting designer?' or 'what is lighting design good for, what is its ideological dimension?' For example, Richard Palmer's *The Lighting Art* (1994) presents a taxonomy of the creative aspects of lighting design, including a detailed list of theatrical styles together with an explanation of what might characterise appropriate lighting choices in their constitution. While 'postmodernism' is given as a theatrical style, any engagement with how postmodern thought – that of Baudrillard, Jameson, Lyotard, Virilio and others – might effect understanding of the nature of theatre and lighting's role within it is refused, signalling that the approach is largely mechanical as well as lacking in critical reflexivity.[3] Ric Knowles summarises the position:

> the most a lighting designer can contribute … are illumination, atmospherics, decoration, underscoring or perhaps special effects. And most texts used in the teaching of design in the English-speaking theatre reflect, reinforce or even celebrate this situation. They tend to naturalize particular procedures as the taken-

> for-granted "way things are," rather than framing them as culturally determined and determinate, the products of specific historical, political and economic conditions that function to shape, frame and contain the designers' work (Knowles 2001)

An implicit assumption remains: the role of lighting in theatre performance seems to be understood to be determined by forces external to the lighting design profession. That is, lighting should only follow where changes to wider theatre practices lead, and should operate only in terms of the values implicit in the latter. For these reasons, the professional literature of lighting design does not represent a reflexive, critical discourse that can in itself form the platform for my project. However, what the literature does offer is both a record of the historical development of theatre lighting practices and material through which to analyse the forces within the theatre production economy that shape lighting practices. I perform such analyses on material from this literature at various points throughout my written thesis, using methods I describe below.

Having examined the professional literature, I want to shift attention now to the place of lighting design within the discourses of the academy. Through a series of examples, I demonstrate a certain 'blindness' to the specifics of lighting practices, and indeed a degree of blindness to the role of light itself, in the scholarly discourses of theatre. My first example is from the themed edition of *Performance Research* entitled 'A Lexicon', which consists of a series of words presented in alphabetical order with accompanying texts of varying length and in a variety of registers (Allsopp 2006, 81).

> **LIGHT** Whoever is in charge of the light is an important guy. It is in the same realm as **sound** and **silence**.

The entry for Light I have selected (reproduced above in its entirety) is revealing, I would argue, of the place of light and lighting within scholarly discourse. In the entry, light and its importance are acknowledged, and yet the writer has almost nothing to say about it – this entry is amongst the shortest in the Lexicon (some are several hundred words) and nearly half of it consists of cross-references that contribute to the commentary on light, but only by association. The entry admits there is someone 'in charge' of the light, and while this person is described as 'important', the demotic language and tone ('guy' rather than, say, 'person') undermine any sense of professional status. Furthermore, the use of the word 'guy' points to the cultural stereotyping of lighting as an essentially 'technical' activity undertaken by men. Theatre and performance scholarship has often focused on the gender-political in other aspects of the discipline, drawing on the wider debates and theories of gender studies, but the use of the term 'guy' here suggests a blindness or an

indifference on the part of the author to such discourses in the specific context of performance lighting as a practice.

My purpose here is not to mount an attack on one particular writer – who might argue that brevity is wit or that the link of light with sound and silence is 'philosophical' – and one very brief text, but rather to begin to point out that while *light* as a material used in the making of a theatre performance is acknowledged and even (occasionally) analysed as a subcategory of directorial choice, *lighting* as the set of professional arts practices that centre on the use of light in performance (including the associated activities, apparatuses and personnel) has been effaced in scholarly discourses. There are however scholarly accounts of other professional theatre-making practices such as directing that interconnect with the practice of lighting design. My second example is one such account: *On Directing*, edited by Gabriella Giannachi and Mary Luckhurst, aims to offer an account of the diversity of directing practice in the UK through interviews with leading directors.

What I want to point to in this example is the way in which Giannachi and Luckhurst appear – through the way that they have conducted the interviews – to align themselves unconsciously with a set of assumptions about the role of the director and other practitioners, rather than revealing or challenging these assumptions. While some quite open questions recur in many of the interviews, such as 'What is your principal medium?' and 'What are your thoughts on audience?', the question of working relationships is usually framed specifically in terms of performers (for example 'How do you work in the rehearsal room?' and 'Could you talk more about the theatre language you develop among the actors?') without equivalent questions being raised regarding other working relationships. Even when opportunities arise in the course of the interviews to pursue the question of the relationship with and the contribution of designers, these are not followed up. For example, Katie Mitchell responds to the question 'What are the guiding principles of your directing practice?' with:

> I always work collaboratively with a team of people including a set designer, a lighting designer, a sound designer, a musical director and a movement director … I believe collaboration to be at the heart of my work both outside and inside the rehearsal room. The working environment has to be egalitarian: everybody has to have equal input into the work. In the end it is very difficult to define who is doing what: who is directing, who is leading the movement, who is leading the music – there is a lot of cross-over. This is the key principle of my practice. (in Giannachi 1999, 96-7)

Despite that fact that Mitchell claims 'egalitarian' collaboration to be 'the key principle of [her] practice' and specifically refers to set, lighting and sound designers, musical and movement

directors, the following question is: 'How do you work with the actors?' On this evidence, it would seem the interviewer is unwilling or unable (perhaps through a lack of the specific knowledge required) to enquire into practices of designers and others, even when offered the direct opportunity to do so. I would argue that Giannachi and Luckhurst are unable to bring to bear the kind of critical analysis of the specific question of the role of the lighting designer in a way that could provide in part a basis for the present project. One might go so far as to conclude that they are unaware of both its importance and its widespread erasure.

My final example is a rather different kind of scholarly writing in the field of performance – different in both form and approach. In his book *Multi-Media: Video – Installation – Performance*, Nick Kaye's announced concern is 'with practices defined in movements between video, installation and performance', and he draws on the work of a variety of artists and companies working in that range of fields (Kaye 2007, 10). Kaye's commentary and analysis is interspersed with images and other documentary evidence from the artists' work, as well as written reflections and commentaries by the artists. I have selected Kaye's study for consideration here because its subject matter is artistic works that for the most part do not communicate, at least primarily, through a written text (taking 'text' in the narrow sense of words-to-be-spoken by a performer), yet *performance* is a central idea in Kaye's approach. Kaye is also interested in the role of technologies in performance, and these two concerns – visual and technological – suggest that *Multi-Media* might begin to offer the kind of discourse I am seeking.

Kaye's analysis is to a large extent focused on drawing parallels between the diverse range of works under consideration, and these parallels are for the most part conceptual in nature. Kaye uses the works, together with the writings of philosophers such Jacques Derrida and theoreticians such as Philip Auslander, to illustrate and develop his ideas on matters that include: liveness, mediation and transmission; presence, place and separation; time and tense. Kaye's arguments move away from the specifics of individual works and towards generalised accounts, identifying joining themes that link works that otherwise have little in common in terms of form (video, live performance, installation), date of creation (from the nineteen-sixties until recent years), or apparent subject matter (in the sense of any persons, locations, events, or themes that may be presented). Kaye's concern appears to be for a theoretical and conceptual reading of the works leading to a synoptic and totalising perspective that prioritises the *meaning* a work may have for a spectator over the *feeling* that it may engender. Furthermore, it is specifically the self-reflexive meaning of the work that Kaye wants to address – how the work *performs* itself as a constituent node in a network of conceptually-connected arts practices which collectively add up to a body of

theory. In this inversion, the theory does not 'explain' or help the spectator to interrogate the work, but rather the work illustrates (and in a sense comes to *constitute*) the theory.

Kaye presents the visual-affective dimension of the works he is analysing in a very limited way. Photographs are limited in number and reproduction quality, so it is difficult to get more than a superficial sense of the visual aesthetics of the works. While Kaye makes use of artists' commentaries and reflections in the book, and indeed makes them quite prominent, questions about creative process, particularly the contingent and often fraught circumstances of production, are given scant attention. In this sense Kaye's perspective is that of a detatched spectator, not the arts professional, and one might surmise that works are included on the basis of their ability to excite his expert spectatorial engagement, which – as Melrose has pointed out (2002, 2003, 2005a, 2005b) – remains 'theoretical' in a quite specific sense. In summary, because Kaye's agenda is to generate generalised accounts and concepts, because he is unable or unwilling to address the visual-affective, and because he adopts a spectatorial rather than practitioner perspective, Kaye does not, I argue, offer a discursive model suitable to the present enquiry.

The examples I have chosen begin to point, I would argue, to the reasons for the gap between the discourses of the academy and the kinds of professional practices my project seeks to take as a starting point for reform. Scholarly accounts of professional practice tend to adopt wholesale and with little interrogation the kinds of systematic privileging that structures the professional as well as the 'academic' theatre economy, so that otherwise interested and well-disposed academics tend to attribute 'signature' or 'ownership' to directors, writers and performers, but rarely to designers or other collaborators (exemplified by Giannachi and Luckhurst's account). Also, the academy tends to construct its object of study along lines of academic study, spectator perspectives and performance context – as I have observed elsewhere (Hunt and Melrose 2005, 74) – rather than along the lines of the professional roles and practices that are so influential in structuring the professional theatre economy (to which, after all, theatre scholars may have no particular access).

The academy has, in recent years, adopted practice as a mode of both teaching and research so that scholars now increasingly engage directly with the practices of theatre-making, and a new breed of practitioner-teacher-researchers has appeared within universities. However, while the working practices of performers, writers and directors (as well as more loosely-defined roles such as 'performance artist') have come under greater scrutiny and have been incorporated into the academy's object of study, this has not been the case with other roles (such as designers, technicians, managers), including the role of the lighting designer that is of specific interest here.

On the basis of the above I would argue that the scholarly discourses of theatre practice are unable to provide a suitable discursive platform for the present project.[4]

A methodology for a practice-research intervention

At this point, having reviewed the professional and scholarly literature that might be seen as the 'conventional' basis for research into an aspect of theatre practice and found it inadequate for the present purposes, I want to set out my methodology.

My project proposes a reinvention of certain aspects of theatre lighting practice, conflating the roles of the lighting designer and the lighting operator to create the *lighting artist*, and shifting her/his creative process to be 'more like' that of the performer. My initial premise is that such a shift will lead to enhanced and extended creative possibilities for the contribution of light to the overall performance, and the potential for the lighting artist to take on a fuller, less curtailed role in the collaborative process of performance-making than is often the case in conventional theatre practice.[5] How then to approach an investigation and testing of the premise, and on what basis should choices of method be made, within the framework of a doctoral thesis? My research process comprises three stages, which while broadly sequential overlap and interoperate: first, a critical analysis of relevant aspects of the historical development of theatre lighting practices in order to reveal the values, structures and forces at work; second, a process of (re)invention, drawing on a diverse range of sources to promote and guide different ways of thinking lighting practices, and leading to a series of strategic interventions into conventional practice; third, testing, developing and evaluating the interventions through practice. I want now to describe the methodology of these three stages in more detail.

I have argued above that there is a lack of an overt reflexive discourse of theatre lighting practice. There is however, a reasonably substantial body of material that constitutes a primary archive of the history of that practice, mainly in the form of contemporaneous professional publications such as magazines and manufacturers' literature (most notably *Tabs*, published by Strand Electric, *Focus*, published by the Association of Lighting Designers, and *Sightline*, published by the Association of British Theatre Technicians), together with 'how to' text books generally published by lighting professionals and based largely on their practical experience (such as Bentham 1950 and 1968, Palmer 1994, Pilbrow 1979 and 1997, Reid 2001, Schiller 2004, Staines 2000). There are also several autobiographies written by key individuals that record and, to some extent, reflect on the development of the lighting profession and its practices (Bentham 1992, Northen 1997, Reid 2003 and 2005). To examine current practices, I also draw on my own

experience – a matter I return to below – and the accounts given by lighting designers I have interviewed (Constable and Fisher). I use this material to examine aspects of the history, practices, economies and formations of power and knowledge of theatre lighting – what in Foucauldian terms, as Shapiro points out, we might call an *archaeology* (Shapiro 2003, 9-10). My methodology here, then, is one that is familiar from critical theory, and aligned with the hermeneutic approach of 'traditional' Drama/Theatre/Performance Studies.

However, in order to achieve the partial *reinvention* of theatre lighting practice my project proposes, I need to adopt discursive strategies that are primarily heuristic rather than hermeneutic. Gregory Ulmer provides an extensive theorisation of what he terms 'a logic of invention', in which the hermeneutic epistemology in which theories are valuable in proportion to their explanatory scope is replaced by one that emphasises a power of *invention* (Ulmer 1994). Here, a theory borrowed from another disciplinary field can be used to provoke creative thinking without the theory having to be adopted completely or validated in the new disciplinary domain, since 'success' is defined not in terms of explanation or proof but in terms of creative efficacy, and intuition and acts of judgement replace explanation.[6]

Brian Massumi offers his own account and examples of similar discursive strategies that are aimed at invention rather than analysis in his book *Parables for the Virtual* (2002). For Massumi the techniques of examining examples in close detail and borrowing concepts from other disciplinary fields are vital to his inventive strategy, and have again been influential in developing my own methodology. In Massumi's heuristic method it is the confrontation between concepts and examples, and concepts from different disciplinary fields and conceptual systems and networks, that is generative, since the confrontation is a violent one, not merely an application of a concept to particular material:

> The important thing, once again, is that these found concepts not simply be applied. This can be done by extracting them from their usual connections to other concepts in their home system and confronting them with the example or a detail from it. The activity of the example will transmit to the concept, more or less violently. The concept will start to deviate under the force. Let it. Then reconnect it to other concepts, drawn from other systems, until a whole new system of connection starts to form. (Massumi 2002, 18-19)

It is the new 'system[s] of connection' generated by this method that I want to make use of in order to rethink the role of the theatre lighting artist: a confrontation between concepts from diverse disciplinary fields and the specifics of professional lighting practice brings about new ways of connecting the concepts, new ways of thinking the role of the lighting artist (and so new ways of doing that role). Furthermore, and essential to my project's strategy, following both

Ulmer's and Massumi's logic, the heuristic discourse that I want to use to develop the strategic interventions that shape the practice-research stage does not need to aim for a comprehensive theory of theatre lighting as an arts practice, but only to provide the springboard to launch and energise the partial reinvention of that practice I am attempting.[7]

While I draw on a diverse range of texts in Part II as I establish the strategic interventions that guide the practical investigation of Part III, there are some key texts that I want to identify here that I have used to generate a 'new system of connection' as part of a logic of invention. In her article 'Objectual Practice' (2002) Karin Knorr Cetina examines and theorises what she calls 'knowledge objects' or 'epistemic objects' created by research scientists. These objects are typically experimental apparatuses of various kinds, and Knorr Cetina seeks an understanding of these that sees them not as static or simple physical objects but as dynamic, mutating, with many instantiations from initial ideas and plans through to physically realised forms that are nevertheless incomplete and continuously revised. I select Knorr Cetina's work because her stated intention to rethink the practices of scientists strongly parallels my own need within my project to rethink the creative process of lighting designers, and particularly to rethink the lighting design as a dynamic and mutating knowledge object rather than something static and inert. I adopt Deleuze's phenomenological account of the creative practices of the painter Francis Bacon (*A Logic of Sensation*, 2005) for its consideration of the role of the accidental, and how an artist can both make use of but also control random factors. Deleuze's approach focuses on the creation of sensation and affect, rather than meaning, in an artistic work, which resonates with my premise in this project that light's potential contribution to the performance is not fully realised in current mainstream practice. Phenomenology also informs my approach to the embodied lighting artist, as I draw on Sita Popat and Scott Palmer's research (2008) that is in some ways similar to my own and itself informed by Paul Crowther's Merleau-Ponty-derived model of how we experience artworks (1993). I also make use of Brian Massumi's categorisation of the exteroceptive, the proprioceptive and the interoceptive aspects of bodily experience (2002), and Robert E. Innis's concept of the exosomatic organ (1984, cited in Jay 1993). Wertheim's *A Field Guide to Hyperbolic Space* (2006) and DeLanda's *Intensive Science and Virtual Philosophy* (2002) both provide mathematical ideas that – taken as metaphors – shape the development of a revised conceptual model for the structuring and control of light during performance that moves away from the conventional one of static, synoptic lighting states and transitional cross-fades.

I have chosen these texts primarily for their potential, following Massumi's strategy, to generate new ways of thinking about the subject at hand by extracting concepts from their original

system and applying them to detailed examples in the new context. Thus I have taken concepts of science practices, fine arts practices and mathematics and confronted them with the specifics of theatre lighting practices, both those described in historical and current accounts (in Part II), and those of my practical investigation (in Part III). I have deliberately chosen not to make extensive use of accounts or theories of closely related creative practices (such as those of other theatre designers, directors or performers) since this would undermine the strategy of confrontation between *different* fields and disciplines, and risk simply modelling the new role of lighting artist that I want to establish on an existing role in theatre-making practice.

The third stage of my research process (noting again that the three stages to a significant extent overlap and interact) comprises the two practical elements – the custom-built lighting control system, and the performance project. Both these elements were designed to test and extend the strategic interventions I establish in Part II, and their development processes are documented in the appendices (A0 and B0), while I analyse the research outcomes in Part III. At this point, I want to make some remarks about some of the choices I made regarding these practice-research elements, and some of the practical constraints that shaped them, as well as why practice-research was the most appropriate method for certain aspects of my project.

My practice research is not simply a matter of testing or verifying the proposals of my strategic interventions. Rather, if research is concerned with 'knowledge', 'understanding' and 'insights', then practice research offers, I would argue, different 'ways of knowing' compared with research that is undertaken primarily through reading/writing/thinking.[8] To use an example from my research as part of the present project: to *experience* the relationship between the mechanical quality of a lever and the affective quality of light fading is not only to confirm something that has been *thought*, it is to understand it in an qualitatively different way. This different way of and order of knowing applies not only to research outcomes at the end of the practice process, but also during these processes, and so feeds back (an ongoing feedback loop) into the research practices themselves. To extend my example, if the mechanical quality of the lever offers a new insight into the affective quality of a light fade, then the reverse can also be the case, proposing an altered design of lever. These sorts of changes are ongoing and likely to affect all aspects of the work.

Practice research also has its own pragmatics: equipment fails, activities take longer than planned, resources are not what are needed, intended outcomes are replaced by unintended ones. These pragmatic considerations act (to adopt the terms I introduce in chapter II.1) *diagrammatically*, providing frameworks in which terms the accidental is seeded, offering new possibilities while closing off others. The research project unfolds, explodes and mutates, not

wholly under the researcher's control – critical insights arise, some sought and some not. The shift from analysis to invention I describe above is vital again here. The question 'what if?' is in my experience a guiding, speculative question for practitioners in the creative arts and is also a guiding question for the practice researcher. While the research project may have an overall direction that is determined (in my case by the strategic interventions), deciding what to do next at the local level is more a matter of – in Massumi's terms – operative reason than instrumental reason: 'a process of trial and error, with occasional shots in the dark, guided in every case by a pragmatic sense of the situation's *responsivity* (as opposed to its manipulability)' (Massumi 2002, 112). In this sense there is, perhaps, little difference between the professional practitioner and the practice researcher. While their intended outcomes may differ, their ways of thinking/doing/seeing have, I would argue, much in common. The difference between them, though, is critical, for it is a matter of *discursive practices*, and what these engage with and/or regulate: research through practice makes possible a combination of the kinds of knowing that can only be achieved with a direct, lived engagement with the practices being investigated, together with the reflexivity and self-awareness of scholarly discourse. In terms of my project, I would argue, my enquiry can only proceed from the strategic interventions of Part II through practice research.

I want to turn now to some of the specific choices and constraints that shaped the practice-research elements. The principal limitations on the design of the custom lighting control and the extent to which it could meet the needs of my research project were my own technical skills and knowledge, and the available resources, including budget. However, while there were some technical choices determined by the availability of and/or my ability to work with a particular technology, I was broadly able to realise most of my design intentions within the available skills and resources. (Nevertheless, some of the pragmatic choices made shaped the research outcomes – a matter I return to in Part III). Methodologically, the conceptual basis for the control system's design arose both from the processes of invention using texts by DeLanda and Wertheim (applied using Ulmer and Massumi's methods) and – crucially – from my own experience as a lighting operator using a variety of control systems in a variety of professional contexts. Here, an embodied and tacit set of knowledges regarding the intricate and sensitive relationships between the technologies of the lighting control system, the physicality of the control interface and of the lighting operator her/himself, and the creation of lighting effect and affect was vital to the design, development and use of the lighting control system as an element of the research.

The position with the performance project is more complex. My argument throughout the written part of the thesis takes as its starting point UK 'mainstream' theatre and lighting practices,

but the practical performance research was undertaken in the context of a devised work in a small-scale studio environment in an academic context working with a professional director but student actors and students and academic staff filling technical and organisational roles – hardly a 'mainstream' production environment. To some extent this choice was pragmatic, driven by the availability of a performance space, equipment and personnel within a very limited budget. Methodologically, however, I was also aware of the importance of working with people who would be receptive to the project as a *research* enterprise as well as a performance-making one. Before starting the performance project, my view was that the greatest difficulty in implementing my strategic interventions would be found where they impinged on the working practices of others. Trying to test my proposals for the reinvented role of the lighting artist for the first time in a mainstream professional context would have run the risk of the project failing (in the sense of not producing useful research outcomes) because of resistance or a lack of commitment to the project *as research* on the part of other personnel. Working with academics and students, together with a professional director with research experience, helped ensure the project's personnel understood and supported its research as well as its artistic imperatives. Furthermore, in my view it was important that I could retain a large degree of control of the project as a vehicle for research, which would have been far more difficult in an environment with 'external' artistic, commercial and other imperatives shaping the project and the work of its personnel.

However, the choice to use a devising process is another matter – arguably I could have selected an extant play text as the basis for the project. One of my concerns in planning the performance project was to ensure that the artistic processes and aims allowed scope for the research process to function. Given that my project is not an investigation of *improvisational* lighting, the performance 'text' needed to be fixed at the macro scale, while allowing for small, local variations of timing or expression from performance to performance – the expressivity that in my conception the lighting artist brings to the performance. My concern is with the subtleties of expression that can take place as audience, performers and light interact and respond to each other: a focus in the moment of performance not on 'what happens' (which has been pre-agreed) but on 'how it happens'. While this need for a broadly stable performance text would have been satisfied by using an extant dramatic text, one of my strategic interventions is to place the lighting artist in the rehearsal room so that s/he can play a full role in the development of the performance throughout that process, so I wanted to ensure that there was no possibility of a dramatic text 'short-circuiting' the creative process by effectively making decisions about the role of light in the performance that might have narrowed the research potential of the project. Adopting a devising

process was also in alignment with the kinds of practices I identify in the Introduction, under Harvie and Lavender's term 'contemporary theatre', that have in part motivated the present project. Practice-research of the kind that I have undertaken is often time- and resource-intensive, and so there may be limited opportunities to repeat the research under different conditions to extend or broaden it. Pragmatically I have had to make choices based on a need to be reasonably confident that I could achieve the main research outcomes – testing the strategic interventions – and so I have deliberately created a relatively controlled environment (a matter I return to in Part III). Moving those strategic interventions into a more typical 'professional' environment is a matter for future research, beyond the scope of the present project, with its sense of 'laboratory' rather than 'field' research.

Having outlined some of the key methodological decisions for each of the three main stages of my research, I want to proceed to place the research in a wider methodological context. My reference to 'laboratory' above, and an overall research process that might be described as 'formulate a hypothesis and test it under (relatively) controlled conditions' begin to suggest a science-like positivist or post-positivist research paradigm. However, for a number of reasons I would argue that this is not the case: my research makes extensive use of subjective accounts (from published and primary sources) without any overarching mechanism for cross-corroboration; I rely to a significant extent on my own experience (suggesting in part a kind of auto-ethnography); I make no use of statistical or quantitative analysis; I make no use of 'controls' or other benchmarks. Instead, my methodology has many of the characteristics that Denzin and Lincoln identify with qualitative research:

> Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them. (2005, 3)

Denzin and Lincoln go on to note that 'of course, all settings are natural – that is, places where everyday experiences take place. Qualitative researchers study people doing things together in the places where these things are done. There is no field site or natural place where one goes to do this kind of work. The site is constituted through the researcher's interpretive practices.' Thus while my practice-research was in one sense located in a 'laboratory' in that it was a project whose sole purpose was research, the participants including myself were having 'everyday experiences' as

performance-makers as well as researchers. While caution is needed in applying any conclusions to what might happen in other contexts (such as a 'professional' rather than 'research' context), such caution is required for any research in any context, since the 'site is constituted through the researcher's interpretive practices'.

Denzin and Lincoln go on to identify some other characteristics of qualitative research that are also helpful in locating the research methodology I have adopted. Qualitative research, they argue, tends to comprise a *bricolage* of materials and methods:

> [t]he qualitative researcher as *bricoleur* … deploy[s] whatever strategies, methods, and empirical materials are at hand. If the researcher needs to invent, or piece together, new tools or techniques, he or she will do so. Choices regarding which interpretive practices to employ are not necessarily made in advance [but depend on] what is available in the context, and what the researcher can do in that setting. (2005, 4)

And,

> Qualitative researchers use semiotics, narrative, content, discourse, archival and phonemic analysis – even statistics, tables, graphs, and numbers. They also draw on and utilize the approaches, methods, and techniques of ethnomethodology, phenomenology, hermeneutics, feminism, rhizomatics, deconstructionism, ethnography, interviewing, psychoanalysis, cultural studies, survey research, and participant observation, among others. (2005, 7)

According to Denzin and Lincoln, no one method or practice can be privileged over another, since they all can provide important insights. Susan Kozel, approaching the subject more specifically from a performance research perspective, underlines the value of a hybrid approach:

> Writing from lived experience often amounts to writing without a clear methodological mandate, or demands the courage to assert that the methods are fluid and subjective. Paradigms are scraped together (defiantly, guilefully, playfully, intuitively) from philosophy, literature, the social sciences, physics. This bricolage or hybridization is done in part to find a voice in the academy, but more important, to help the writer herself understand what it is that she is experiencing and to communicate these experiences. (Kozel 2008, 9 cited in Kershaw and Nicholson 2011, 227)

In terms of my own methods, I have selected these on a pragmatic basis for their potential to achieve my research objectives and to make use of the available materials and resources at the 'site' of my research (accommodating the absence of a readymade scholarly discourse of lighting practice I identify above, and making best use of myself as practice-researcher who as a lighting practitioner is an object of research as we as a subjective researcher). On this basis, I would describe my research methodology as located within qualitative research practices (while noting the complexity and variation within this single descriptor) but that (after Denzin and Lincoln) I am

not operating within one single research paradigm. In terms of the three stages of research I identify above, the first stage of *archaeology* emphasises the methods of hermeneutics and deconstruction, the second stage of *invention* uses a method and sources drawn from the intersection of philosophy and cultural studies (Deleuze, Massumi, Ulmer), and the third stage of *practice-research* together with its evaluation (which we might see as a kind of ethnography and in part auto-ethnography) uses methods of experiment, participant observation, interview and survey.

I have of course made further choices regarding the articulation and presentation of the research in the context of a doctoral thesis. The first two stages are presented in a relatively conventional written form, although I would note that the material in Part II especially is not merely an account of research undertaken but is also an artefact left behind by the research process. That is, the act of writing is itself generative, part of the process of invention, and does not take place entirely (or even largely) 'after the fact'. The versions of the three chapters of Part II presented here have been edited and reduced in length to meet the University's requirements, and so are a partial record only, recalling Knorr Cetina's mutating and always-incomplete epistemic objects (see chapter II.1). The question of the extent to which practice-research can articulate research outcomes without resort to accompanying written or other commentary or 'explanation' is a contested one. Robin Nelson argues that,

> [a]n arts practice or artwork may stand alone as evidence of a research outcome. A musical composition, a choreography, a theatre-piece, an installation or exhibition, a film or other media artefact, a performance in any field, may self-evidently illustrate a development of what has gone before in ways which offer substantial new insights in the subject domain as adjudged by those in a position to make such judgements, namely peer reviewers. (Nelson 2006, 111-12)

However, Nelson goes on to state, '[t]hough insights may indeed be evident within the product, the production of knowledge is typically processual and the relational encounters in which it is yielded might helpfully be pointed up for the purposes of articulating research' and 'praxis (theory imbricated within practice) may … better be articulated in *both* the product *and* related documentation' (Nelson 2006, 115). Nelson points to a widespread anxiety within the academy (shared by myself as a researcher) as to the reliability and precision with which an example of arts practice such as a performance can articulate research outcomes. Or – to put the emphasis differently – the practice-researcher is likely to have an anxiety that the spectator observing her/his practice may not be able to 'properly' discern the research outcomes supposedly contained within a performance or artefact. Such an anxiety may well of course be shared by spectators, including examiners of PhD theses, and is amplified when the practice produces artefacts whose operations

can only be experienced through use (such as a control interface) or that only exist in the moment (such as a live performance). Furthermore, video and other documentation is inherently partial and limited in what can be captured for archiving and dissemination.[9]

Given these difficulties, I have chosen to provide a detailed analysis of the research outcomes drawing on video recordings of rehearsals, performances and post-performance and post-project discussions, my own journals, and feedback from audience members and project personnel. I do not provide this analysis on the basis that a written account of the research outcomes is somehow a more reliable or 'accurate' means of communication, since there remains, I would argue, an issue *expertise* – of whom is equipped to make the kinds of critical judgements required when reading or observing a research output whether in written or practical form. While there is a largely tacit and arguably unwarranted presumption that readers of scholarly *writing* have the expertise to read the research outcomes appropriately that the writing supposedly contains or mediates, with research outcomes articulated through a performance or artefact, the question of expertise obtrudes: what expertises do researcher and observer hold in common, that they might have similar understandings about the performance or artefact in question? How is it possible for an observer to be one of Nelson's 'peer reviewers'? Since '[d]octoral degrees are awarded to students who have demonstrated … the creation and interpretation of new knowledge' (The Framework for Higher Education Qualifications in England, Wales and Northern Ireland 2008), the difficulty for a PhD candidate such as myself when designing and composing a PhD thesis is not simply the matter of creating 'new knowledge' but also – in the kinds of terms I have used above – how to articulate that knowledge to others who may have differing expertises and who will not have direct access to the experiential knowledge (including embodied, in the moment *knowing* arising from the kind of professional expertise I point out above) of a practice-based research process. I present my research through a combination of written thesis, the practice itself, documentation of the practice and written evaluation of the practice not to privilege one form over another but to give examiners and others multiple ways of approaching the research and its outcomes so as to ameliorate, but not eliminate, these difficulties.

[1] Typical examples in these two categories are the Association of Lighting Designer's members' publication *Focus*, and *Lighting & Sound International*, published by the trade organisation the Professional Lighting and Sound Association (PLASA), distributed free of charge to professionals in the entertainment industry.

[2] One exception to the general trend I have outlined is noteworthy here: some thirty years ago Dorian Kelly argued for the merits of live operation of lighting, including discussion of its aesthetic potential and the required control interface, in a way that has parallels with my own argument in the present project (Kelly 1980). I only became aware of Kelly's work after the development of my thesis was largely complete.

[3] Ric Knowles discusses Palmer's book, pointing out that Palmer – as with other text books – affirms lighting's role in supporting what Knowles sees as normative theatrical and cultural conventions and hegemonies, although he points out that 'Palmer, virtually alone among the authors whose texts [Knowles is] examining, resists, and encourages resistance to, the marginalization of lighting designers – but even he counsels strategic cooperation when all else fails' (Knowles 2001).

[4] I would note here that the academy's construction of its object of study is dynamic, and there are signs that lighting design as a professional arts practice is beginning to be the subject of scholarship and research. As the small, specialist training institutions ('drama schools') have moved out of the private sector and into mainstream Higher Education (in terms of public funding and degree awarding), or have merged with or created alliances with larger universities, they have in some cases begun to engage in research and other scholarly activity beyond the specifics of a narrowly-defined professional training, of a kind that would be recognised as such by the wider academy. Several of these institutions have submitted to the two most recent Research Assessment Exercises (in 2001 and 2008), either independently or as part of a larger university submission. Research in the area of performance lighting is only a small part of such activity, but there are now a handful of scholars in the UK active in the field, and some dimensions of its discursive territory are beginning to be mapped out (the present project might be seen as a contribution to that mapping). Nevertheless, considerably more work will need to be done before a discourse of the kind I have been seeking here emerges, and it may well be that 'academic' recognition of its historical and still-continuing erasure is a necessary starting-point.

[5] This premise arises principally out of my 'expert-intuitive competence' (Melrose 2005b) as an experienced theatre lighting designer with an ability to interrogate my own practices and those of others developed through my experience as a lighting educator, scholar and researcher in UK Higher Education. I identify at various points through the written thesis where particular professional experiences have prompted reflection on and development of aspects of the initial premise.

[6] To put the same point in different terms, we might think of the use of the 'notional' as the tendency to extract single ideas from discourses or bodies of theory, and employ them for other ends.

[7] Ulmer adopts the term *heuretics* (originally used in Theology, and later in the Fine Arts, before Ulmer introduced it into critical-theoretical discourse) to describe his heuristic strategy and method 'for reinventing literacy in the electronic or, what is frequently called, the post-literate age … signal[ing] an attempt to integrate visual and verbal discourse' (Jarrett 2010). According to Ulmer, '[h]euretics contributes to what Barthes referred to as "the return of the poetician" - one who is concerned with how a work is made. This concern does not stop with analysis or comparative scholarship but conducts such scholarship in preparation for the design of a rhetoric poetics leading to the production of new work', thus underlining that heuretics builds on and extends hermeneutics, rather than replacing it (Ulmer 1994, 4). Similarly, my strategy is to establish an 'archaeological' reading of certain aspects of theatre lighting practice, and then through heuristic methods partially to reinvent those practices.

[8] I would want to acknowledge that reading, writing and thinking are themselves embodied practices. However, terms such as 'practice research' are generally used to distinguish research practices other than reading/writing/thinking, and I would in any case argue that different kinds of practice engender different 'ways of thinking'.

[9] Plainly this raises the issue of future dissemination of examinable material to the wider research community. This question is one that needs to be raised, but it is equally one to which the present project cannot provide adequate answers. My main position here is to argue that the much-contested 'liveness' (Auslander 2008) of live performances cannot be replicated through documentation itself. By implication, 'liveness', multiperspectivality, the accidental and the contingent are genuinely 'lost'.

Part II

Part II Introduction

Part II establishes the basis for my aim to give the theatre lighting artist a role that is more directly involved in the creative immediacy of the moment of performance. My strategy for achieving this, in both conceptual and empirical terms, is to conflate the existing professional roles of the lighting designer and the lighting operator into the new role of *lighting artist* – a role modelled in part on that of the performer. This strategy has, as I proceed to demonstrate, a seventy-five year old precedent.

Frederick Bentham, widely known in the lighting industry during his lifetime simply as 'Fred', was born in 1911, and in 1932 began working for Strand Electric,[1] the company that was the major manufacturer of stage lighting equipment in the UK from the nineteen-thirties until the nineteen-seventies.[2] From soon after joining Strand until his retirement in 1973, Bentham played a significant role in the development of stage lighting control systems in the UK as well as (to a lesser extent) internationally. When Bentham joined Strand, lighting control was an essentially mechanical affair: resistance dimmers were controlled by levers linked via shafts to wheels to give 'master' control of multiple dimmers. Strand Electric's 'Grand Master' was typical (Figure 3).

The Grand Master incorporated both the dimmers and the control interface in a single unit so large (over 2 metres tall) and heavy that it had to be positioned backstage, typically on a 'perch' position above one of the wings. For lighting of any complexity, several operators were required, who from their control position could see little – if anything – of the stage itself. A well-practiced team of operators could reproduce with some accuracy a lighting plot given to them, synchronised to the performance by cues from the stage manager. However, this was a process of rote reproduction, since the operators had no way of seeing the effect of the lighting or its relationship with the other activities of the stage. To the extent that the operators of a Grand Master or similar controls might be said to exhibit *virtuosity*,[3] that virtuosity was a matter of procedural technique, the quality of which could be measured precisely in terms of the accuracy of replay of the producer's lighting plot.[4] There was no opportunity for the lighting operator to make a creative contribution to the making of the performance, and – with some notable exceptions – little interest on the part of producers and other theatre creatives in them doing so.

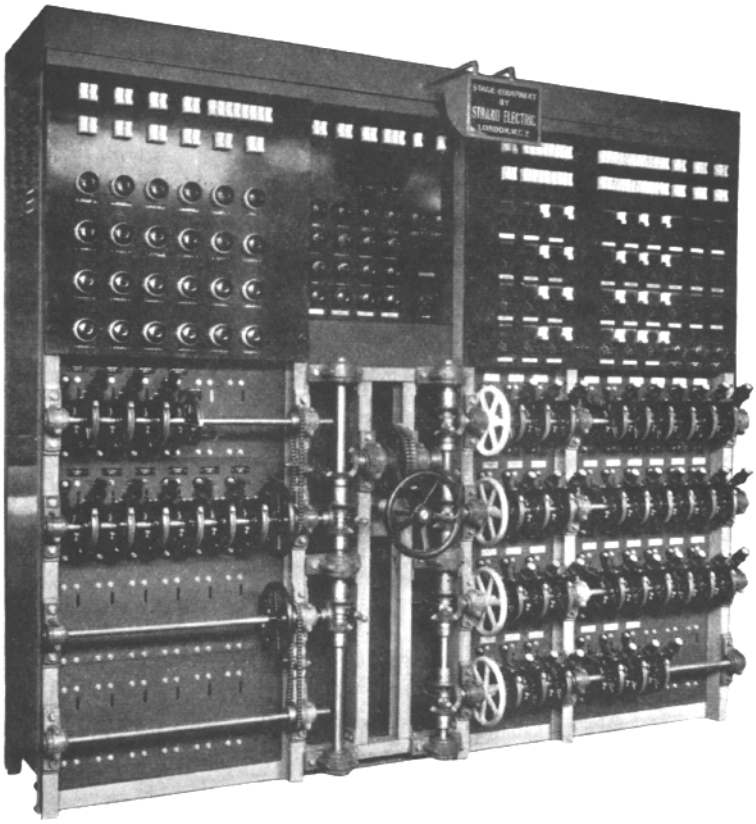

Figure 3: Stand Electric Grand Master

Looking back to the early nineteen-thirties, Bentham wrote that '[g]ood and complicated lighting was done in those days, but … I have never held Grand Master controls in anything but contempt as a contribution to lighting and, in consequence, as soon as I became active in this field, set about providing an alternative' (Bentham 1976a, 50). Within three years of starting work at Strand, Bentham had created his alternative: the Light Console (Figure 4), which was a radical departure from the lighting controls of the time in three key respects. The first departure was – to adopt a term Bentham used repeatedly – the Light Console's 'playability'. Pragmatically, Bentham's adoption of cinema organ technology provided a ready made control interface and sophisticated control logic based on relays that would have been prohibitively expensive and time consuming to develop from scratch. Philosophically, it appears that Bentham was drawn to the organ console for its *instrumental* rather than *engineering* approach: he seems to have wanted to be able to *play* light as a musician plays music.[5] While the Light Console was ostensibly developed as Strand's premier theatre lighting control, I would argue that its creation and design were driven largely by Bentham's 'life-long mania for Colour Music' (Bentham 1992, 31) – a lighting performance to accompany recorded music.[6] With the Light Console, all stage lighting was brought under the control of a single, comfortably seated operator, who could select any

combination of lights for immediate control. Whilst it was still *de rigueur* for theatrical performances to work out the lighting plot on the console in advance of the performance (as with the Grand Master), the Light Console also made it possible for a practised operator working with a known lighting rig to improvise lighting *in the moment* in response to stage action or – in the case of Bentham's colour music – to music. Although the lighting operator here remains 'responsive to', and hence (in terms of my enquiry) not fully determining of theatre artistry, it is nevertheless the case that The Light Console was the first theatre lighting control to offer such *playability*, and it proposed a virtuosity of the lighting operator that was of a different order from that implied by the Grand Master.

Figure 4: Fred Bentham at the 1935 Light Console

The second respect in which the Light Console was a radical departure from previous control systems was that it separated the control interface from the dimmers themselves, freeing the design of the interface from the constraints of the mechanical dimmers (although imposing other constraints).[7] The operator could now be placed front-of-house where s/he could see the activity of the stage and (potentially) take a creative part in its making.

The Light Console's third departure from previous controls was that for the first time the state of the operator's control interface was divorced from the state of the dimmers – and so from the

light on stage. With a Grand Master, the operator could see directly, by looking at the controls, what level each dimmer was at; with the Light Console, the state of the interface controls did not reflect the state of the dimmers, and if the operator wished to know what level a dimmer was at s/he had to either look at the stage to see if the light was on, or use the Light Console's rather basic functions to interrogate the level of individual dimmers. In either case, it was difficult to get a sense, 'at a glance', of the state of the control system. The Light Console was the first lighting control to require the operator to have a mental model of the system state that was different to the one presented by the interface itself: with the Light Console, the lighting system acquired a *virtual* dimension.

It is against the backdrop of this historical emergence that my own research undertaking finds its imperative. The three innovations I have outlined above – playability, the spatial position of the operator, and the partial virtualisation of the lighting system – came about, I would argue, because of Bentham's central proposal: that lighting should be performed or played in the way a musician plays music. From this insight sprang Bentham's choice of the cinema organ as the preferred technology platform, together with his insistence that the lighting control should be placed front-of-house so the operator could see the stage clearly.[8] Some seventy-five years later, my project makes that proposal again, and once again it proposes its own technology platform along with other changes to the practices of the lighting artist and her/his role in the making of live theatre performance. To restate Bentham's proposal in my own terms, and in relation to those current practices that my research enquiry represents, we can say that to reposition the role of the present lighting designer, such that her/his role is 'more like'[9] that of the performer as a creative theatre artist, is to defer certain creative decisions until the moment of performance itself, where those decisions are contingent upon performance circumstance. On this basis, rehearsal is reconceived: it leads not to the formulation of a 'frozen' lighting plot to be reproduced with as much technical accuracy as possible, but rather it prepares the lighting artist to create anew in the moment.

Each of Bentham's innovations suggests opportunities for intervention that might be fruitful in seeking to promote such a shift: intervention into the relationship between the lighting artist and the other elements of the performance (by adopting a creative process more akin to that of the performer, viewed as a creative artist); intervention into the spatial relationships between lighting artist, the audience, and the stage – hence into the domain of performance-affective potential; and intervention into the relationship between the lighting artist and (through the control technology) the light on stage. Each of the three chapters of Part II that follows approaches one of these opportunities in order to formulate a series of *strategic interventions* intended to promote the

lighting artist as performer. The three chapters are to some extent free standing: each approaches the central aims of my project from a different direction, and each formulates its own strategic interventions. However, concepts, histories and professional practices form recurrent themes crossing the three chapters, which weaving together form the discursive platform that is the basis of the practice-research of Part III.[10]

Notes

[1] Strand Electric was an independent company for most of Bentham's working life. It became part of the Rank group of companies shortly before Bentham retired, later returning to independence as Strand Lighting before having a complex history of ownership and restructuring up until the present.

[2] Bentham recorded his professional life in his autobiography *Sixty Years of Light Work* (Bentham 1992), and wrote about his own work and ideas extensively in *Tabs* (the house journal of Strand, which he edited for many years), *Sightline* (the journal of the Association of British Theatre Technicians, which he also edited for several years), and in his books *Stage Lighting* (Bentham 1950) and *The Art of Stage Lighting* (Bentham 1968). However, because much of the written record of Bentham's work was written by Bentham himself, and because he was both highly opinionated and an accomplished self-publicist, it is important to be cautious when interpreting that record. The material presented here on Bentham's impact on the development of stage lighting in the UK and internationally is largely based on this body of work, tempered by the counter-views of other industry professionals where appropriate.

[3] Not all lighting operators of the period were professionals in the sense we would mean today; stage crew – including lighting operators – were often employed on a casual basis, and they would typically have non-theatre jobs during the day. Michael Northen relates that in the nineteen-forties the stage crew at the New Theatre in Hull were mostly firemen from the adjacent fire station, and prioritised emergency call-outs over theatre performances (Northen 1997, 51).

[4] The producer – a term used in the first half of the twentieth century for a role that approximates to what we now call the director – was responsible for lighting productions; the role of lighting designer, as a named professional specialism, did not begin to appear until the nineteen-fifties.

[5] Bentham wrote that for a lighting control to be 'playable' it 'must have the instrumental quality which permits improvisation, composition and finally interpretation when repeating the result', as well as allowing 'a single operator to reach everything without leaving his seat' (Bentham 1971, 51). Bentham further described his instrumental approach in *The Art of Stage Lighting* (Bentham 1976, 50).

[6] It is not clear where Bentham got the idea of colour music. From his work at GEC before he moved to Strand, he was certainly familiar with the sometimes elaborate lighting installations in cinema auditoria

which ingeniously mixed coloured lighting from concealed sources washing onto ceilings and walls. In his autobiography he says that he found a 'like mind' in Adolphe Appia (Bentham 1992, 45), and Appia's theories on the relationship between theatre, music and light may have been influential. In the chapter on 'Colour Music' in his book *Stage Lighting* (Bentham 1957, 299-319), Bentham gives a brief history of colour music, listing several theorists and practitioners in the UK and internationally, but it is difficult to know how much he was aware of in the early nineteen-thirties. Equally, histories of other colour music exponents rarely mention Bentham's work.

[7] The Light Console achieved this separation by exploiting the electro-magnetic clutch (invented by Moss Mansell in 1929 but largely neglected until taken up by Bentham), linking controls to dimmers with an electrical connection, rather than the previous mechanical rods or tracker wires.

[8] As far as I have been able to establish, only one of the sixteen Light Consoles made was designed to be positioned exclusively backstage: the one for the Palace Theatre, Manchester. The Light Console for the Theatre Royal, Bristol, was designed to be used either at the side of the stage or (for rehearsals) in the stalls, but in practice it was only used on the side-stage (personal email correspondence with Joe Aveline, 28/3/07).

[9] Plainly 'likeness' is a tricky notion: we need to identify what it is in the external measure (the role of the creative performer) that the liberated lighting designer might seek to emulate. I have suggested that in this instance, what is emulated is the performer's ability (albeit limited) to control and modify a dynamic role in the moment of performance itself – a theme I return to at various points below.

[10] It is perhaps worth pointing out that the 'woven' thetic structure (rather than the more common model of a single linear thread) I have adopted in Part II is an analogue of the woven lighting data structure I argue for in chapter II.3 and implement in the lighting control I develop in Part III. In both cases, I am seeking to expose both synchronic and diachronic relationships within the material.

II.1 The Virtuosity of the Lighting Operator

Figure 5: 'Ruggles visits backstage at the Manchester Palace'

In this first chapter of Part II, I establish the basis for the first two of the five strategic interventions that motivate and guide the practice research of Part III. These two interventions concern the restructured role that I am calling the *lighting artist* and lead to a creative process that – I argue – promotes a greater artistic engagement with the moment of performance. At this point, then, my research questions are: how have the present professional roles of lighting designer and lighting operator been structured by historical forces, and what principles and processes might shape the working practices of the lighting artist, if not the principles and processes of lighting *design,* as it is conventionally understood? I start by considering briefly the roles of the lighting operator and the lighting designer as they have emerged and developed since the middle of the twentieth century. I go on to examine the conceptual model of the lighting design *as object* which I argue is widely held, but in certain respects gives a poor account of the practice of lighting designers. Using the method of invention that I outline in chapter I.1, I develop a new model in which lighting design is understood as a *process of unfolding*, drawing on Karin Knorr Cetina's notion of the epistemic object and Rick Fisher's account of his own lighting process on the National Theatre 1992 production of *An Inspector Calls*. I develop this model into a lighting strategy using Deleuze's account of the creative practices of the painter Francis Bacon. In

particular, I adopt and adapt the idea of the *diagram* as a mechanism for introducing the accidental into the creative process. Building on these various theoretical approaches and accounts of expert practice, I argue for a partial reinvention of the working practices of the lighting artist that combines aspects of the present roles of the lighting designer and the lighting operator together with aspects of the performer's practice of rehearsal, so leading to the first two strategic interventions.

The historical emergence of the operator and the designer

In my introduction to Part II, I describe Bentham's threefold reinvention of lighting control with his 1935 Light Console, promoting 'playability', enabling the operator to be positioned so as to see the stage, and initiating the virtualisation of lighting control systems. However, while the Light Console offered the possibility of a position front-of-house and a capacity for rapid, complex lighting changes, for drama, opera and ballet the Light Console had a crucial limitation: it was unable to set balanced levels accurately and repeatedly.[1] Bentham's proposition – that the lighting operator might be a lighting *artist*, deploying a creative virtuosity in addition to a technical skill – represented by the Light Console and supported in principle by some notable practitioners, was for the most part blocked by the Light Console's own technological limitations.[2]

The Light Console was not the only innovative lighting control technology of the period: by the late nineteen-forties a new dimming technology developed in the USA – the thyratron dimmer – had been adopted by Strand to create the control system known as the Preset Electronic (Figure 6).[3] The Preset Electronic had a very different interface and way of working to the Light Console, with twin banks of faders or 'presets', with one fader for each dimmer, which could be cross-faded between, thus allowing precise dimmer levels to be preset in advance of the entire lighting 'look' being brought onto stage with a single control wheel. By 1950, then, Strand offered two distinct top-of-the-range controls – the Light Console and the Preset Electronic – representing two very different operating philosophies. The Light Console promoted the operator as a creative interpreter of the producer's (and later the lighting designer's) artistic requirements, live in performance. The Preset Electronic prioritised the precise reproduction of the producer's or lighting designer's plot, with minimal creative contribution on the part of the operator (the timing of lighting changes was still controlled manually with the Electronic). The two systems proposed differing *virtuosities* on

the part of the operator: both required a technical craft skill, but the Light Console additionally promoted a virtuoso *creative* engagement with the performance.

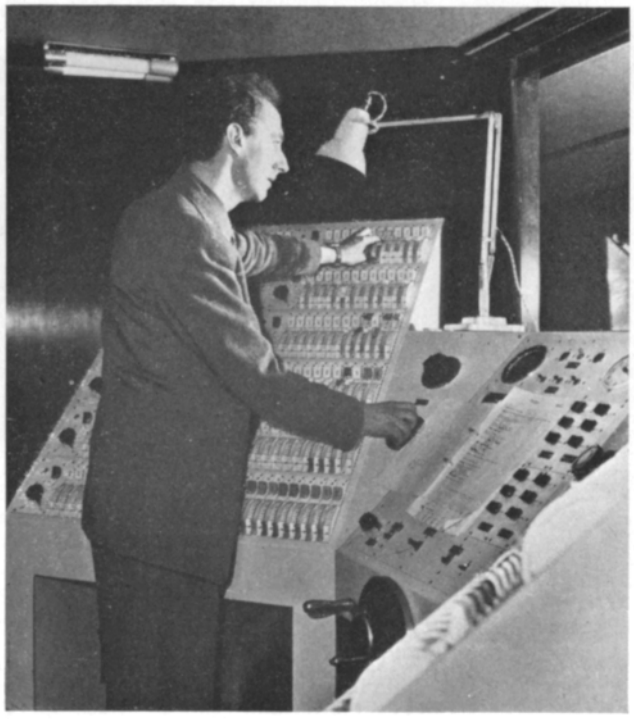

Figure 6: The 1951 Preset Electronic control at the Royal Shakespeare Theatre, Stratford.

Both the Preset Electronic and the Light Console offered the potential to position the operator so as to have a clear view of the stage, no longer tied (by mechanical linkages or tracker wires) to the dimmers. However, while these two control systems established (for those theatre practitioners who desired to promote the role of lighting in performance, at least) the idea of the operator as someone who could be visually engaged with the performance by virtue of her/his newfound position in the auditorium, there were other factors, I would argue, that resisted the wholesale handing over of creative responsibility for lighting to the operator.

The role of the lighting designer as a professional specialist was beginning to emerge in the first half of the nineteen-fifties. Producers (what we now call directors), finding themselves with both greater artistic aspirations for lighting and also facing greater technical and logistical complexity, were increasingly receptive to the idea of a lighting specialist who could take over from the producer some of the creative, technical and logistical responsibility for the lighting, while nevertheless remaining subordinate to the producer (A Duo of Doyens 1976, 53). However, the lighting *operator* was not seen to be the person in whom to invest such responsibility: regardless of the still very new shift to front-of-house – as yet only found in a few theatres – the

role of the operator was well established as a 'back-stage' function, involved in the running of the show, not the making of it. Despite the general post-war political shift to the left, and a national sense of the weakening of the structures of class and social and professional boundaries, theatre was still very hierarchical, and lighting operators were strictly 'manual labour' (A Duo of Doyens 1976, 53): the new lighting specialists were not ex-operators, but ex-stage managers – for example, Michael Northen and Francis Reid – and ex-theatre engineers and master electricians – for example, Joe Davis (Northen 1997, Reid 2003, A Duo of Doyens 1976). The early lighting designers came from backgrounds where their status and relationship with the producer was pre-established: they were already undertaking lighting tasks (stage managers often relit touring productions for each venue, in the absence of the producer) and crucially – unlike lighting operators – they were already *managers*.

Bentham, however (perhaps with some of his colleagues at Strand who were also adept with the Light Console), was in a unique position as his role leading research and development at Strand gave him a professional status that in general lighting operators lacked. Bentham or a colleague often operated the first few performances after a Light Console had been installed, before handing over to the theatre's own operator. On these occasions he was effectively the lighting designer as well as lighting operator, combining the two roles to become what I am terming the *lighting artist*. The emerging specialist lighting designers, however, did not generally operate their lighting designs;[4] they were for the most part freelance, moving from production to production, and their role was modelled on the established role of the set and costume designer.[5] Making the claim for professional status by aligning lighting artistry as a specialism with the established roles of the set and costume designer constructed a professional persona that other practitioners (crucially, those who controlled who was to be employed) could readily understand and work with, following existing models.[6] The claim also proposed lighting as an equal contributor, with the other design disciplines, to the artistry of the theatre. On the other hand, had those emerging lighting designers instead aligned themselves with the lighting operator as *performer*, they would have lost the advantage of a pre-defined relationship with other creative personnel, particularly the producer, as well as assigning themselves the lower status of 'back-stage' staff.

Modelling the lighting specialist's role on that of the designer implied a process as follows: making creative decisions – in response to factors such as the text, the producer's approach to the production, the stage action as seen in rehearsal, and so on – in *advance* of performance; testing and refining those decisions through a process of rehearsal; then reproducing the lighting for each

performance. For such a conception of lighting design – design as artefact – the Preset Electronic was perceived as a far more suitable control than the Light Console, prioritising as it did precision of replay of the designer's previously worked-out intentions with minimal intervention by a third party in the shape of the operator. The subsequent development of theatre lighting controls in the UK – spurred on by the availability of electronic and later computerised technologies – adopted the 'presetting' system established by the Preset Electronic. The model of the performance of lighting that presetting encapsulates and reinforces has, largely unconsciously, been adopted by theatre lighting professionals as the 'correct' – or even the only – conceptual model. In what I term the 'state/cue' model, each static lighting look or 'state' is recorded as a series of intensity values for each dimmer, and the lighting progresses during the performance by way of a series of transitions or 'cues' from one state to the next (a matter I discuss more fully in chapter II.3).[7]

The nineteen-sixties and -seventies saw an increasing automation of the principles of the manual preset controls: firstly, 'memory' functions eliminated the need to manually set faders to the dimmer levels required for each upcoming lighting change; later, the previously manual operation of the transition became automated, so that the operator set a time in seconds for the change and the lighting control faded down the outgoing state and faded up the incoming state in the allocated time, at the press of the 'go' button. As the professional model of lighting artist as freelance *designer* increasingly dominated, the virtuosity of the operator – both in terms of technical skill and creative artistry – diminished. Since the mid nineteen-seventies lighting control technology has advanced in many respects; consoles now offer highly sophisticated ways of manipulating the lighting rig, and can control more, and more complex, luminaires and other devices. However, in terms of operation during the performance there has been no significant change for thirty years: almost all lighting for the professional theatre stage is created by freelance designers whose role is to predetermine as far as possible a lighting plot that can be mechanically replayed in performance by the operator pressing the 'go' button when instructed by a stage manager.

If the role of the theatre lighting operator in performance has remained essentially unchanged for the last two or three decades, then a parallel case can also be made for the role of the lighting designer. I have described above how lighting designers came to align themselves in many respects with the more established professional role of the set and costume designer. This alignment has continued and is, I would argue, a powerful but largely unrecognised factor in shaping the professional practices of lighting artists. Contractually, designers – including lighting designers – are creators of intellectual property, and they are paid for the use of that intellectual

property while retaining ownership of it.[8] Constructing the designer's role as one in which the primary responsibility is to produce intellectual property sets up – in epistemological terms – the idea of *design-as-(abstract)-object*, as opposed to *design-as-process*. In contrast, performers, technicians, managers and other personnel involved in the making of the performance are paid for their time and labour; they are not paid royalties, and they retain no rights over the artistic work that they help to create.

It is this distinction between design as object – a *thing* that can be made, and reproduced on demand at the press of a button – and design as process – inextricably bound up with the lighting artist's presence at, and engagement with, the performance event – that is encapsulated in the operating philosophies of Strand's two premier lighting controls of the nineteen-fifties: the Light Console and the Preset Electronic. The subsequent history of lighting control development charts how the emerging theatre lighting profession came to reject Bentham's vision of the lighting artist as *performer* and instead adopted the ready-made role of *designer*, and it is this historical formation of the two roles that provides an essential starting point for the shift my project proposes. While I take up the matter of the role of the lighting operator again in chapter II.3, I want at this point to concentrate on the role of the lighting designer, and consider further the model of *design-as-object*, in order to develop an alternative model of *lighting-design-as-a-process-of-unfolding*, which will form the basis for the two strategic interventions of the present chapter.

Design as an Unfolding (Epistemic) Object

Constructing, epistemologically, 'design' as an abstract object rather than a process places certain constraints on the role of light and the lighting artist in the making of a theatre performance. I would also argue that such an understanding of design, whilst widespread, is in some respects an unsatisfactory description of the creative practices of lighting designers, and that this mismatch between the conception of *design-as-object* and professional theatre-making practices results in tensions that lighting designers may find difficult to reconcile. The conventional *design-as-(conceptual)-object* model that I argue above is constituted by the contractual and other structures in which lighting designers operate, and that is implied by most lighting textbooks, suggests the design is static and inert, and that the lighting designer's twofold task is: firstly to *create* the design through an act of the imagination (motivated and guided by external stimuli such as the play text, director's vision, historical research, and so on) and secondly to oversee the *realisation* of this Design Concept through the marshalling of human, technical and other resources. J. Michael Gillette in his lighting textbook offers a typical account: 'the [research, incubation and]

selection phase of the design process is finished when the director feels satisfied that all design areas support the production design concept' and 'the implementation phase begins when you stop planning and start doing' (Gillette 2003, 171).[9] According to this conventional understanding, the first phase is essentially complete before the second begins, so that any alterations during the second phase are to bring the realised lighting into line with the unchanging imagined Design Concept.[10] The *design-as-(conceptual)-object* model further implies linear, procedural processes both imaginative and realisatory, together with a virtuosity of the lighting designer that is centred on the expert execution of those processes – in Donald Schön's terms, it is a model of technical rationality (Schön 1983).

For at least some expert lighting designers the model of *design-as-(conceptual)-object* sits in an uneasy tension with their lived experience that outcomes are non-identical with intentions. This tension, I would argue, underlies Rick Fisher's adoption of the phrase 'post-design rationalisation':

> I hit on that phrase when I was preparing (I think) one of my Showlight[11] talks … I found that when I had done a show, and preferably done a show often, as in *An Inspector Calls* or as in *Swan Lake* … I found that when I was talking about [what had made these shows work] and presenting it to these young, eager faces – either students or professionals – that I kind of felt … something of a fraud, thinking that, oh – they must have thought that I sat down at the drawing board and had these ideas, these goals, and figured out how to achieve them, and put them into practice and tweaked them and refined them, and – you know – that was it. That somehow the Eureka moment of lighting design was at the drawing board, or even before you got to the drawing board. And the truth of the matter for me is that it is almost never that way … I hit upon this idea that actually I could make a good theory of it once I had done the design, as opposed to taking the theory and putting it into practice *in* a design … what I had done became much more easy to talk about once it was finished, completed and I could look at it, and then – for want of a better term – analyse it. (Fisher 2007)

Fisher argues that the *design-as-(conceptual)-object* can only be held up for scrutiny – for 'analysis' – *after* it has been realised in performance, and that it has no meaningful existence while he is 'at the drawing board'.[12] If Fisher's self-understanding can be taken as indicative of that of expert lighting designers more generally (and it certainly accords with my own experience as a designer, my experience of observing other designers at work, and accounts that other lighting designers have relayed to me in conversation, including Paule Constable (2008)), then the model of *design-as-(conceptual)-object* is an inadequate account of the process of creating a lighting design. We need to call into question the objecthood – the 'thing-ness' – of the design. The design is manifested in the world in different ways at different stages of its life: what starts as a collection of the designer's ideas and feelings in response to initial stimuli later becomes notes, drawings and other documentation, goes on to be expressed as a complex technological set-up of equipment and

(usually electronic) data, and finally finds embodiment as light on stage in performance. In the model of the *design-as-(conceptual)-object*, each of these physical instantiations is an imperfect encoding of the designer's imagined Design Concept. However, Fisher's self-description implies that – far from the process being one of an imaginative discovery of the design followed by its transcription into various physical instantiations (documentation, technological configuration, light on stage) – the process is such (at least for him) that the design can only be held for intellectual examination *after* it has been manifested as light on stage. Fisher claims not to 'always bring a theory or even a style to my work. By the end of it the theory and the style may be there, but it's not something that – I hope – I've imposed on it, but its grown out of the way [the design has] turned out' (Fisher 2007). An alternative model of the objecthood of the design that can account for Fisher's self-experience must be able to accommodate the open-ended, emergent, and incomplete qualities that Fisher alludes to.

To develop such a model, using the method of invention I describe in chapter I.1, I want to draw on the work of Karin Knorr Cetina, who has examined the practices of the science laboratory. Accounts of science practices have in recent decades shifted away from models of scientific rationalism toward ones that see the activity of science as a social and cultural construct undertaken within the human life-world. I have chosen Knorr Cetina's work because I want to make a similar shift away from an understanding of the design as an object worked on entirely rationally and with a clear sense of both the intended outcome and the processes required to reach it. Knorr Cetina uses the terms 'knowledge objects' and 'epistemic objects' to refer to what is worked on and produced in creative and constructive practices such as science and technology research: '[k]nowledge objects differ in important ways from … commodities, instruments, and everyday things … epistemic objects [are] defined by their lack of completeness of being and their nonidentity with themselves.' Furthermore, the 'lack of completeness of being of knowledge objects goes hand in hand with the dynamism of research. Only incomplete objects pose further questions, and only in considering objects as incomplete do scientists move forward with their work' (Knorr Cetina 2001, 176). The research scientist and the lighting designer (and indeed other artists) are – I would argue – analogous in their relationship with the epistemic objects that they create. In both cases, the goals are only broadly defined and, while each has a 'toolbox' of processes and techniques to draw on, there is no deterministic procedure for reaching those goals: both are 'creative' activities in that neither ends nor means are fully known at the outset. The characteristics of epistemic objects that Knorr Cetina describes also offer a good fit with those of lighting designs. Where '[e]pistemic objects frequently exist simultaneously in a variety of forms

[and] have multiple instantiations, which range from figurative, mathematical, and other representations to material realizations' (Knorr Cetina 2001, 182), lighting designs also take on a variety of instantiations as I describe above. Knorr Cetina argues that 'even when such an [epistemic object] is officially declared "finished" and "complete," the respective experts are acutely aware of its faults, of how it "could" have been improved, of what it "should" have become and did not'. For Fisher the design is still incompletely known, and still presents unanswered questions, when it has been 'finished' (in the sense of being realized as a part of public performances of the production). He claims even then only to 'know a little bit more' about his goals, and only to 'know how to make certain things kind of work'. As with Knorr Cetina's epistemic object, '[t]he "finished," [design], then, is itself always incomplete, is itself simply another partial object' (Knorr Cetina 2001, 183).

I propose to adopt Knorr Cetina's model of the epistemic object, continually changing and revealing itself, *unfolding*, as an alternative to the static and inert *design-as-(conceptual)-object*. This choice brings with it two important implications for my project. Firstly, the *design-as-a-process-of-unfolding* model implies that design decisions are always provisional, since the design itself is never 'finished' and always open to review and change. In terms of the lighting designer's process, the two-stage *imagine-and-realise* schema is replaced by a process of continual review and tentative decision-making that leads to the moment of performance. In such a model the lighting designer's period of creative judgement and decision-making is extended beyond the initial 'imagining' stage, so that it potentially occupies every point in the process up to and during the performance itself – that is, the model can give an account of the lighting designer's process that both offers a better fit with Rick Fisher's self-description, and offers a starting point in my project for a strategic deferral of some artistic lighting decisions until the moment of performance.

Secondly, Knorr Cetina's model of the epistemic object also has implications for our understanding of the lighting designer's relationship with the design. The model of *design-as-(conceptual)-object* implies a one-way subject-object relationship, in which the lighting designer as autonomous, controlling subject creates and 'works on' the design as malleable, controlled object. In such a relationship, the designer is presumed to be – through her/his professional expertise – 'in command'. Again, this model does not match Fisher's self-understanding: he 'still panic[s] at the drawing board: an empty piece of paper is [his] greatest enemy, [he] will do anything but sit down and make those first few marks on the paper' (Fisher 2007). The model of *design-as-a-process-of-unfolding* (based on Knorr Cetina's epistemic objects), on the other hand,

constructs the relationship between designer and design as a two-way process, in which each stimulates, and is stimulated by, the other. According to Knorr Cetina,

> the defining characteristic of an epistemic object is this changing, unfolding character – or its lack of "object-ivity" and completeness of being, and its nonidentity with itself. The lack in completeness of being is crucial: objects of knowledge in many fields have material instantiations, but they must simultaneously be conceived of as unfolding structures of absences: as things that continually "explode" and "mutate" into something else, and that are as much defined by what they are not (but will, at some point have become) than by what they are. (Knorr Cetina 2001, 182)

It is the lack of completeness and dynamic features of epistemic objects that require the lighting designer to continually ask questions of the design and to – in Fisher's terms – allow the show to 'begin to tell [him] how to do it', rather than for the designer to dictate to the design.

The shift I want to make is from an account of the lighting designer's relationship with the design in which the material resources available – equipment, personnel, and so on – are subject to the command and control of the designer to one in which the lighting artist's process is one of responding and nurturing in order to discover and bring out the potentialities of the materials in the context of the unfolding production.[13] Such a relationship with the work requires a different way of thinking: what Brian Massumi terms 'operative reason' (as opposed to 'instrumental reason'). Operative reason,

> is *pragmatic* rather than analytic. It doesn't master a situation with exhaustive knowledge of alternative outcomes. It "tweaks" it. Rather than probing the situation to bring it under maximum control, it prods it, recognizing it to be finally indomitable and respecting its autonomy. Operative reason is concerned with effects – specifically countereffects – more than causes. It deploys local interventions in an attempt to induce a qualitative global transformation: small causes with disproportionate effect, excess-effect, a little tweak for a big return. Operative reason is inseparable from a process of trial and error, with occasional shots in the dark, guided in every case by a pragmatic sense of the situation's *responsivity* (as opposed to its manipulability). (Massumi 2002, 111-2)

For the lighting artist, Massumi's 'qualitative … transformation' is the key to moving towards the goal of 'good lighting', which is itself underdetermined since the normative criteria (expressed in lighting textbooks and circulating within the professional economy) such as visibility, modelling, atmosphere, and so on are not in themselves sufficient to define a single lighting solution. Since neither precise ends nor means are determinable by instrumental reason, operative reason – which according to Massumi 'is closer to intuition than to reflective thought' (Massumi 2002, 112) – suggests a method of 'local interventions', 'prods' and 'tweaks' in order to discover the

sensitivities of the situation. (We might equate Massumi's 'responsivity' of the situation with Fisher's desire to let the show 'tell [him] how to do it'.)

What Massumi's analysis cannot do (because it is a general one, not specific to lighting) is to indicate how the lighting artist is to gauge where – out of all the possible variables in the lighting setup – the sensitive points lie. In order to move from an *account* of the relationship between the lighting artist and the design towards a *method* that can be taken up and developed for the purposes of my project, it is necessary to develop a model strategy that is specific to lighting. However, given the model I have established of *design-as-a-process-of-unfolding*, with its characteristics of incompleteness and absence (that raise questions rather than dictating answers), dynamism and mutation (that make instrumental methods unsuitable), any such strategy must maximise the potential contribution of lighting as a part of the performance, while acknowledging its resistance to instrumental reason. Such a strategy, following Massumi's lead, must employ local interventions that aim for 'global transformation'. In order to develop a working process for the lighting artist that promotes Operative Reason I want to introduce the idea of the Accidental by drawing on Gilles Deleuze's analysis of the working practices of the painter Francis Bacon.

The Diagram

Gilles Deleuze's work *Francis Bacon: the Logic of Sensation* gives an extensive account of many aspects of Bacon's working methods and self-understanding as a painter (Deleuze 2005). For my purposes, I want to concentrate on one particular concept – that of the 'graph' or 'diagram'[14] – without adopting all of Deleuze's analysis and theorization, which is specific to painting (and in large part to Bacon). According to Deleuze, the diagram is,

> a preparatory work that belongs to painting fully, and yet precedes the act of painting … This preparatory work is invisible and silent, yet extremely intense, and the act of painting itself appears as an afterward, an *après-coup* ("hysteresis") in relation to this work.
>
> What does this act of painting consist of? Bacon defines it in this way: make random marks (lines-traits); scrub, sweep, or wipe the canvas in order to clear out locales or zones (color-patches); throw the paint, from various angles and at various speeds. Now this act, or these acts, presuppose that there were already figurative givens on the canvas (and in the painter's head), more or less virtual, more or less actual. It is precisely these givens that will be removed by the act of painting, either by being wiped, brushed, or rubbed, or else covered over. (Deleuze 2005, 70)

The purpose of the diagram is to prevent painter and painting falling into cliché: '…modern painting is invaded and besieged by photographs and clichés that are already lodged on the canvas

before the painter even begins to work. In fact, it would be mistake to think that the painter works on a white and virgin surface. The entire surface is already invested virtually with all kinds of clichés, which the painter will have to break with' (Deleuze 2005, 8). For Bacon, the avoidance of cliché is essential, and the diagram is a way to admit chance and the accidental because the marks that it consists of concern only the hand of the painter, and they are there to be 'utilized and reutilized by the hand of the painter, who will use them to wrench the visual image away from the nascent cliché, to wrench himself away from the nascent illustration and narration' (Deleuze 2005, 66). Bacon's emphasis on the hand of the painter is significant – he seeks to avoid intellectualising the process of painting: '[o]ne of the things I've always tried to analyze is why it is that, if the formation of the image that you want is done irrationally, it seems to come onto the nervous system much more strongly than if you knew how you could do it. Why is it possible to make the reality of an appearance more violently in this way than by doing it rationally?' (in Sylvester 1987, 104 cited by Bogue 2003, 122). Thus the diagram can (at least partially) replace intellectual thought and decision-making as a guide to further action: '[t]he diagram is indeed a chaos, a catastrophe, but it is also a germ of order or rhythm. It is a violent chaos in relation to the figurative givens, but it is a germ of rhythm in relation to the new order of the painting' (Deleuze 2005, 72).

While the diagram is a preparatory work made before the painting proper, it is – unlike the sketches that artists typically make – retained in the final work, although both its extent in the final work and the extent of its use during the process of painting must be limited:

> Bacon will never stop speaking of the absolute necessity of preventing the diagram from proliferating, the necessity of confining it to certain areas of the painting and certain moments of the act of painting … The diagram must not eat away at the entire painting, it must remain limited in space and time. It must remain operative and controlled. The violent methods must not be given free reign, and the necessary catastrophe must not submerge the whole. The diagram is a possibility of fact – it is not the fact itself.' (Deleuze 2005, 77)

Deleuze also describes the diagram as a 'modulator'; according to Ronald Bogue, '[t]he diagram in [Bacon's] painting … is a kind of visual synthesizer, into which the figurative clichés of coded representations are fed and out of which issue resemblances produced by the nonresembling means of a temporal, variable, and continuous modulation' (Bogue 2003, 135). For Deleuze, the modulator – and so the diagram – is not to be 'read' or 'de-coded' (as if it were a language), or interpreted in terms of visual similitude, but serves to transform clichéd inputs into affective outputs through a kind of affective analogy. Bacon offers an example of how the diagram works:

'you suddenly see through the graph [diagram] that the mouth could go right across the face' (in Deleuze 2005, 111).

Having summarised Deleuze's account of the diagram and how it introduces the accidental into the painting, I want at this point to consider how the diagram as a creative method might be used: firstly, to give an account of the lighting designer's process; and secondly, to develop strategic interventions that will further the aims of my project.[15] The specific aspects of Deleuze's account I want to make use of are: the idea of the 'pre-painting'; the use of the diagram to allow the accidental to enter the creative process in a controlled way; the way that the diagram appears in the finished work (unlike other preparatory techniques such as sketching or cartoons); and the idea that (for Bacon) the diagram must be limited and controlled. To mark the distinction from Bacon and Deleuze's diagram, I shall adopt the terms *diagrammicity* and *diagrammatic*, thereby also emphasising the active quality of the diagram as part of a process.

Rick Fisher details the design process that led to his extensive and systematic use of low angle side-light for *An Inspector Calls*:[16]

> The designer had drawn a piece of scenery through the number one bar,[17] so that wasn't going to work for me, and because the number one bar wasn't there to set up those rep. systems,[18] the number two and the number three and the number six didn't really make much sense either.
>
> And when you turned on those lights that are the meat and drink for most of us of what we use in the theatre [referring to the overhead lighting], the floor looked like it was made of plastic[19] – because it was – whereas if you skimmed it with a little bit of light or you kept light off it, it got reflected light in a way like you used to light old-fashioned scenery, which was that you didn't … So, I found that I was doing that with my floor – I was not lighting it directly, I was lighting the people. And then as I realised that whenever we turned on that cue that had that element in it [the sidelight], we liked it more than the cues that didn't, slowly but surely cutting the overhead rig apart from a couple of lamps that just happened to hit a couple of pieces of scenery in a nicely accidental way because it was their rep. focus and the piece of scenery shouldn't have been there but it was.
>
> Slowly but surely, as I recreated that design over and over again [at different venues] and improved on it, and solved its problems – the new problems that that kind of lighting created – I found that I could talk about it and have this so-called system, that was not by any means a unique personal discovery, but it was rationalised or it was explainable after I had done it, as opposed to: oh, this is what I am going to try and do. (Fisher 2007)

To read Fisher's account of this one aspect of his design – the use of sidelight – in terms of diagrammicity, the given factors of the set design and construction, together with the repertoire lighting rig of the Lyttleton Theatre that provided a range of predefined lighting angles not specific to this particular production, act as the equivalent of the 'pre-painting'. While purposeful with

respect to the production overall or with respect to the lighting of productions in general, the floor and the repertoire rig were in effect accidental to the lighting of *An Inspector Calls* specifically: neither had been designed to allow the creation of particular lighting effects for that production. Equally, while both the floor's surface qualities and the repertoire rig's range of possible lighting angles introduced the accidental into Fisher's creative process, the accidental did not determine the lighting for the production in the sense of randomly chosen lighting angles reflecting off the floor by chance. Rather, the accidental elements 'seeded' the development of the design, suggesting possible avenues that turned out to be productive and leading to what later became a systematic – and retrospectively rationalised – design technique. As with Bacon and Deleuze's diagram, and unlike other possible design development techniques that Fisher might have adopted, the accidental elements of floor and repertoire rig are part of the finished work (in the sense of the overall production).

However, Fisher's use of sidelight was not simply a technical solution to the problem of lighting the floor, although it started as such; rather, the sidelight came to be a key lighting motif. Based on my own experience of seeing the production (in the Lyttleton and Olivier auditoria at the National Theatre, and on tour at the Theatre Royal, Bath), the sidelight served to highlight the actors, increasingly lifting them out of the stage picture as the play progressed so that the characters were presented to the audience for detailed examination, creating, I would suggest, a visual equivalent to the examination that the character of Inspector Goole gives the Birling Family. In the later part of the play, the lighting – dominated by the sidelight – was neither figurative (the earlier use of stage light to represent the sky- and lamp-light of an evening street scene had almost entirely disappeared by this point in the production) nor was it coded (as harsh front light to symbolically represent the interrogator's lamp would have been). Instead the sidelight operated at the level of feeling, of sensation, to create an aesthetic effect. The floor and repertoire rig acted diagrammatically, as a modulator, shaping Fisher's developing lighting design in a continuous and variable way: 'whenever we turned on that cue that had that element in it [the sidelight], we liked it more than the cues that didn't, slowly but surely cutting the overhead rig'.

Diagrammicity and the Lighting Artist

In the above example, I argue that the scenic floor and the repertoire rig of the Lyttleton Theatre acted as diagrammatic elements that led to the particular use of cross-light in *An Inspector Calls*. However, these two elements are both like and unlike Bacon's diagram: like, in that they were outside the lighting artist's direct, conscious control; unlike, in that they were not created by the

artist but were pre-existing elements created by others. Also, the repertoire rig and floor were both elements that are relatively unusual: for most designs in most theatres, lighting designers have a high degree of control over their rig rather than having to work within a repertoire system, and scenic surfaces such as floors only occasionally provoke such a specific lighting treatment of the actors. How then can the lighting designer create the 'pre-painting' that Bacon achieves through making 'marks [that] are irrational, involuntary, accidental, free, random' in order to seed the creative process (Deleuze 2005, 71)? As with the painter, the lighting designer has 'clichés that are already lodged on the canvas' (Deleuze 2005, 8) but for the lighting designer there are also many other pre-existing, and in lighting terms effectively random, constraints: aesthetic, dramatic, technical and logistical. Whilst various elements can act diagrammatically to ensure that the lighting designer avoids the clichés of 'conventional' lighting approaches, it is also important that the 'diagram must not eat away at the entire painting, it must remain limited in space and time' (Deleuze 2005, 77). In other words, the accidental cannot be allowed to over-run the entire design process, which according to Bacon and Deleuze would lead to chaos. For the purposes of my project, then, it is necessary to intervene in the lighting designer's process in such a way that s/he is exposed to the 'given circumstances' so that they can be the equivalent of 'random marks', while carefully limiting that exposure. Furthermore, the choice of factors that should be allowed to function diagrammatically must be guided by their purpose as a modulator, so that the diagrammatic elements have within them appropriate aesthetic values. For these reasons, I propose that the lighting artist should work with lighting in the rehearsal room.

Whilst in current mainstream practice lighting designers are present in the rehearsal room for some of the rehearsal process, in the terms of the *design-as-(conceptual)-object* model they are there in order to develop and test the imagined design against the work of other production personnel, and to make decisions about matters of implementation. In my proposal, the lighting artist enters the rehearsal room for somewhat different reasons: rather than bringing in a pre-conceived design scheme for testing and adjustment, the lighting artist is present so that – in Fisher's terms – 'the show begins to tell [her/him] how to do it.' Furthermore (and here my proposal departs from both the conventional model of design practice and Fisher's self-description), the lighting artist should work with lighting in the rehearsal room, so as to *participate in*, as well as observe, the rehearsal process.[20] Using lighting in the rehearsal room is not a way of bringing the lighting process forward in time in order to close down and finalise the lighting for performance at an earlier stage. On the contrary, it is a mechanism for deferring artistic decisions, by allowing the lighting artist to develop a 'palette' of expressive light qualities and to rehearse

(but not finalise) its use prior to the performance event itself. Rather than producing a finalised design that simply requires procedural implementation, the lighting artist in my proposal will develop together with the lighting 'palette' a lighting 'score' that maps out the use of the palette over the duration of the performance in order to guide, but not fully predetermine, what the lighting artist does in the moment of performance.

In the first part of the present chapter I outline the historical development of the present-day roles of the lighting operator and lighting designer, together with Bentham's proposal for a role combining that of the operator with that of the designer at a time when neither existed in their current form. I have termed this combined role the *lighting artist*, and my proposal for the lighting to be rehearsed in the rehearsal room brings the two parts of the role together: the *telos* of the designer imagining and acting to realise a future; and the reflexivity of the performer-operator responding to the found circumstances. The instrumentality of the designer is replaced with (in Massumi's terms) the lighting artist probing the sensitivities and finding the responsiveness of the performance in rehearsal and, later on, in performance. In such a schema, the rehearsal lighting rig (as with the repertoire rig used by Fisher at the National Theatre) begins as an initial palette that offers an effectively random collection of light qualities equivalent to Bacon's random marks; not a model or maquette for a later, finished work, but a source of diagrammicity that will seed the lighting with the accidental and act as a modulator. As rehearsals progress, the rehearsal rig may be modified and added to, but the original palette – as diagrammatical element – will remain within the finished work without being allowed to dominate or overrun it, in accordance with Bacon's dictum. Furthermore, as well as the rig itself developing through the rehearsal process (and so the range of light qualities available to the lighting artist), so too does the deployment of those light qualities in relation to the emerging performance. The effect and affect of any lighting gesture is partially dependent on the performance context in which it takes place: in other words, the other performance elements (actors, other scenographic elements) act as further modulators to the expressive quality of the lighting. Indeed, all performance elements modulate each other in a complex network of mutual interdependence. Furthermore, once the performance takes place with an audience, the audience too becomes part of this network: the audience become a further modulator, altering in particular delicate and carefully created affects. These affects are often sensitive to small changes to the balance of the lighting or to the timing of lighting changes, and it is for this reason I want to further propose that certain aesthetic decisions are deferred until the moment of performance so that the lighting artist can respond to the further modulation by the audience.

To summarise: I want to propose a strategy for the lighting artist that does not attempt to pre-empt performance outcomes by defining an imagined, conceptual design as the starting point of the process. Rather, my proposal acknowledges the unfolding, never-fully-present nature of the design as an epistemic object, and adopts from Bacon and Deleuze the idea of diagrammacity as the basis for a process that allows the actors and audience to modulate the affective, sensational qualities of the lighting, starting from an initially random lighting palette.

Strategic Interventions:

To rehearse the lighting in the rehearsal room, starting from a randomised lighting palette.

To defer certain design decisions until the moment of performance.

Notes

[1] With the Light Console, when the operator activated a lighting change the dimmers kept moving, and therefore the light intensities kept changing, until the operator released the relevant master-key on the keyboard. If a dimmer reached its desired intensity before others had completed their travel, the operator could 'drop off' that dimmer by releasing its individual stop-key, but to do this for a large number of dimmers with precision of timing (and therefore precision of final light intensities) required of the operator an impossible manual dexterity. In the immediate post-war period, with technological improvements to luminaires and the emergence of the lighting designer as a distinct professional role, the emphasis began to shift away from the earlier techniques of floodlighting and towards new methods of spotlighting, building up the stage picture from an increasingly large number of carefully controlled beams of light rather than broad, ambient washes supplemented by occasional beams for emphasis – a shift that made the limitations of the Light Console all the more acute. By 1967, Richard Pilbrow had adopted the phrase 'multi-lantern complexity' to describe the new approach (Pilbrow 1967). Pilbrow attributes the phrase to Bentham, stating, 'I think Fred coined the phrase "multi-lantern complexity" by which he meant lighting that employed a mosaic of instruments to fill the stage with light. His taste was for a simpler bolder composition' (Pilbrow 2001).

[2] As early as 1919 J. B. Fagan, the Director of the Royal Court Theatre, had predicted prematurely that '[t]he day is not far off when we shall see the electrician an artist as well as a technical expert – seated at his

switchboard like a player at an organ – sending forth rhythmic harmonies of light … in perfect tune with the unfolding of the drama in which he himself is playing a part of no mean importance' (Fagan 1977). George Devine argued that the operator's 'ability to see the stage should allow more precision and subtlety in operation as well as accuracy of timing' and that the then present 'crude methods of control reduce what should be an orchestration to the level of driving an Underground train' (Interview with George Devine 1948, cited in Morgan 2005, 83).

[3] The thyratron was a vacuum tube ('valve') device that could be used to 'chop' the waveform of the mains current in order to change its average voltage, and so dim the connected luminaire.

[4] An exception to this general rule was Francis Reid, Lighting Manager at Glyndebourne between 1959-1968 and lighting designer for many productions there. His philosophy paralleled Fred Bentham's in some respects: he later wrote, 'I began to feel strongly that there was a case for a lighting designer to be performer as well as a composer - that is, to operate (play) the lighting cues on the control desk for which they had been designed (composed). Obviously, this was not suitable for long runs but could be viable for a dozen performances in the repertoire of a Glyndebourne season, especially as the daily focusing permitted some fine tuning of the lighting during the early performances following the premiere' (Reid 2003, 49).

[5] The professional status of set designers was established long before that of lighting designers: according to Michael Hall, scene painters, sometimes also acting as designers, were being acknowledged and credited in programmes nearly one hundred years before lighting designers (Hall 2008, 29). Michael Northen, from the outset of his career as a lighting designer in the early nineteen-fifties, contractually required his credit in programmes and on posters (a significant indicator of professional status) to be 'in the same size as the designer's credit and immediately next to or below it', suggesting that he consciously sought to acquire the established status of 'designer' (Northen 1997, 180).

[6] In an equivalent contemporary move, professionals working in the relatively new field of video projection for the theatre have again consciously modelled themselves on the generic role of 'theatre designer', according to the results of a recent survey undertaken by Rachel Nicholson and myself (email correspondence and face-to-face conversations with Jon Driscoll, Nina Dunn, Ian Galloway, and Finn Ross).

[7] The state/cue model applies to theatre lighting in the UK, and most of Europe. In the US, preset manual controls were rare (despite the early adoption of the thyratron-based preset controls in some prestigious theatres); on Broadway, unionised labour resulted in manually operated mechanical dimming being retained until electronic 'memory' controls began to be introduced in the mid-1970s. As a result, the conceptual model is different to the historical UK one, since each lighting cue is conceptualised not as one state replacing another, but as *changes* to the present dimmer levels – levels that are not recorded as part of the change 'track through' unaltered. This 'tracking' model has become increasingly used in UK practice

because it has important advantages when working with automated lights, although consoles tend to be designed to conceal some aspects of tracking from the user so as to retain the state/cue model as far as possible. Concert ('rock and roll') lighting, by contrast, has seldom worked with 'states', since the lighting is controlled in a more dynamic fashion, often with several separately controlled sequences running in parallel. Concert lighting is outside the scope of my project.

[8] Contracts may specify certain duties that the designer will perform, deadlines to meet, and so on, but these obligations on the designer follow on from the central concept of intellectual property, and are in place to ensure that the theatre producer can make the required use of the intellectual property that is being paid for (Equity/SOLT, 2002 and Equity/TMA, 2003).

[9] Gillette acknowledges, when introducing his seven-part Commitment, Analysis, Research, Incubation, Selection, Implementation and Evaluation model of the design process, that 'the design process is not simply a linear progression … you monitor your progress by continually checking back to see where you have been' (Gillette 2003, 165). However, Gillette proposes this looking back only as a way of checking that 'you are headed in the *right* direction with your proposed solution' (my emphasis), implying that there is a 'right' solution to the (presumably) well-formed problem that will have been identified by the analysis and research stages.

[10] This model is suggestive of a Platonic metaphysics, in which the Design Concept is an eternal Form, while any actual realisation is an imperfect copy.

[11] Showlight is a four-yearly international colloquium for lighting professionals working in live performance, film and television.

[12] I would note at this point that Fisher is in my experience (having seen his work in performance, and having observed his process in the rehearsal room and the theatre) a designer who more than most works in what we might call, in everyday language, an 'instinctive' way, preferring to respond to what he discovers rather than planning the minutiae. By contrast, Paule Constable plans in detail at a relatively early stage, developing both conceptual structures for the lighting, and a fully elaborated rig and cue structure. Nevertheless, for Constable this elaborate planning is provisional because it is untested. She describes her own process in the following terms:

> I plan very, very carefully, and that's not because I've got a fixed idea of what I want, but it's the more carefully I plan and the clearer my structure is, the more I have room to allow myself a creative process … so that if I get it wrong, at least I am wrong within a structure I can then change, rather than wrong within a structure that is elliptical and unformed … once I get into the space, even though I might stick to that [structure] to start with, what that then gives me is more room to manoeuvre beyond that. I like to work really quickly ... to

> paint and paint and paint, and once you've got something to look at, even if its wrong it is something to rage against, something actual in front of you to respond to, and … that's the point where I think I start to get creative. (Constable 2008)

On this basis, I would argue that neither Fisher's nor Constable's creative process is satisfactorily described by the model of *design-as-(conceptual)-object*.

[13] In Heideggerian terms, this distinction is between the establishing a 'standing-reserve' on the one hand and 'bringing forth' and 'making present' on the other (Heidegger 1993).

[14] Bacon uses the word 'graph' in English, which Deleuze translates as 'diagramme' in French. Diagramme is then retranslated as 'diagram' in the English translation of Deleuze's text I have referred to.

[15] To be clear – I make no ontological claim that Deleuze's account of Bacon's methods is also an account of the lighting designer's process; only that aspects of Deleuze's account can be used as a basis for an account of lighting.

[16] Directed by Stephen Daldry, set and costume designed by Ian MacNeil, music by Stephen Warbeck. First produced in the Lyttleton auditorium of the National Theatre, London, 1992, and later on UK tour, followed by Olivier Theatre, West End, Broadway, and other international transfers and tours.

[17] The most downstage overhead lighting position in a conventional proscenium arch theatre, and a crucial position for the systematic approaches to lighting actors' faces commonly used in the UK lighting tradition.

[18] Repertoire systems: standardised, systematic ways of lighting the stage in grid-like areas, employed by the National Theatre and other repertoire theatres. Working in repertoire means that lighting cannot be rigged and focused specifically for each production but must be based on a largely fixed lighting rig in order that the lighting can be changed from one production to the next overnight.

[19] Much of the scenic floor was designed as a representation of a cobbled street.

[20] There have been a number of precedents for the use of light in the rehearsal room, ranging from the practice of rehearsing in the actual theatre where the performance would take place throughout the rehearsal period (found in some Eastern European traditions during the twentieth century, for example) to Complicite's present practice of having a partial (though generally rather minimal) lighting rig in the rehearsal room whenever possible. However, the practice is comparatively rare, and has not – as far as I am aware – been linked to a comprehensive attempt to shift the role of the lighting artist in the way I am proposing here.

II.2 Ways of Looking

Figure 7: *The Caucasian Chalk Circle*, Berliner Ensemble, 1954

In this second chapter of Part II, I establish the basis for the third strategic intervention that underpins the practice research of my project. This intervention concerns the spatial relationships between the lighting artist, the actors and the stage, and the audience. Lighting practitioners, including designers, programmers and operators, have a complex and varying relationship with the performance *as event*, including not only the activities of the stage but also the audience. Previous accounts of the practices of the lighting designer have, I would argue, almost entirely ignored what I would see as a crucial aspect of that role: the act of looking. I examine firstly certain aspects of how lighting professionals' 'ways of looking'[1] are shaped by the spatial configuration of the theatre (itself historically contingent), how their 'ways of looking' in turn shape their relationship with the performance as performed art object and their 'ways of experiencing' it. I adopt the term *the interrogating gaze* to refer to a particular way of looking and experiencing I want to promote as a part of my project; a way of looking that is inflected by – amongst other factors – the

geometries of the performance space.[2] The present chapter, then, asks how the spatial relationship between lighting artist, stage and audience can be configured so as to promote the kind of responsiveness between the lighting artist and the other performance elements that I am seeking.

The Interrogating Gaze

> Brecht … allowed his chorus in *The Caucasian Chalk Circle* to lean against the theatre's proscenium arch and, in this precisely ambivalent position, interpose between us, the audience, and they, the actors, telling their story up there on the stage. (Mackintosh 1993, 79)

The *ambivalence* that Mackintosh identifies, above, in Brecht's positioning of the chorus in *The Caucasian Chalk Circle* (**Figure 7**) provides the first point I want to examine here in order to develop my conception of the *interrogating gaze*. As Brecht's actors stepped through the proscenium arch to take their place against it, they moved out of the framed picture of the proscenium stage (with its historical origins in the perspective scene of the Italianate theatre) and into a shared space with the spectators. The line they described – extrapolated in either direction – is a line of some significance, marking a tension between two polar-opposite conceptions of theatrical space. At one end (the infinitely distant perspectival vanishing point) is a notion of a theatre to be observed at a distance by an isolated, generalised subject, and at the other end (in the centre of the audience) a theatre that takes place in the here-and-now of a community of spectators. At various times and places theatre makers have, I would argue, adopted philosophical positions along this metaphorical line: Renaissance monarchs built court theatres that can be seen as a machine to demonstrate the exertion of political and cultural power (Kernodle 1944, Wiles 2003); Wagner created a theatre designed to isolate spectators in a darkened auditorium so they could be drawn into a fictional place cinematically framed and free of worldly distractions (Burlingame 1875); Stephen Joseph's theatre-in-the-round could be argued to have reinforced the audience's awareness of its collective self by making the audience the visual background to all stage action, emphasising the common humanity of all participants by minimising the distance between audience and actor (Joseph 1967).

One might argue, more generally, that the spatial arrangements of places of performance have had a reflexive relationship with philosophies of theatre: as one has been influenced by social, cultural, political and technological changes, it would seem to have provoked a response in the other. New ideas about how theatre should work and how it should relate to its audience demand

new spatial configurations. These new configurations in turn not only influence the experience of the audience, but also the relationship between the theatre practitioners – including the lighting professionals – and the performance they work to create. Because the great majority of performance spaces (at least in the Western tradition since the seventeenth century) have been permanent, purpose-built architectural constructions, one might claim that philosophies of theatre have taken concrete form, and projected an architectonic influence into the future, sometimes long after the originating philosophy has been abandoned or subsumed (perhaps with certain contradictions emerging) within later ideas. I would argue that the relationship of present-day lighting professionals to the performance art object – the nature of their (expert) *gaze* – is in significant part determined by the spatial arrangement of the theatres in which they work, and that the layout of the majority of these theatre spaces has been influenced by a tradition of theatre design originating (in the UK) from the convergence of the Elizabethan playhouse and the Italianate theatre. I would further argue that the gaze of the lighting professional promotes certain kinds of self-perception and certain kinds of creative contribution by that professional, while suppressing others.

Brecht's positioning of his chorus against the proscenium arch proposes a 'way of looking' for the audience. We are encouraged to watch not only the main action of the scene, but also to watch the watchers watching; we consider, perhaps, how others are interpreting and responding to the unfolding drama, and reflect on our own reactions. Such a way of looking would meet Brecht's political agenda for his theatre, but it has earlier historical precedents. In the late sixteenth and early seventeenth century English court theatres, perspective scenery was aligned opposite the royal viewing position, as with continental court theatres of this and earlier periods. Here however, as John Astington observes, the remainder of the audience were 'grouped around these two central elements of stage and state':

> Court theatres generally were not made to give the best possible view of the stage to the greatest number of people … Audiences at court came to see the entertainments, naturally, but they also came to watch the monarch watch, and to register their own presence at such an occasion. Lesser members of the court watched the greater, and so on. The seating, turned towards the royal seat as much as to the stage, reflected a double spectatorial function, though in effect display and observation at court assemblies must have been complex and many-layered. (Astington 1999, 95)

It is this 'complex and many-layered' way of looking that I want to call the *interrogating gaze*, and I develop the meaning that I want to attach to this term through the present chapter. The playhouses of the late seventeenth and early eighteenth century had a composite form, conflating

the Italianate court theatre (as it had been adapted for plays and more especially masques by the English court) with the varied forms of the commercial Elizabethan playhouses, and here I would argue the interrogating gaze is particularly clearly articulated and strongly promoted (Figure 8).

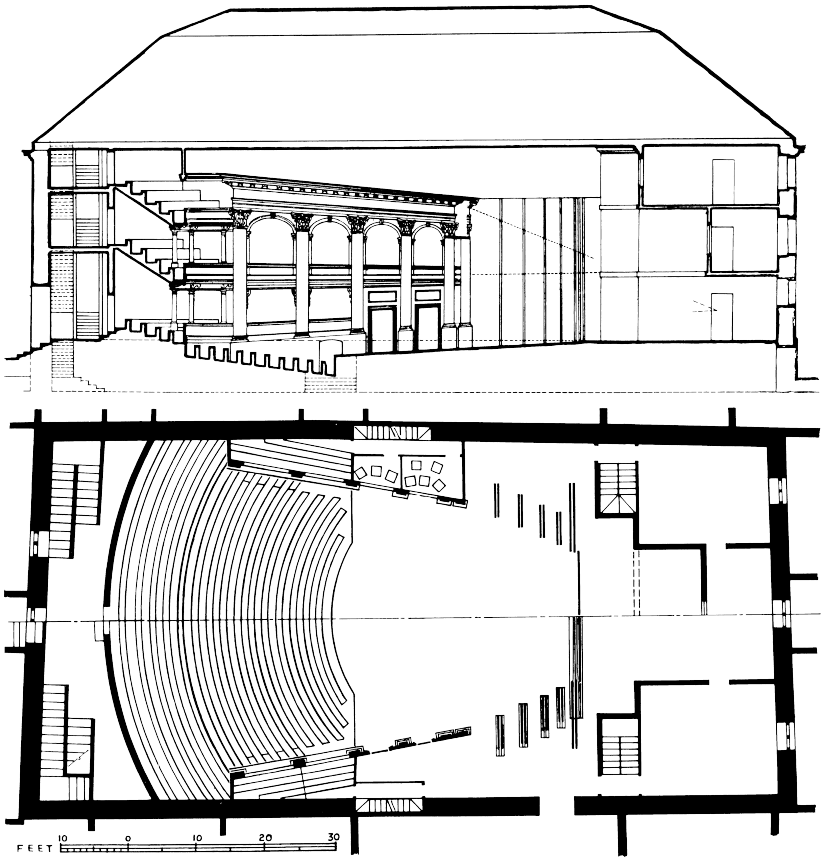

Figure 8: Section and plan of a playhouse, probably Drury Lane, based on a drawing by Sir Christopher Wren, 1674

The auditorium, with its three levels, partially wraps around the platform, bringing as many people as possible close to the main acting area. It also populates the side walls and on-stage boxes, so that from all parts of the house other spectators are within the field of view. Here, the motivation appears not to be to enable the commanding gaze for a singular sovereign, but to ensure for everyone an intimacy with both the actors and with a community of fellow spectators – an intimacy of human contact that reminded each spectator of the fictional nature of the material being presented, and promoted something akin to a dialogue between actor and audience as if a conversation between friends. Furthermore, such a theatre geometry that populates the walls of the auditorium encourages – even requires – a physical as well as metaphorical 'leaning forward'

attitude, promoting active study and engagement rather than passive reception. One might conclude, as Jocelyn Powell does, that ideally, emotions and sensations were evoked by the performance, but were themselves objects to be studied, evaluated and discussed by the audience:

> The art of the Restoration stage … plays with feeling constantly; but this play of expression is controlled by a structure of ideas which is intended to be understood. The audience is excited by sensationalism; but this excitement is both intellectual and physical, it comes not only from the expression but from the conception of the work. (Powell 1984, 60)

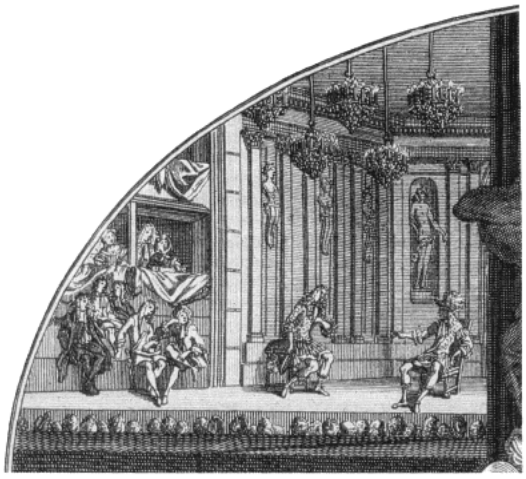

Figure 9: Audience members on stage, 1690

The study by the audience of the emotional effects produced by the performance was aided by the wrapping of the seating around the platform, and in some cases by the placing of seats directly on the stage (Figure 9), ensured that the audience was aware of itself, and members of the audience could examine effects of the stage action on other audience members.[3] The theatre becomes, David Wiles suggests, 'a space which allowed people to perform their feelings. … the performances which mattered most were those of the principal spectators. The actors were a catalyst, not the be-all and end-all of an aesthetic experience' (Wiles 2003, 223). Such catalysis was promoted, I would argue, by the theatre's architecture and internal design. Feelings are performed, ideas and sensations are presented and examined; the spectators exert – and fall under – an *interrogating gaze*.

The Geometry of Present-day Theatres

Having outlined the rather complex notion that I am calling the interrogating gaze, and how it may be promoted by particular theatre geometries, I want to begin to apply these ideas to present-day lighting professionals – in particular the lighting designer and the lighting operator. To do so, we must examine the range of theatre geometries in which they may work. Despite the move in the later part of the nineteenth century towards three-dimensional modelled scenery in place of *trompe l'oeil* paint effects on flat surfaces, and the move towards more symbolic and less representational staging styles (led by theorist-practitioners such as Craig and Appia), until the middle of the twentieth century new theatres retained three aspects of theatre architecture developed originally to support perspectival illusion: the proscenium arch, the raked stage, and the positioning of the best seats close to the central axis. Whilst the first half of the twentieth century saw some experiments with the relationship between the actor and the audience, in the UK it was not until the nineteen-sixties and seventies, with the substantial programme to (re)build regional theatres for occupation by the new subsidised repertory companies, that the proscenium arch and the raked stage were (largely) abandoned, together with the notion of an 'optimum' or 'privileged' viewpoint.[4] Theatres built during the construction boom of the nineteen-sixties and seventies mostly adopted the 'continental' seating layout, with a single raked tier of seats fanning out from the centre point of the stage (a form pioneered by Wagner's Bayreuth Festspielhaus nearly a hundred years earlier) to give – supposedly – an equally good view to all:

> [a]n early 20th century desire for a more egalitarian society seized on this 'cinema-style' with enthusiasm. In the older vertically-stacked theatres, the central "king's box" had the best view. Let now everyone share that view. The result can be 2,000 people all trying to share the 'best' view. Add modern safety codes to modern expectations of comfort and the result is over-stuffed, barren, soulless, fan-shaped halls with blank side walls, devoid of atmosphere, where from the furthest seat the actor appears a midget sometime [sic] under one centimeter high. Neither king nor commoner would be satisfied sitting in the back row of a 2,000 seat royal, but now egalitarian, box. (Pilbrow 1993)

Later again, theatre architects and consultants shifted the emphasis away from a 'technical' model of perfect sightlines and towards auditorium designs that aimed to promote the audience's awareness of itself as a cohesive group sharing its collective experience of the performance – a return to the courtyard and multi-tiered layouts of earlier periods. However, only a small number of theatres were built in the late twentieth century, whether to the 'courtyard' or any other design, and comparatively few theatres built before the middle of the nineteenth century survive. The present-day mix of theatres in the UK is varied, but – in terms of seats sold each night – dominated by two forms: the multi-tiered, picture-frame proscenium auditorium characteristic of the late

nineteenth century but also built since then, and the 'continental' arrangement of a single fanned rake of seating facing (or only slightly wrapping around) an end-stage.[5] Large parts of the theatre industry (particularly ballet, opera, and commercial theatre including West End and touring) operate primarily in proscenium arch theatres, and have developed a production apparatus, with technical, artistic, procedural and economic dimensions, that makes it difficult to work any other way. Equally, for a theatre that is to present a mixed programme of drama, opera and dance, it must offer a standardised facility (including stage size, technical resources, sightlines, audience capacity) in line with other theatres on the touring circuit, or touring companies will not visit. Thus the production apparatus of commercial theatre is self-sustaining, and widely influential. Resident companies often have economic or artistic imperatives pushing them to co-produce or tour their productions: again, the standardised apparatus is promoted. Because this apparatus is widely seen as the 'correct' model of theatre production (or at least the one that accrues the highest status) within the professions of the theatre, and is promoted by many of the vocational training and education institutions, the values and practices associated with proscenium arch theatre are also commonly found in other models of production, even when they are arguably not appropriate. For lighting professionals (designers and operators), the dominant theatre geometry that determines their spatial relationship with the stage, and which shapes their perceptual and conceptual relationship with it – their complex *gaze* – is the geometry of the picture-frame proscenium theatre.

Ways of looking: the practitioner's viewpoint

Historically, Nigel Morgan observes, the newly distinct role of the lighting designer began to take on the lighting responsibilities previously discharged by the director in the decade following the Second World War.[6] The director of the late nineteen-forties was at the apex of a pyramidal command structure, in which, '[t]he bosses were the Directors … and they made all the decisions. They told the actors where to go (they rarely told them why) and they told the technicians what to do' (Reid 2005, 302). Francis Reid goes on to describe the director during rehearsals in the theatre:

> The grandest [directors] were very grand indeed and the very grandest of them all had a butler in constant attendance to lay white linen on the production desk and serve anything from a champagne snack to a full silver-service dinner while his sarcastic commentary on the efforts of the crew boomed through all the FOH and dressing room speakers. The director sat there alone - there was no production team. If there was a tricky lighting effect, Strand [the lighting company] would be sent for.

Reid's description, we may suspect, is heightened for rhetorical effect; nevertheless it indicates the authority of the director, singularly located at the production desk much as the renaissance or baroque monarch sat in the Royal Seat, commanding all within view. Later, the production desk came to be shared with other members of the emergent production team, including the lighting designer. While the production desk may now be identified metaphorically as a 'nerve centre' rather than the former 'Royal Box', its location is still largely determined by traditions formed when the role of the lighting designer was first becoming established in the proscenium theatres of the major producing theatres and companies.[7] Within these traditions, the production desk, and therefore the lighting designer, is located at a position that has been determined to have 'a good view' and to be a point of command; the decision is made either by the technical staff of the theatre, or (because the production desk needs to be supplied with power and communications) by the theatre consultants responsible for the design of the theatre's technical infrastructure. In either case, there is generally an assumption that there is one 'correct' location for the production desk (it is rare for alternative locations around the auditorium to be offered[8]), and that the correct location equates to the position of the 'best' seats in the auditorium: on or near the centre line, in either the stalls or the dress circle (in a multi-tiered theatre) or about half-way back (in a single-tiered theatre).[9]

Just as the privileged position of the Royal Seat in the Renaissance court theatre promoted the monarch's role as the principal spectator, through whose eyes other spectators saw the performance vicariously, the privileged position of the production desk promotes the role of the lighting designer as surrogate spectator. Lighting designers are well aware of this role and their responsibility to spectators in every part of the auditorium: Pilbrow exhorts the lighting designer during the dress rehearsal to 'go all over the theatre. He must see his lighting from the stalls, the gallery and every other part of the house, ensuring that everything he means to be clearly visible is clearly visible from the farthest seat' (Pilbrow 1979, 76). The implication of Pilbrow's remarks, however, is that while the role of surrogate spectator is seen as a professional responsibility, it *follows on* from the responsibility of the designer to her/himself: only once the performance has been lit to be seen from the production desk is the view from elsewhere in the auditorium tested against this 'gold standard'. Within the mainstream of practice in proscenium arch theatres, the lighting designer is held at the production desk both by practical constraints (the need for technical and other facilities), and by the way in which her/his role as surrogate spectator has been traditionally constituted.[10] In summary: the auditorium layout of proscenium arch theatres has historically been informed by conceptions of theatrical space that have placed the preferred

viewing position (and therefore the 'best' seats) close to the central axis. The 'best' seats, and therefore the production desk, and therefore the lighting designer, are located at a privileged position that offers a synoptic and commanding view from which operations may be directed, and which promotes in the lighting designer a sense of her/himself as distanced yet controlling, distinct from the 'art object' on stage that s/he (jointly with the other, similarly located, members of the creative team) creates and manipulates.

As I discuss in chapter II.1, one of the aims of my project is to shift the conception of the creative process away from the model of *design-as-(conceptual)-object* with an emphasis on action and control (Massumi's 'instrumental reason') to the model of *design-as-a-process-of-unfolding* with an emphasis on sensitivity and responsiveness to the moment (Massumi's 'operative reason'). Such a relationship between the lighting artist and the artistic work that is made is promoted, I would argue, by what I have called the *interrogating gaze*, with its complex networks of interaction and responsiveness, and its alertness to the activity of the stage, to other audience members and to the spectator's own feelings and thoughts, as well as its questioning, 'leaning forward' (metaphorically and perhaps literally) attitude. A shift in the spatial location of the lighting designer, as s/he takes on the reformed role of lighting artist, might – on the basis of the above – support the aims of my project. However, theatre lighting does not constitute a single professional role, and my project proposes the conflation of the roles of lighting designer and lighting operator, so it is to the later that I want to turn now.

Figure 10: The lighting operator under the stage (1887), at the end of the dress circle (1941), and in the control room (1976).

Candle, oil, gas and early electric lighting in theatres was always operated from beneath the stage or from wing or perch positions. It was not until after the Second World War that Bentham's Light Console and subsequent control systems began to be installed in theatres, allowing the relocation

of the operator to a position where s/he[11] could see the stage. In existing theatres, when the lighting control was updated, the operator's position would be located pragmatically wherever a suitable location could be found: typically in an auditorium box close the proscenium (made redundant as a place for audience seating by changing ideas of what constitutes a 'good seat'), or at the rear of the stalls. Newly built theatres were designed with (often spacious) control rooms at the rear of the stalls seating (Figure 10).[12] The two locations for the operator, pragmatically arrived at – the side-of-auditorium box and the rear stalls – result in quite different spatial relationships between operator, actors and audience, and – in my extensive experience as a lighting operator in a range of theatre geometries – these relational differences have a significant impact on the operator's perceptions and understandings, including understandings of how theatres themselves operate, and how the operator's role is constituted. The auditorium box places the operator far from the central axis, close to the stage and often raised somewhat above it: the operator can see (and hear) the audience and is aware of her/himself as a member of the audience, sharing the same space. The slight elevation encourages a 'leaning in' in order to see the stage well, and the closeness to the stage (together with the absence of the glass windows often found in rear-stalls control positions) 'gives the operator a tremendous feeling of involvement in the show.'[13] Echoing the seating of the restoration and Georgian playhouse with its intimate spatial relationship with the activity of the stage, the auditorium box operating position, I would argue, promotes the operator's *interrogating gaze* (situated, self-aware, a 'lean-forward' attitude). However, such operating positions are now rare outside of experimental and informal theatre spaces,[14] having been replaced by control rooms located at the rear of the auditorium.[15] Such an operating position follows the geometry of the proscenium theatre even in continental-style auditoria: located on or close to the central axis and facing the pictorially presented stage. The frame of the proscenium arch is doubled by the framing aperture of the control room window, further distancing the already distant stage. If the operator can see any members of the audience at all, it is the backs of their heads, since s/he is located further from the stage than any of them, and the now almost universal glazed control room window completes a spatial, visual and acoustic separation of the operator's experience from that of the audience. Distanced and detached from the objectified stage and its action, yet (in part) controlling that action, we might suppose that the operator's 'way of looking' would mirror that of the lighting designer at the production desk. However, just as technological developments permitted the move of the operator from backstage to front of house, so more recent technological developments have permitted and perhaps encouraged another change – not spatial, but attitudinal.

The gradual computerisation of lighting control systems has allowed the automation of the playback of lighting in performance, to the point where (much of the time) the only action required by the operator is to press the 'go' button when instructed by the stage manager calling the cues. The gradual erosion of the responsibility of the operator for the expressive quality of the lighting performance, to the point where s/he makes almost no artistic contribution at all, has undermined the controlling gaze that we might suppose would be promoted by the rear-of-auditorium control room. While the lighting operator still commands – pressing the 'go' button triggers lighting changes – the command only exists as a mechanistic process, since its aesthetic dimension has been predetermined during rehearsal and stored for automated replay by the computerized lighting control. The operator's gaze under such circumstances is, at least metaphorically, blank.

Promoting the interrogating gaze

I have argued that the spatial location of the lighting designer at the production desk, in the picture-proscenium theatres in which the working practices of lighting designers have principally developed, promotes a 'way of seeing' in which the stage, and hence the art work the lighting designer contributes to, is objectified and distanced. The synoptic view of the stage that this produces encourages the assigning of a similarly synoptic (rather than dynamic) role to the lighting of the performance; the stage is seen as a (literally) framed space, within which the lighting tends to function as a further (conceptual) framing device, providing the environment for a stage action that the lighting designer and her or his work is both literally and metaphorically *outside of*. Such a separation from and objectification of the design as a part of the overall artwork serves, once again, the model of *design-as-(conceptual)-object* I describe in chapter II.1 and which I want to reject in my project. On the other hand, promoting the lighting artist's *interrogating gaze* through a change of location in the theatre space, as one part of an overall programme of reform of her/his role, might be productive in promoting a greater sensitivity towards, and affinity with, both the activity of the stage and the audience's response to it. This notion, then, underpins the strategic intervention proposed in the present chapter.

Towards a new geometry

Certain spatial geometries have been widely viewed, in various cultures and historical periods, as having particular potency.[16] For Mackintosh, the *sacred geometry*, upon which 'a high proportion of successful theatres are set out' is 'a system of … theatre space … arranged not for repose but to

encourage the movement of energy' (Mackintosh 1993, 161-2). Mackintosh cites the actor Albert Finney talking about the failings of the Olivier auditorium at the National Theatre, London:

> If you stand on the stage of a "proper" theatre, there is a circuit of energy flowing out to the audience and back to the performer again. [In the Olivier theatre] the circuit wasn't completed. The energy going out of me did not come back. Instead of being recharged, like a dynamo, I felt like a battery running down. (in Mackintosh 1993, 154-5)

Mackintosh further describes the nature of this energy:

> Although this energy flows chiefly from performer to audience the performer is rendered impotent unless he or she receives in return a charge from the audience. This can be laughter in a farce, a shared sense of awe in tragedy and even a physical reciprocity to the achievement of dancer or actor. The energy must flow both ways so that the two forces fuse together to create an ecstasy which is comparable only to that experienced in a religious or sexual encounter. (Mackintosh 1993, 172)

Finney's term 'circuit' implies that the energy flows through and between each member of the audience before returning to the actor, suggesting a performative invocation of their *interrogating gaze*: look carefully, and then again! However, throughout his book Mackintosh not only promotes a philosophy of theatre that privileges the form of 'encounter' between actor and audience that is invoked by the flow of energy he describes, but he also privileges those spatial geometries that (in performative terms) channel and direct that energy: for Mackintosh, this is primarily the geometry of the Restoration Playhouse.[17] Here, intimacy is promoted through close proximity of audience to stage, and the audience's awareness of itself is promoted through closely-packed seating that wraps around that stage and ensures that all spectators can see other spectators as well as the stage. I would argue that the *interrogating gaze* is the condition of being connected into the circuits of energy, and so in order to promote the role of the lighting artist *as performer* (my project), it is necessary to connect her/him into the circuits of energy already shared by other performers and audience members. This is turn requires strategies that, through appropriate spatial geometries, promote the lighting artist's *interrogating gaze*.

However, while Mackintosh's notion of 'energy', combined with Finney's 'circuit', together form a metaphor that is expressively charged in a way many theatregoers and theatre professionals will identify with, it is rather intangible. A more concrete way of thinking about the 'circuit of energy' is suggested by research into the social role of facial expressions:

> facial expressions are much less involuntary responses to inner stimuli than social signs and … the distinction between genuine, spontaneous expressions and simulated, deceptive expressions is far from clear-cut. Happy people smile more in the company of others than when alone … and viewers of films react more

> demonstratively when observed by others than when unobserved. (Bogue 2003, 87-8)

If 'viewers … react more demonstratively when observed', then an auditorium geometry that makes spectators more aware of one another, and provides viewpoints that include – as well as the stage itself – the *faces* of fellow spectators and not just the backs of their heads, as well as close enough proximity for expressions to be seen, might be a geometry that serves to amplify what is interpreted as the expression of emotion. From the performer's point of view, such an auditorium would be a tuned instrument – a *resonator* – that returns emotional 'energy' manifold.[18] To connect the lighting artist into the circuit in order to heighten her or his sensitivity to the audience's response, s/he must not only be positioned so as to experience the activity of the stage as a representative spectator might experience it, but also be able to see the facial expressions of spectators; furthermore, to be a fully participating element in the circuit, the lighting artist must be able to be seen by the audience. Neither the conventional production desk, nor the conventional control room, nor even the stage itself, offers such a position. However, in the geometry of the playhouse, the side-of-auditorium box I have already described and associated with the interrogating gaze offers one possible such position. While other geometries may be constructed to meet the requirements I have described, any solution must be able to sustain a certain tension or *ambivalence* – the ambivalence of Brecht's chorus with which we began, who are both watchers of and participants in the stage action. The lighting artist, as I have conceived the role, is neither fully spectator nor fully actor, but something of both, and a geometry that locates the lighting artist so as to achieve such an ambivalence will, I argue, promote the interrogating gaze with its associated *discourse* between spectator and stage.

Strategic Intervention:

To strategically position the lighting artist in the geometry of the performance space in order to engage her/his interrogating gaze, thus connecting her/him into the 'circuit of energy' between lighting artist, activity of the stage, and spectators, and promoting her/his role as a performer.

[1] 'Ways of looking' conflates the titles of two works by John Berger: *Ways of Seeing* (Berger 1972) and *About Looking* (Berger 1980).

[2] Laura Mulvey coined the phrase 'the male gaze' as part of her conscious politicization of the act of looking (Mulvey 1975); my use here of the word *gaze* is intended to serve as a reminder that '[l]ooking is not indifferent. There can never be any question of "just looking"' (Burgin 1982).

[3] Seats have occasionally been placed on the stage since the Restoration period: in Spring 2007 both the Broadway musical *Spring Awakening* (opened on 10th December 2006 at the Eugene O'Neill theatre, New York, closed 18th January 2009) and the West End production of *Equus* (opened on 27th February 2007 at the Gieldgud Theatre, London, closed 9th June 2007) had audience seats on the stage as a part of the set design. However, in both cases they were some of the cheapest seats available, suggesting that producers did not expect ticket buyers to regard them as the best seats in the house. One member of the *Equus* audience reported that she felt put off by being able to see the main body of the audience, implying that the gesture of seating her on the stage was, on its own, not enough to activate her *interrogating gaze* (Front Row 2007).

[4] Many experimental theatre forms in the first half of the twentieth century arose out of utopian ideals, such as Appia and Dalcroze's theatre at Hellerau (Volbach 1968, 82-93), Walter Gropius' proposed 'Total Theater' (Gropius 1961, 10-14), Norman Bel Geddes' series of proposed theatres (Izenour 1977, 96-99), and – to a lesser extent – Stephen Joseph's theatres-in-the-round (Joseph 1967). Such theatres were either not realised at all, or were not immediately widely influential on new theatre building.

[5] A sample of theatres in the 2003 British Theatre Directory suggests that seats in proscenium arch theatres outnumber those in other formats by a factor of more than three to two in London, and by a factor of more than five to one in the UK regions. My sample technique is limited: it assumes, for example, that all theatres sampled present the same number of theatre performances in a given period, and that all theatres sell the same proportion of their capacity for each performance. Nevertheless, the results give a broad indication of the dominance of the proscenium arch geometry.

[6] Nigel Morgan describes the emergence of the lighting designer in considerable detail in *Stage Lighting Design in Britain: the Emergence of the Lighting Designer* (Morgan 2005). Although the early lighting designers (and many present ones) started as stage managers or theatre electricians, as lighting designers they took over responsibilities previously carried out by directors.

[7] Michael Northen, for example, began his career as a lighting designer in the Memorial Theatre in Stratford-upon-Avon, the Royal Opera House, Glyndebourne, and various West End theatres.

[8] In my own experience as a lighting designer I have very rarely been asked where I would like the production desk to be placed, and I have generally encountered either a tacit or an explicit resistance to any request to locate the production desk other than in its customary position.

[9] Asking technical staff about the reasons for the location of the production desk in their theatres produced responses such as 'it is convenient', 'the LD wants to plot from the stalls', 'that is where the power is for it' and 'so [the production team] can make sure the expensive seats have a good view' (personal email correspondence with staff at the National Theatre, London, 8/11/06 and the Shaftesbury Theatre, London, 29/1/07).

[10] Jackie Staines, resident lighting designer at the in-the-round Stephen Joseph Theatre, Scarborough, between 1987 and 1994, advocates a different model in which the lighting designer moves continuously around the theatre during the production process. This method relies on the designer being able to free her/himself, in practical terms, from the production desk: Staines' technique was to memorise all the required technical information (principally channel numbers for every luminaire in the rig) and communicate with the lighting operator and other production personnel without an intercom, by voice or gesture in the small auditorium. As a resident lighting designer in a theatre-in-the-round, Staines was able to develop her own working practices (including learning the channel numbers of a largely fixed lighting rig) in a way that is not readily possible for lighting designers whose practices have developed in the dominant picture-frame proscenium theatre form and freelance employment pattern. Furthermore, we might speculate that such an innovation in practice would be easier in a theatre-in-the-round that – by design – has no 'natural' privileged position in which to locate the production desk. Staines reports that visiting lighting designers to the Stephen Joseph Theatre were unable to change their working practices to suit the in-the-round format, always using a conventional production desk (Personal email correspondence, 5/7/07).

[11] Writings of the time always assume a male operator, though this was not universally the case.

[12] Nevertheless, even in the late nineteen-sixties many theatres still used older control systems located backstage. Francis Reid's notes on theatres that he was regularly lighting at then indicate that only 50% had front of house control positions at that time (Reid 2005, 81-3).

[13] Francis Reid, writing about the 1974 lighting control installed in a stage box at the Birmingham Hippodrome (Reid 2005, 104).

[14] The Royal Exchange Theatre in Manchester is a notable exception of a 'main house' theatre with open control positions in the midst of the auditorium (Bentham 1976a, 20).

[15] While I have chosen to use a spatial model for the present analysis, other methodologies are also possible, and the term 'control room' suggests a linguistic approach might also be productive. For example: where

traditionally the stage manager calling the cues required by other performance personnel has been located at the 'prompt desk', and the lighting operator in the 'lighting box', in theatres built since the mid-twentieth century they are typically located in 'control rooms'. Power stations and other industrial plants have 'control rooms' to supervise and control 'processes'; theatre (we might read from this evidence) has become industrialised. From such a reading a different, though perhaps largely congruent, discourse of the place of the lighting designer and operator within the theatre economy might be made.

[16] Architects of the classical period, and subsequent architectural schools that revived the classical or based their philosophy on it, took geometry as a starting point: according to Vitruvius, '[a]rchitecture depends upon Order, Arrangement, Eurythmy, Symmetry, Propriety, and Economy' (Vitruvius 1960, 13), and 'Eurythmy is beauty and fitness in the adjustments of the members ... where they all correspond symetrically' (Vitruvius 1960, 14). In the nineteen-twenties Le Corbusier claimed that '[g]eometry is the language of man', meeting the 'necessity for order', and based his geometry on the *regulating line* that is a 'guarantee against wilfulness' and 'an assurance against capriciousness: it is a means of verification which can ratify all work created in a fervour' (Le Corbusier 1930, 68-75).

[17] The only other theatre geometry that Mackintosh shows favour towards is Tyrone Guthrie's series of thrust stages.

[18] Nicholas Ridout has proposed the term *vibratorium* as 'a model for thinking about the transmission of affect in the theater' in which 'the vibrations of sound and light are manipulated [so as to] bind together the spectators in the sociality of an audience' (Ridout 2008). McAuley offers a similar account (2000, 123-5).

II.3 Playability, Immersion and the Virtual

A theatrical anecdote

The Stage Manager called the cues to start the show, including LX Cue 1 to take out the houselights. A short while later the Stage Manager called LX Cue 2, and the houselights came back on. She queried this with the Lighting Operator, who was surfing the 'net on his laptop. The operator checked the screen of the lighting console and said that the houselights weren't on, and that all was well. After some discussion, the Lighting Operator was persuaded to look out of the control room window, at which point he saw that the houselights were indeed on, and he took them out.[1]

In this third chapter of Part II, I establish the final two strategic interventions that underpin the practice research of Part III, asking how the relationship between the lighting operator (and so the lighting artist in my project) and the lighting control interface might be modified so as to advance my project's aims. The anecdote above reinforces the arguments I make elsewhere in this thesis about the role of the lighting operator, and the quality of attention operators typically pay to the business of the stage during a performance. I present it here, however, because it also provides evidence of something else: the lighting operator's relationship with the lighting control system. When told that the houselights are still on, the operator in this tale initially prefers to consult the data presented by the control surface and its associated screens than the evidence of 'reality' as seen through the control room window. For this particular operator at least, the lighting console is (until proved otherwise) an authoritative and more readily available source of information than the illuminated auditorium. If the lighting console can shape the operator's relationship with the performance, and the values that operate in that relationship, as powerfully as this anecdote suggests, then the design of the console is critical in determining the conceptual model of lighting that structures its control as part of the performance, as well as the expressive potential that the lighting system makes available to the lighting artist.

It is these two aspects of the console – its conceptual control model and its expressive potential – that the present chapter investigates. I begin by considering how lighting consoles have come to

present the underlying lighting system not as a material object to be controlled but as data to be manipulated, with a conventional data-model that structures the organisation and control of lighting in a particular way with particular consequences. This data model uses the geometry of the grid, and is presented as existing in a virtual space 'within' the console. I go on to propose an alternative data model that better fits the aims of my project. I then consider the lighting artist's relationship with the physical controls of the console, arguing for a conception of the console as an *exosomatic organ* that extends the artist's expressive capabilities, and permits and promotes the artist's quality of attention that I argue is required for my project. Each of these two lines of enquiry leads to a strategic intervention.

In the Introduction to Part II, I argued that one of the radical departures from previous practice the Light Console represented was the separation of the state of the controls on the console from the state of the dimmers, and so from the state of the light on stage. On previous systems such as the Grand Master, each dimmer lever both controlled the dimmer *and* indicated its level, so the front panel offered a synoptic display of the state of the lighting system (and so of the light on stage) 'at a glance'. Bentham's Light Console broke this direct link between the interface object and the state of the control system: the operator used selector switches to choose which dimmers to control (the stop keys on the organ console), and issued commands by holding down keys (the manuals on the organ console) to drive the selected dimmers to a higher or lower intensity (Bentham in Reid 2005, 182). These commands were relative, not absolute, and therefore relied on the operator either remembering, or seeing directly by looking at the stage, the current level of each dimmer in order to know which dimmers to move and by how much. The Light Console's minimal display devices offered no synoptic view of the overall system state; in the terms used by Donald Norman, it offered users little 'knowledge in the world', instead requiring them to rely heavily on 'knowledge in the head' (Norman 1998a, 54-80).

The Preset Electronic (which I describe in chapter II.1) and other controls based on the idea of presetting returned to providing a lever or fader for each dimmer channel as the Grand Master types of control had done, but later lighting controls once again disconnected the interface state and system state. The introduction, at the beginning of the nineteen-seventies, of memory controls that could record entire stage lighting states electronically for later replay, together with the move to a 'multi-lantern complexity' (Pilbrow 1967) and so to large numbers of dimmers, meant that the

fader-per-dimmer approach became impractical. Physical faders came to be replaced by continuously rotating encoder wheels combined with a numeric keypad to select channels. As with the Light Console's use of organ stop and manual keys, the encoder wheel separates the control of the data (the intensity value of the dimmer) from its display to the user since the positionless wheel cannot be marked with an absolute scale. However, current consoles have sophisticated information displays using screens and software-generated graphics.[2]

For as long as the control and the display were one and the same – the Grand Master's dimmer lever or the preset console's fader – the system state and the interface state were essentially the same thing. The mechanism sat, as it were, on the console's surface, creating the (somewhat illusory) idea that what the operator saw and touched was all there was. With current consoles, the operator becomes aware that they are using a series of interface controls in order to manipulate 'data' that is somehow *in* the console; data that can be displayed in various ways on the sometimes numerous screens, and which is created, edited and finally used to play back the lighting for a performance. The adoption by console designers of idioms familiar to users from personal computers – for example, graphical on-screen elements including lists, grids of numeric data, and alternative configurable views presented in 'windows', as well as input devices such as alphanumeric keypads and trackballs controlling on-screen pointers as well as data – reinforces the sense that there is a 'virtual' lighting control system comprising data and functions that is distinct from (and independent of) the physical hardware. As N. Katherine Hayles puts it, '[lighting] information [has] lost its body' (Hayles 1999, 2).

I want to consider this virtual dimension of current lighting control systems in further detail, and in two respects. Firstly, I want to discuss the ways that the data are structured and manipulated in the virtual space of the lighting console, and how this structuring relates to the process of creating lighting for performance with reference to my project. Secondly, I want to consider the operator's engagement with the 'virtual' environment provided by the console, in relationship to the operator's engagement with the 'real' of the physical console and the activities of the stage.

The state/cue model

> When we concentrate only upon the information represented within our artifacts, anything not present in the representation can conveniently be ignored. In actuality, things left out are mostly things we do not know how to represent, which is not the same as things of little importance. Nonetheless, things not represented fall in importance: They tend to be forgotten or, even if remembered, given little weight … We value what we can measure (or represent). (Norman 1993, 52-3)

Current lighting consoles enable the operator to create, edit, view and deploy lighting data – data that represents and controls the light on stage. Such a description of a lighting console brings to the fore its virtual aspects as an information device, and is a description that (following Norman in the quotation above) we might see as partial and value-laden. That partiality comes about both because as Norman points out the information represented is incomplete, but also because it is presented in particular ways, which become progressively normalised. Information comprises the relationships between data: relationships both within the data 'set' and with external points of reference. Thus the *way* that data is presented – its groupings and layouts, its annotations and connotations, the contexts in which it is displayed, the methods that are offered to manipulate it – determines the information that it represents. If we 'value what we can … represent' then what we choose to represent, and how we choose to represent it, embodies and reinforces our values, including in the case of a lighting control system our aesthetic values (that is, the role of light in the making of performance meaning and affect). That reinforcement, however, does not compensate for what is systematically omitted.

The general adoption of lighting controls based on presetting from the mid-twentieth century onwards both responded to and reinforced a particular conception of lighting on stage and its control over time – a conception that is still pervasive in professional theatre lighting practice and which, as a part of my project, I want to resist. I term this conception the 'state/cue model', in which the lighting designer conceptualises, develops and implements the design as a series of static lighting pictures or *states*, with transitions between states occurring as a series of events or *cues*. Manual presetting controls offered two, three or more 'presets', each of which represented the intensity levels for one lighting state. The lighting proceeded through the performance by cycling through the available presets as lighting changes were demanded. Thus the general principles of the state/cue model were established: create a static lighting 'picture' on one preset, and when a change is required, replace it over a period of time (from instantaneous to several minutes) with another state on another preset. Later, memory controls continued with the by then well-established principles of the state/cue model, recording states in electronic memory. Operationally, manual and memory consoles were the same: prepare complete lighting states in advance, and cross-fade from one to the next on cue during the performance.[3]

The structuring of lighting data according to the state/cue model is historically apparent not only in the design principles of manual preset controls and subsequent memory controls, but also in lighting documentation and console screens. Cue sheets, graph plots[4] and on-screen cuelists and

channel displays all present quantitative lighting data in numerical form, laid out in grids (Figure 11, Figure 12 and Figure 13).

Show: How Steeple Sinderby Wanderers Won the FA Cup. Page: 1

Cue	State	Notes
Preset	6/7 12/3 22 23/F	Preset + HL.
1	6/7 12/3	HL out, blue on stage
2	1,2,3,4/5 6/7 16,17/5 19/4.5 25,26,27/7	Build D/S. + C/S
3	1,2,3,4/7 6/4 9/6 16,17/7 19/5.5 25,26,27/3	Focus to D/S
1.	1,2 9 16 17 19 21	D. 1 DL

Figure 11: A typical cue sheet

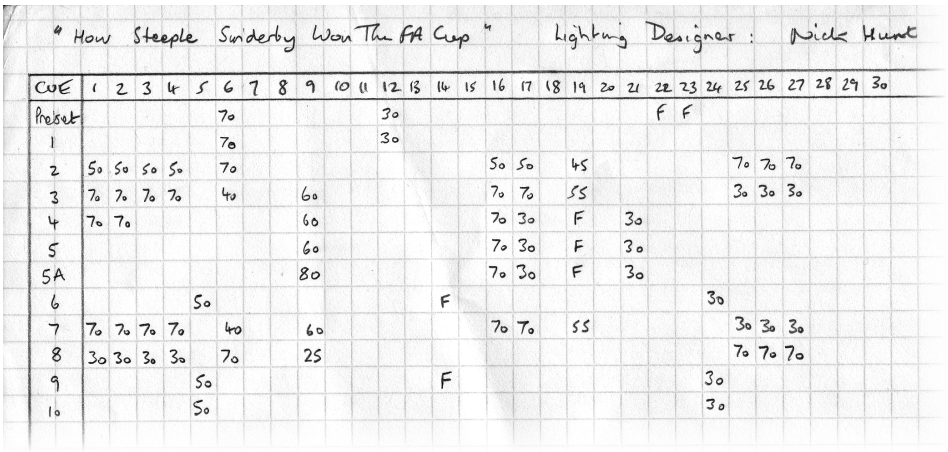

Figure 12: A typical graph plot

Figure 13: Data displays on a Flying Pig Wholehog III Console

I want to argue that such presentations of the lighting data privilege certain ways of thinking about and working with that data – and so of thinking about and working with the lighting itself as a component part of the performance event – while suppressing other ways. In the terms used by Norman I introduced above, we 'value what we can [or choose to] … represent', and, by implication, devalue, and/or fail to think about, what we cannot or do not. Particularly, I want to argue there is a privileging of the *spatial* distribution of light on stage over the *temporal*, a matter that is of especial importance for several reasons: firstly, because theatre is a time-based art; secondly, because the state/cue model itself privileges the spatial; and thirdly, because for the lighting artist working with the spatial distribution of light is easier – to put it simply, the light 'stays still' for consideration, experiment and adjustment for as long as is required. By contrast, the distribution of light in time may only be fleeting, and no synoptic view is directly available to the lighting designer, who must fall back on either memory or other secondary methods such as storyboards or lighting scores.[5] It is this sense of the importance of the temporal dimension, the greater difficulty of working with it, and the bias against its full consideration as a part of the lighting process implied by the dominant state/cue model, that are amongst the central motivations for my project: I want to find strategies by which my reformed role of the lighting artist might give more attention to this aspect of performance making.

The privileging of grids

Martin Jay, writing about the visual in the late nineteenth century, argues that,

> geometrical form as a visual language [fitted] nicely with the needs of industrial technological design as well as with the … ideology of universal rationalism. That strain in modernism which privileged grids – "flattened, geometricized, ordered ... antinatural, antimimetic, antireal," as Rosalind Krauss has described them – could gain sustenance from this conceptualist reaction to the fleeting glance of Impressionist visual experience (Jay 1993, 157 citing Krauss 1985, 9)

Jay and Krauss identify a prioritization of the numerically ordered and the geometric – perhaps particularly a Euclidean geometry of line and arc, of perfect precision, operating within a Cartesian, rectilinear framework or grid.[6] Such approaches emphasise order, exactitude, similarity and objectivity while suppressing uncertainty, individuality, variation, tolerances (in the engineering sense of variability around a notional value), and situatedness. I would argue that the data representations of current lighting controls – and the state/cue model in particular – embody a similar privileging of grid-like orderings. The tabular view showing values for intensity and other parameters emphasises the static and the synoptic: a snapshot moment, a cross-section cut through the flowing time stream of the performance. Such views do little – if anything – to present either

functions or values that we might suppose are inherent to much theatre lighting: the lighting ideas, affects or gestures that the parameter values might be felt to represent. In a list of cues, all cues are given equal value, irrespective of the magnitude of lighting change or dramatic significance they correspond to, the speed of change, or the duration of the state following a change before the next cue is initiated. While timing information is presented to and manipulated by the operator, it is done so in numerical form, so that it must be read and interpreted rather than apprehended visually; comparisons between data, and hence its artistic significance, are thus suppressed. The state/cue model discourages (although it does not entirely prevent) lighting designers and operators from thinking about – and intervening in – the trajectory that lighting parameter values such as intensity take as they travel from their initial value to their destination value (as determined by the outgoing and incoming lighting states) during the progress of a transition. Unless a specifically different choice is made, the fade profile is linear, and once again a Euclidean geometry is assumed (Figure 14).[7]

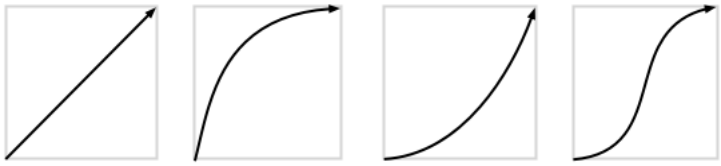

Figure 14: A linear fade profile (left) and a variety of non-linear profiles. The vertical dimension represents intensity, the horizontal, time.

The state/cue model instead encourages a focus on the stage picture, as static image, synoptic and objectified, as a frozen slice in time to be worked on in great spatial detail ('Four and sixteen up five percent – no, down a touch' calls the lighting designer to the operator, studying the precise balance of light levels in a corner of the stage). But when the cue begins to run, the designer sits back, helpless until the cue is complete, since the lighting console – built to implement the state/cue model – offers no way (*can* offer no way, within that model) to control the path of the fade while it is actually happening.[8]

My concern here is that the values that underlie the structuring and representation of the lighting data are disconnected from the situated, in-the-moment human activity that comprises most theatre performance (Jay's 'fleeting glance of Impressionist visual experience'). The state/cue model emphasises stasis when theatre is an art form of action – indeed, dramatic action; it prioritises spatial detail over temporal complexity, and proposes a monolithic, linear narrative in

contrast to theatre's woven, multivalent texts.[9] Consoles measure out fades in seconds, while theatre measures time in heartbeats, pauses, impulses, arrests, epiphanies and longueurs. In order, for the purposes of my project, to replace the state/cue model and the values that it entrains, the geometry (literal and metaphorical) upon which that model has been constructed must be replaced: I need to make a shift away from a modernist metaphysics privileging grids and establish an alternative geometry.

Hyperbolic space and qualitative transformations

Theatre is an art form that characteristically takes the human both as its subject matter and as one of its main constitutive materials: performers – embodied, present to us – are literally the stuff of which theatre is so often (in part) made.[10] Stage action is for the most part qualitatively human as well as created through human agency, and for the lighting artist in my project to be able to make a contribution to that action that is of the same qualitative order, the underlying geometry of the lighting control must also be a human, organic geometry. According to Margaret Wertheim:

> We have built a world of rectilinearity. The rooms we inhabit, the skyscrapers we work in, the grid-like arrangement of our streets and the freeways we cruise on our daily commute speak to us in straight lines. Yet outside our boxes the natural world teems with swooping, curling and crenellated forms, from the fluted surfaces of lettuces and fungi, to the frilled skirts of nudibranches and the animal undulations of sea slugs and anemonies [sic]. We have learned to play by Euclidean rules because two thousand years of geometrical training have engraved the grid in our minds. But in the early nineteenth century mathematicians became aware of a space in which lines cavorted in aberrant formations, suggesting the existence of a new geometry. (Wertheim 2006, 11)

This 'new geometry' is hyperbolic space, in which the surrounding space expands exponentially as you move away from a given point.[11] Daina Taimina's crochet models of the hyperbolic plane (a two-dimensional hyperbolic space) give a sense of some of the qualities of this space, described by Wertheim as 'characterized by an almost organic excess … resembl[ing] nothing so much as a sea creature' (Wertheim 2006, 13) – see Figure 15.

I am not proposing to adopt the mathematics of non-Euclidean geometries such as hyperbolic space; rather I want to draw an aesthetic analogy: to establish a lighting model that is characterised more by 'lines cavort[ing] in aberrant formations' and 'organic excess' than by the rectilinearity of 'Euclidean rules'. Only thus, I would argue, can the lighting artist articulate through the lighting her or his human sensitivity to the aesthetic and dramatic 'moment'. While such an articulation could be simulated by a computerised lighting control that made use of non-Euclidean geometry to process the lighting data and capture in *general* terms the qualities I have tried to convey here, the

lighting would still not be expressive of the *particular* moment. In order to achieve that particular sensitivity to and expressivity in the moment, the operator must have control over both the timing and the path of the lighting change: in other words, a return to the manual control of cues that was gradually eroded by the increasing automation that culminated in the adoption of the 'go' button as the standard way of triggering lighting changes. Manual operation replaces the linear path from one set of values to the next, based on a Cartesian, rectilinear geometry, with paths determined by the hand: a curvilinear, organic geometry of expressive gesture and impulse, aesthetically analogous to the complex curving forms of the 'swooping, curling and crenellated' forms of hyperbolic space.

Figure 15: A crochet model of the hyperbolic plane

Merely returning to manual operation while maintaining the state/cue model does not in itself fully address the needs of my project, however. While such a shift allows for and encourages a different, non-Euclidean, geometry in the time dimension, it does not propose an alternative structuring of the lighting data. In seeking a way to structure the data that is aesthetically and dramatically meaningful, I want once again to make an analogy with a mathematics – this time that of state-spaces. In the following I draw primarily though indirectly on DeLanda's writing on the subject (DeLanda 2002, 18 onwards). Generally, we are used to defining an object by its static properties, so that the geometric figure of a square is defined by the number and length of its sides, and the right angles at its corners. However, objects may also have properties that are defined by what happens when the object undergoes a particular operation: for example, a square is unchanged when rotated about its centre by ninety degrees. Similarly, an equilateral triangle is

defined by its physical properties such as having three sides and three equal internal angles of sixty degrees, but also by its one hundred and twenty degree rotational symmetry. A symmetry exists when an object is unchanged under a particular operation, and squares, triangles and other objects can be distinguished by their different sets of symmetries. This analysis can be extended beyond geometric figures to any system: the system can be defined by its symmetries under certain operations, or in other words by its behaviour in response to certain sets of stimuli. In the mathematics of state-spaces, a system undergoes a 'phase-change' not when its static properties change, but when the set of symmetries that define it changes; the system may be dynamic with various properties changing value, but it remains in the same phase-state if its *behaviours* are constant. Most importantly, a phase-transition is more than just a change to the values of some properties of the system; it is a change of *behaviour* of a dynamical system – in Massumi's terms (2002), a *qualitative transformation*.

Remaining with this important notion of qualitative transformation, I want to consider light on stage as a system that has aesthetic and dramatic behaviours: its system properties are its *affects*. Such a system has symmetries: just as the operation of rotating a square through ninety degrees is undetectable due to the square's rotational symmetry, so the light on stage can undergo certain alterations with no change to its aesthetic or dramatic properties. In other words, it is possible to have two lighting states that are, in a given performance context (that is, under a particular set of *operations*), aesthetically and dramatically equivalent even though they might be visually distinct. Thus we might have a whole series of lighting changes that create visual change, but not a change of affect – for example, a series of cues to subtly emphasise the area of the stage being used by the actors at a given moment so as to guide the audience's locus of attention. Equally, a lighting designer might seek to replace one lighting state with another that is affectively the same, in order to solve a technical or logistical problem.[12] Considering the light on stage in this way foregrounds a distinction that will be familiar to lighting designers between lighting changes that have dramatic and/or aesthetic significance and those that don't – a distinction that is not reflected in the state/cue model. I want to take this distinction further and use it as the basis for a new lighting model based on 'units' of lighting that are persistent through extended periods of the performance, and which are defined by a single phase-state. Such a unit will have the same affect (set of symmetries) in a given performance context (set of operations or transformations), although it may vary visually.

An important aspect of my proposal is that it reorients the structuring of lighting data in relation to the time axis: instead of the primary unit of structure being the cue-state that is a synoptic snapshot cutting across the time dimension synchronically, the primary unit is one that

runs along the time axis diachronically, for which reason I propose to adopt the term ‘thread’ for such units (Figure 16).

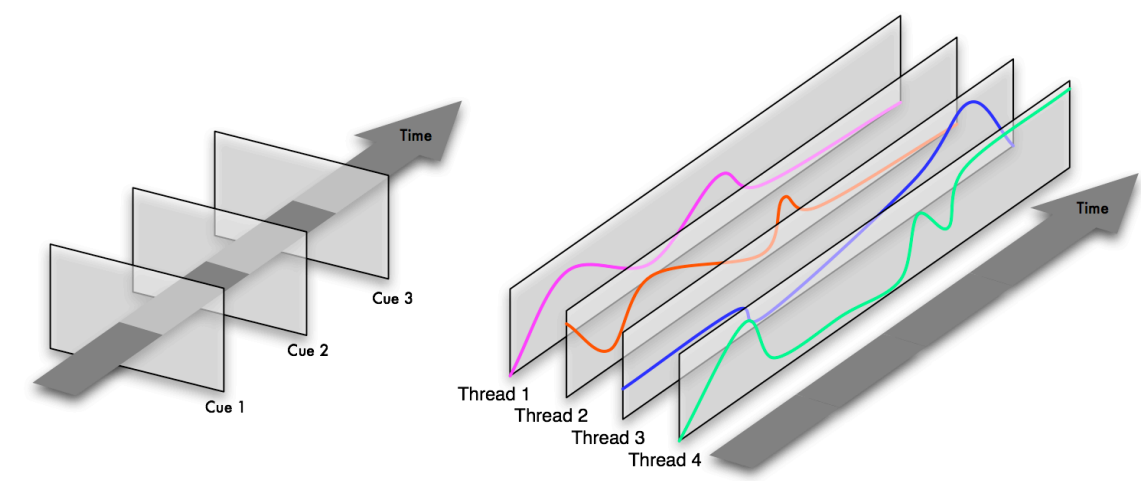

Figure 16: The State/Cue Model and the Thread/Impulse Model

In my proposed model, at any given moment during the performance the lighting will comprise one or more threads, each with its particular affect. Thus the total aesthetic and dramatic value of the lighting in relation to the performance is created by the weaving together of the various threads, with threads being introduced, boosted in prominence, diminished and faded out as the performance progresses. Such re-mixing and re-balancing of the total affect produced by the light on stage is motivated by the stage action, either as a response or as a spur to that unfolding action; for this reason I adopt the term ‘impulse’ for any changes to the combination or balance of threads.[13] This *thread/impulse* model not only describes the lighting in conceptual, abstract terms, but also in terms that can be used in the design of a lighting control interface. Each thread is an aesthetic and dramatic unit, but is also a group of lighting parameters such as dimmer levels. A thread may ‘morph’ during its lifetime for pragmatic reasons, such as to rebalance the light on stage according to the location of the actors, but its *affect* remains constant. Threads can be created during rehearsal, and collectively form a ‘palette’ of affective materials to be used during the performance by the lighting artist who, by applying impulses via manually operated controls, weaves the threads together to create affective textures.

To summarise, the *thread/impulse* model I describe differs from the established state/cue model in two important ways: firstly, it adopts a data structure that establishes a unit of lighting defined by its *affect*; and secondly it reorients the data structure along the time axis so as to support and encourage the lighting artist in working in the time dimension.

The Immersive Data-space

Having established the conceptual model for the control of lighting I want to adopt as part of my project, I turn now to the control interface itself. Much of my argument in the present chapter centres on the interdependent relationship between the design of the lighting control system and the task that the system is used for. Brenda Laurel summarises this interdependence while writing about computer applications: 'since it is true that the interfaces to existing applications reflect not only the interface design but also the conception of the application itself, it is difficult to improve the interface without reconceptualizing the whole action' (Laurel 1993, 168). She goes on to assert that, '...it is also true that new understandings of tasks can (or should) effect changes in the design of cognitive artifacts. A new vision of the task changes what the artifact needs to be.' Thus while an interface may give the impression to the user of being 'intuitive' or 'transparent', it nevertheless shapes the user's conception of the task (without the user necessarily being aware of this shaping), just as the interface was shaped by its designers' conception of the task.[14] And not only the user's conception of the task: the interface also shapes the *quality of attention* the user pays to the task. There can be no single 'ideal' interface because, while we might imagine – and even create – an interface that is 'transparent' in the sense that the user looses any conscious awareness of the interface and attends only to the task, the interface can never be neutral with respect to the *way* that the user attends to the task.

The anecdote of the lighting operator with which I began the present chapter suggests a particular quality of attention, in which the operator gave more attention to, and perhaps put greater trust in, the lighting console data compared with direct apprehension of the 'real' through the control room window. I argue in chapter II.2 that the operator is, during the performance, disconnected from the activity of the stage by the widely adopted professional practices and expectations of that role. However, during the rehearsal period in the theatre (lighting, technical and dress rehearsals) the same operator will typically be 'programming' the lighting console as the lighting designer requests changes and refinements to the recorded lighting data that will be replayed in performance. During programming, then, the operator navigates both the 'virtual' realm of the lighting data in the console and the 'real' realm of the light on stage, and it is the operator's quality of attention to the virtual data-space – as it is shaped by the interface design – I want to consider here.

I have used the term 'transparent' to refer to the perceived quality of an interface to disappear from the user's consciousness, but the term also suggests a different but related meaning: the perception that the interface acts as a window onto the lighting data that is in some sense *within*

the console. The multiplicity of display screens found on the more sophisticated lighting consoles, presenting multiple, alternative views of the data, sometimes using the 'windowing' interface conventions familiar from personal computers, combines with the dominance of visual perception within the human sensorium to reinforce such an understanding. For programming operations of any complexity, the operator, on receiving a request from the lighting designer, must check the existing state of the data-space, evaluate the changes to that data called for by the designer's request, implement those changes, and check the data-space again.

An experienced operator will, through habituation, have learnt a repertoire of physical actions that are largely automatic: sequences of keystrokes and other manipulations of the console's controls that can be combined to effect the required operations in the data-space. Acquired muscle-memory ensures that the operator needs to look at the physical control surface only occasionally, if at all, and can focus attention on either the light on stage or the 'virtual' data-space presented on the console's screens. This data-space is in part a literal space, with data mapped out in grids and lists in the way I describe above. Although a display screen is a two-dimensional space, some consoles imply a virtual third dimension by visually layering windows and other graphical elements behind each other. However, the data-space is a virtual space in another less literal way: the lighting data for a large show with many luminaires and many lighting states is too much to be presented or apprehended as a whole. The data is displayed to the operator for review or manipulation in semantically meaningful groups such as all the intensity data for a cue-state, or all the intensity data for a single luminaire throughout the show. These semantic groupings are richly interlinked: a cue-state may combine data from other semantic data groups, for example.

For the operator, viewing limited amounts of data at a time through the 'windows' presented by the console, the sense is – in my experience – one of *navigation* through the data, cross-referencing different data views in order to undertake the greater mapping of the semantic meaning of the console data against the desired light on stage. When there is a perceived mismatch between the actual light on stage and that which the lighting designer intended, the operator does not (typically) review the state of the console's control *surface*, but the state of the lighting data *within* the console.[15] As in the anecdote at the start of the present chapter, the virtual data-space may be more 'real' to the operator than the physical reality of the console hardware or the stage, and the quality of attention that consoles tend to engage in the operator is particular to this sense of immersion in a virtual space.

The perception of the lighting data as separate from the physical console is further promoted by the increasing adoption of computer technologies in lighting consoles. The lighting data for a show

can typically be saved onto a variety of media (hard disk, recordable CD, flash memory drive, and so forth), loaded onto another console (including 'virtual' consoles running as a software application on a personal computer), emailed, and shared across computer networks. According to Hayles:

> Information viewed as pattern and not tied to a particular instantiation is information free to travel across time and space … The great dream and promise of information is that it can be free from the material constraints that govern the mortal world … In the face of such a powerful dream, it can be a shock to remember that for information to exist, it must always be instantiated in a medium … The point is not only that abstracting information from a material base is an imaginary act but also, and more fundamentally, that conceiving of information as a thing separate from the medium instantiating it is a prior imaginary act that constructs a holistic phenomenon as an information/matter duality. (Hayles 1999, 13)

I would argue that the historical emergence of the *design-as-(conceptual)-object* model I describe in chapter II.2, together with the concomitant *state/cue* model described above, constitute Hayles' 'prior imaginary act' that has separated lighting data from matter, so that '[lighting] information [has] lost its body' (Hayles 1999, 2). Such a process of disembodiment of the lighting data, or rather its re-embodiment within a virtual space produced by the console's interface, both arises from and reinforces a conception and practice of lighting design as a creative process that takes place *before* the act of performance. The lighting data in the console, together with associated information such as the type and position of each luminaire in the rig,[16] has come to constitute the lighting design *itself*, from which the lighting is replicated as required in performance as an impress is made from a die. During the performance, according to this generally adopted conceptual model, the lighting operator's role is simply to replay the lighting 'accurately', and any perceived flaws in or potential improvements to the lighting must be traced back to the lighting data and changes made there for the subsequent performance.

My project, however, proposes the deferral of some creative decisions until the moment of performance, and I would argue that the quality of attention required to navigate the immersive environment of the console's data-space is of a different order from that required of the lighting artist as performer, alert and responding to the activities of the stage. While preparatory work may require the lighting artist to be immersed in a virtual data-space, the lighting interface that supports my project must be based not on immersion but (to adopt a term from Bentham) *playability*.

Playability

I want to use the term playability, in relation to the lighting artist *as performer*, to remind us that: firstly, the control interface is primarily the means to manipulate the light on stage, rather than data in a virtual space; secondly, the control interface as an instrument has its own particular expressive potentials. A lighting console designed for my project must engage in the user a different *quality* of attention, allowing the lighting artist as both operator and performer to take a more direct control over the aesthetic and dramatic qualities of the lighting. A key shift here is a move away from a conception of the console as an editor of lighting data that controls a technical apparatus, and towards a conception of the console (and indeed the whole apparatus) as a device that extends the lighting artist's capabilities. Martin Jay adopts Robert E. Innis' term 'exosomatic organs' to describe devices such as the telescope, microscope, camera, telephone, sonar and so on that have extended human vision and hearing (Jay 1993, 3 citing Innis 1984, 67). Where Jay describes the expansion of our exosomatic organs as 'extending the range of our vision, compensating for its imperfections, or finding substitutes for its limited powers', I propose a conception of the lighting console as an exosomatic organ to enable the artist to be expressive through the medium of light as a part of the performance event. This model of the lighting console, and the lighting system it is linked to, as an extension of the lighting artist's embodied self (what Mick Wallis has called 'distributed embodiment'[17]) underpins my conception of the lighting system as a playable instrument that promotes a certain quality of attention by the lighting artist, and makes available particular expressive qualities.

Sita Popat and Scott Palmer describe a research project in which an operator controls a projected animated figure or 'sprite' in order to dance with a live performer on stage (Popat and Palmer 2008). Their project has certain parallels with my own, in that it has an operator with expressive control of a performance element 'in the moment' via an interface. Popat and Palmer draw on Paul Crowther's account of how people experience artworks (1993), and particularly Crowther's development of Mereau-Ponty's phenomenological theories in this context. Crowther argues that our experience of the world is intimately bound up with our embodied selves, without a defined separation of 'an inner "thinking subject" gazing out upon an "external" world' (1993, 1). Crowther goes on the argue that the experience of art creates an 'integral fusion of the sensuous and the conceptual which enables art to express something … in a way that eludes modes of abstract thought' (1993, 5). Popat and Palmer develop Crowther's account of the experience of the 'viewer' of an artistic work into one of the maker – although as they point out makers are also

viewers.[18] Significantly for my proposal, Popat and Palmer argue that for their sprite performer-operators,

> the distance inherent in offstage operation of the sprites has the effect of creating a duality of the aesthetic experience of visual engagement with the stage picture and kinaesthetic engagement of embodiment and 'being in the moment' often associated with improvised dance performance. The visual aspect suggests that the attention is centred outside of the body (i.e. on the artwork); the kinaesthetic aspect suggests that the attention is embodied … The performer-operator's attention is centred upon the distanced stage space, experiencing it through embodied engagement with the sprite. The resulting potential, we propose, is a place of rapt attention to the visual experience folded together with pre-reflective performance via the digital interface (Popat and Palmer 2008, 135).

Popat and Palmer's folding together of the visual attention to the distanced stage with the embodied engagement with the control interface and what it controls (for their project, the sprite; for mine, the light on stage) is a quality of attention I am seeking here, replacing the 'blanked gaze' of the lighting operator I identify in chapter II.2. There will still be a need for an immersive mode of attention during equipment setup and adjustment (the equivalent of the conventional 'programming' phase in present professional practices) and for a more distanced quality of attention while reflecting on and in action (Schön 1983). However, in order that the lighting artist can respond in and to the moment, the lighting control interface must permit and promote Popat and Palmer's 'rapt attention', with its combined *concentration on* and *embodied responsivity to* the stage action – what in everyday language, and emphasising the embodied aspect, we might call metaphorically and perhaps literally a 'lean-forward' attitude. Popat and Palmer's formulation of the operator's rapt attention usefully extends the notion of the interrogating gaze that I describe in chapter II.2 by emphasising the somatic, both in terms of the spatial situatedness of the operator and in terms of the kinaesthetic aspect of the manipulation of an interface to produce aesthetic effects. Thus, I would propose the interrogating gaze, as applied to a lighting operator rather than a spectator, as combining being situated and self-aware together with a kinaesthetic immediacy of pre-reflective response and action via the control system.

Returning to the second aspect of the lighting control as playable instrument – its potential for expression – I want to consider the 'go' button that is used to trigger a lighting change on conventional theatre controls. This button is essentially a binary device: while the operator can control *when* to press the button, it makes no difference to the lighting change that is triggered *how* the button is pressed. Other than in the matter of the timing of the start of the change, the operator cannot use the 'go' button in an expressive way – in other words, and to use the terms I introduce in chapter II.1, the 'go' button has no way to register the impress of the hand of the artist. This

contrasts strongly with for example an acoustic musical instrument, where the *way* a key is struck, a string plucked or bowed, or a wind instrument blown and fingered, changes the affective quality of the sound made. For the lighting console to be playable in my terms, it must be capable of qualitative triggering of lighting changes so that not only the fact of change, but also its expressive quality can be influenced by the lighting artist in and in response to the moment of performance, through the interface. In designing a lighting console there are two main opportunities to influence the control's expressive qualities: firstly, through the choice of mechanical qualities and ways of using the interface controls themselves (buttons, faders, and so on); and secondly, during the processing of the control signals that the interface produces before they are sent to the dimmers or automated luminaires.

While the post-processing of the control signals captured by the physical interface controls may be useful, it is the physical qualities of the controls I am concerned with here. Consider, for example, a fader that allows a value to be set along a continuous range, typically thought of as a percentage scale. The physical qualities of that fader promote particular qualities of movement: for instance, a small, light, smooth fader can readily be worked by one finger and set quickly and with precision to a chosen value. A larger fader may require movement from the wrist or elbow, producing a different fade trajectory. Larger still, and the fader might require full arm and torso movement or even two hands, further changing the operator's kinaesthetic relationship with the control.[19] A fader with some friction will resist small accurate changes as it 'sticks' but will move suddenly as the friction is overcome, perhaps overshooting its target. A fader with damped[20] movement will move smoothly with gentle acceleration and deceleration, giving an impression of fluidity, and will resist sudden movement. These various qualities might vary over the length of the fader, creating textural effects such as roughness, or 'cogging', where the fader moves through a series of detents. To the extent that these characteristics of the fader (in everyday language, its *character*) effect the control signal passed on to the rest of the system, such characteristics provide the opportunity for the operator and interface together to manipulate the lighting system expressively. Wallis's 'distributed embodiment' is critical here: neither the operator nor the interface can independently ensure expression (although each can independently curtail it). It is only though the *combination* of the capacity of the hand of the artist to be expressive, and the capacity of a suitable interface to make available certain expressive potentials, and to capture and transmit the artist's expressive action, that a *playable* control can work.

To summarise: I want to propose a lighting control that departs from present practice for theatre controls in three respects. Firstly, the control will be based on a data structure that takes a lighting

affect as its basic unit, and promotes the combination and recombination of units of affect by the lighting artist during the performance. Secondly, the lighting control will function as an exosomatic organ, extending the lighting artist's expressive capacity through the medium of light and promoting a quality of attention that folds together a visual attention to the distanced stage with an embodied engagement with the control interface. Thirdly, the lighting control will present the lighting artist with a range of expressive potentials through the design of the physical control elements themselves.

Strategic Interventions:

To redesign the lighting interface to promote a conceptual model of the control of light structured in terms of affects and temporal dynamics.

To redesign the lighting interface to provide a playable instrument, promoting certain types of attention and expression by the lighting artist.

Notes

[1] This anecdote was relayed to me by a senior lighting technician at the National Theatre, London in conversation on 31st July 2007.

[2] In my argument up to this point I have concentrated largely on the interface used to control dimmers, in order to focus on the underlying principles. Current lighting controls are very complex, offering the operator various ways of grouping and manipulating dimmer data as well as controlling automated lighting fixtures that may have many variable parameters such as position, colour, beam quality, and so on. Nevertheless, my argument applies to the relationship between interface elements such as faders and the lighting parameters that are to be controlled, irrespective of the way those parameters are combined.

[3] I would note at this point that the state/cue model, whilst (I would argue) pervasive in UK and much European theatre practice, is not universal. Rock and pop concert lighting has developed lighting controls, with their own data models, according to its specific ways of working and aesthetic goals. To some extent theatre lighting has adopted technologies developed by the concert industry, such as automated lighting, together with lighting controls designed for use with such technologies. Nevertheless, designers of lighting control systems intended for both concert and theatre use are aware that theatre has a particular way of

working and that a console will only be accepted in the theatre market if it is able to operate the state/cue model, whatever else it may also be able to do. In the US, the development of lighting control was very different to that in the UK. Different working practices and economic models meant that US memory controls have always used a system known as 'tracking', in which a dimmer intensity value is maintained through a series of cues until a cue that contains a specific instruction to change it. Thus the console records only the changes required to get from one lighting state to the next, rather than each complete lighting state as is implied by the state/cue model. Nevertheless, while the tracking model is now widely used in lighting controls not just in the US but internationally because it has important advantages when working with automated lighting, the console designers tend to hide from the lighting designer tracking as a way of storing and processing the lighting data, while allowing its advantages to be available. The specialist role of the lighting programmer in theatre now acts as an intermediary who understands both the lighting designer's aims and ways of working (still largely based on the state/cue model), and the data model used by the console.

[4] Graph plots were widely used in the early years of memory controls, to record cue data in order to transfer it between incompatible systems when touring, to provide a backup to unreliable electronic memory, and to allow the interrogation of the lighting data in ways not provided by the limited display formats of the time (Brady and Couch 2007, 14). The graph plot combined the separate data found on cue sheets into a single grid, with a row for each cue and a column for each dimmer.

[5] A lighting score is analogous to a music score, showing various aspects or qualities of the lighting progressively along a timeline. Richard Palmer describes a technique for lighting scores (Palmer 1994, 210), but lighting scores are, in my experience, little used by professional lighting designers. For a more detailed consideration of lighting scores, see Hunt and Nicholson 2008 (appendix C4).

[6] The term 'Euclidean geometry' has a specific meaning in mathematics in relation to geometries that adopt Euclid's axioms. I use the phrase here in a more general sense to evoke the geometry that will be familiar to most readers: one of straight lines, angles and arcs of circles.

[7] Some consoles do offer separate start timings and fade durations for every parameter, and also offer a variety of 'paths' so that parameters do not have to progress in a linear fashion from the start to the finish of a fade. However, these console features and functions are not the default ones – they are presented as options, supplementary to and divergent from the normative functions that derive from and support the privileged state/cue model.

[8] In my own experience as a lighting designer, I have felt this frustration acutely. I have designed lighting for productions where the light was in almost perpetual, gradual motion – a series of long cues with only short periods of stasis in between. I have sat watching the lighting progress during rehearsals, wanting to make

one part of the lighting run just a little quicker here, to hold back another part of the lighting there, but unable to stop the lighting or to make changes while the cues were running. The more sophisticated lighting consoles provide ways to have parameter levels travel at different rates, on different paths, and with different start times, but such things are always assumed to be the exception, and often require the operator and the designer to have some quiet dark-time on stage undisturbed to work out how to do it, and so have to be worked on outside of the main rehearsal time.

I would note here that the Jands Vista lighting console has made some progress in dealing with this problem, allowing the operator to 'scrub' backwards and forwards along a timeline that represents a series of lighting changes; an interface idiom familiar from video editing software (see the Jands Vista website).

[9] Massumi makes a similar argument in the very different context of conceptual models of cultural formations based on systematic grids, claiming that '[w]hen positioning of any kind comes a determining first, movement comes a problematic second' (Massumi 2002, 3). In a different context again – that of quantum mechanics – Heisenberg's Uncertainty Principle set up the same opposition of position and movement: 'the more precisely the position (momentum) of a particle is given, the less precisely can one say what its momentum (position) is' (The Uncertainty Principle 2006).

[10] The concepts that underlie terms such as 'embodiment' and 'presence' that I have used here are complex and contested (for example: Broadhurst and Machon 2006, Counsell and Mock 2009, The Presence Project 2009). The very fact that these terms have been extensively debated and used to give impetus to a diverse range of research investigations is evidence of the importance of the aspects of performance they refer to.

[11] In hyperbolic space, Euclid's fifth axiom – that for any straight line and a point not on that line, there is only one straight line that passes through the point and is parallel to the first line (i.e. does not meet it) – is altered to allow an infinite number of lines through the point that are parallel to the first line. For a more detailed account of hyperbolic space, see Hyperbolic Space 2009.

[12] As a lighting designer, my own questioning of this matter of affective equivalence came about largely in response to the problem of lighting for theatre-in-the-round. When the stage is viewed from all directions, the only way to give each spectator the *same* lighting is to make the lighting of equal brightness and colour from all directions, which means that the lighting designer cannot make use of colour or intensity contrast – two potent expressive lighting qualities. However, if the goal of making the lighting look the same to all spectators is replaced with a goal of *affective equivalence*, the designer is free to use contrast. The lighting (and so the lit performers and objects) will appear visually different from different viewpoints, but the affective quality will be the same. My thinking on this matter has also been informed by Ben Ormorod, who insists that anyone relighting on tour a show he has designed should not use a graph plot to replicate the

original dimmer levels, but build each lighting state from scratch in each venue, not to look the same but to have the same *affect*.

[13] According to Sita Popat (speaking in a plenary discussion at *Emergent Objects: Performing Design*, Leeds University, 17-19th December 2007), classical ballet is based on poses, while modern/postmodern dance is based on impulses – a shift which is analogous to my proposed move from the state/cue model to one based on threads and impulses. Brian Massumi uses the term impulse in relation to the analogue: '[t]his is the analog in a sense close to the technical meaning, as a continuously variable impulse or momentum that can cross from one qualitatively different medium into another. Like electricity into sound waves. Or heat into pain. Or light waves into vision. Or vision into imagination. Or noise in the ear into music in the heart. Or outside coming in. Variable continuity across the qualitatively different: continuity of transformation' (Massumi 2002, 135). My adoption of the term impulse similarly proposes a continuous transformation of the intention of the lighting artist into changing light on stage (whilst acknowledging the slippage between intent and outcome that inevitably occurs).

[14] 'Intuitiveness' in user-machine interfaces is widely regarded as an ideal: an advertisement published in the Autumn 2008 issue of *Sightline* by Electronic Theatre Controls claims its lighting control systems enable the user to 'create quickly and easily, with simple and intuitive tools'. Jef Raskin argues that 'the ideal humane interface would reduce the interface component of a user's work to benign habituation' (Raskin 2000, 20), and while his phrase 'benign habituation' perhaps better reflects the extended learning that underlies apparent 'intuition', Raskin also promotes such habituation as an ideal. Along similar lines, Donald Norman argues for the 'invisible computer', seeking to, 'hid[e] the computer, hid[e] the technology so that it … disappears from consciousness … The goal is [a situation] where technology serves human needs invisibly, unobtrusively: the human-centered, customer-centered way' (Norman 1998b, viii-ix).

[15] Many consoles put up large flashing reminders on screen when the master blackout button is activated, because if the stage is blacked out by inadvertently pressing this button the operator will typically look at the display screens before checking the state of the button.

[16] Information about the lighting rig is itself increasingly being incorporated into the console's data model, so that the console can provide a three-dimensional 'virtual reality' model of the rig that the console can manipulate and display in real time. Thus programming can take place without the actual rig and performance space.

[17] Wallis used this phrase during a plenary at the *Emergent Objects: Performing Design* event, Leeds University, 17-19th December 2007.

[18] I use the word 'viewer' here as a placeholder for all the various words that are used to identify people who experience artworks, for whom there seems to be no single, all-encompassing term available.

[19] Massumi distinguishes between the tactile (exteroceptive), the proprioceptive (the spatial awareness of muscles and ligaments) and the visceral (interoceptive) (Massumi 2002, 58-9). While we might assume that it is the operator's proprioception that is used to position the fader at the desired point on its travel, I would argue that all three aspects of embodied awareness are in play at once, with the tactile and visceral playing an important role in the operator's expression through the fader. How firmly or gently do the fingers grasp? Is the fader moved with steady determination, or violently, or with a flourish? These are as much matters of visceral as intellectual intent.

[20] In engineering and physics usage, a damped system is one where the resistance to movement is proportional to the speed of movement.

Part III

Part III Introduction

Strategic Interventions:

To rehearse the lighting in the rehearsal room, starting from a randomised lighting palette.

To defer certain design decisions until the moment of performance.

To strategically position the lighting artist in the geometry of the performance space in order to engage her/his interrogating gaze, thus connecting her/him into the 'circuit of energy' between lighting artist, activity of the stage, and spectators, and promoting her/his role as a performer.

To redesign the lighting interface to promote a conceptual model of the control of light structured in terms of affects and temporal dynamics.

To redesign the lighting interface to provide a playable instrument, promoting certain types of attention and expression by the lighting artist.

Part III applies, develops, tests and evaluates the strategic interventions of Part II through two related practical projects: a lighting control interface and a performance, documented in the digital appendices. I would however want to emphasise that it is the practical work itself that is presented for examination, with the documentation as supplement rather than primary material. The two written chapters of Part III reflect on and evaluate the two practical elements of my thesis, drawing on the substantial body of feedback and personal-professional reflection generated during and after the process of showing the work. These aspects were 'captured', to some extent at least, by video recording rehearsals, performances, post-performance and post-project discussions, as well as in my own journals, the written feedback obtained from audience members, and the performance project blog. A complete set of lighting data, recording all the lighting changes made during each performance, was also secured by the 'logging' functions I included in my console software. Some of this material can be found in the appendices.

The two chapters of Part III are structured using the five strategic interventions I develop in Part II, and I discuss some of the wider outcomes of the project in the Conclusion. I recommend

reading the overview descriptions of the lighting control interface (appendix A0) and the performance project (appendix B0), followed by the remaining key documents: the video recordings of the performance (B2, B3) and the documentation of the Theolux console (A1-4). The remaining appendices can be considered optional, to be viewed if you want to explore aspects of the practice research in more detail, or where they are referred to in the main text of the written thesis. The ‘Open Me’ document on Disk 1 gives further guidance and links to all the appendices.

III.1 Reflection and Evaluation 1: The Performance

Chapter III.1 is structured in terms of the three strategic interventions I develop in chapters II.1 and II.2. What follows in the present chapter assumes the reader is familiar with the practical research of Part III through either direct experience of it or the documentation presented in the appendices, including the summary description in appendix B0.

Strategic Intervention 1: ***To rehearse the lighting in the rehearsal room, starting from a randomised lighting palette***

In order to evaluate the impact of my first strategic intervention, I want to begin by describing in some detail an example of how the randomised lighting palette, together with the devising process in the rehearsal room, lead to a particular 'gesture' in the final performance. The gesture, as seen in performance, comprised one of the actors sitting on the bed, slowly covering and uncovering her eyes while grimacing. She was lit by a cold, greenish light from above and a blue-green light from below and to one side. (see the video of the Main Camera View of the performance, between 19'45" and 21'40", and Figure 17.)

Figure 17: Hannah Neate performing 'slow-dark'

The initial stimulus for this gesture came from a devising exercise early in the rehearsal process, in which the Director asked all the performers (including myself as lighting artist) to pick out single words in response to the research we had undertaken so far on Walter Benjamin. The Director selected words and wrote them on postcards, and then asked each performer to select unseen and at random a pair of cards, and make a performance gesture or moment using the two words. The Associate Director had the words 'slow' and 'dark', and created the gesture of covering and uncovering her eyes very slowly while grimacing. Later, while exploring this and the other gestures we had made, one actor, Hannah, performed 'slow-dark' while sitting on the bed, in a position already known to be in a sense 'activated' because it was lit by a top light coming down in a sharply defined, small area just big enough to sit in. I responded by bring up that light, and then – seeing the effect of the cool, greenish light on Hannah's Asian skin tones – I added the blue-green low side light to amplify its effect. These lighting directions and colours were a part of the pseudo-random colour palette chosen prior to rehearsals as part of the initial lighting rig intended to 'seed' the accidental. Seeing the combination of Hannah's gesture and the quality of light, I identified 'slow-dark' as a piece of material I felt we should use in the final performance, and the Director made the decision of where it would appear in the overall performance composition.

I have described this particular process from initial stimulus to final performance in some detail, since it exemplifies, I would argue, the role of the randomised rig as 'diagrammatic' (to use the term I introduce in chapter II.1), seeding the creative process. For myself as lighting artist, the presence of the blue-green side light in the rig (without any specific intended use) and the affective quality of the cool top light colour on the actor's skin (again, unanticipated) suggested a possible composition of action and light. While it is impossible to be certain, it is my view that I would not have arrived at the lighting for this moment that I did through a conventional design process of watching and responding to an actor in the rehearsal room. In the terms I introduce in chapter II.1 discussing Deleuze's account of Bacon's process as a painter, the randomised lighting palette acted diagrammatically to avert the risk of the clichéd response of a conventional process. The *affect* of the 'slow-dark' performance gesture we created through an accidentally seeded process was, in Bacon's terms, 'done irrationally, [so] it seem[ed] to come onto the nervous system much more strongly than if [we] knew how [we] could do it' (in Sylvester 1987, 104 cited by Bogue 2003, 122).

The same devising process that lead to the word-pair 'slow-dark' also produced the pair 'sad-angel', to which my initial response in the rehearsal room was to gently flicker a light rigged at approximately head height, pointing into the room so the lens of the light was in view. Here, it was the flickering light source itself (rather than the illumination of people or objects in the room) that produced the affect that interested me in relation to the word-pair. Again, this gesture – a purely lighting one this time, rather than a light-and-actor combination – was kept as a part of the compositional materials used to construct the final performance, and it was used twice in different forms: firstly, in its original form during Section 5 (see the video of the Main Camera View of the performance, between 17'12" and 19'02"), and secondly, at the very end of the performance during a pre-recorded dialogue, where the affect was modulated by the suspended paper assemblage known as the 'map' that had by that point been constructed as part of the action (28'12" to 30'12"; Figure 18). Again, it is my sense that I as lighting artist would not have arrived at the same lighting – or indeed the same *affect* – without being a part of the devising process and adopting the creative strategies that I did. In both the cases I have described above (and at many other points during the rehearsal process) I would argue that the use of the randomised lighting palette acted diagrammatically to suggest how light might be a part of a particular performance moment with a particular affective result, in echo of Bacon's account, in which 'you suddenly see through the graph [diagram] that the mouth could go right across the face.'

Figure 18: The 'map' lit by 'sad-angel'

By contrast, I want to discuss a different example – that of the intense white backlight used immediately after the construction of the 'map' (23'44" to 26'07"). For me, at least, this use of light provided a powerful affect at a climactic moment in the performance, but it was one that is a familiar and established part of a widely used 'grammar' of theatre lighting. As such, it was in my view a cliché only partly ameliorated by the intimate space and open staging that encouraged the sense that audience and performers were all present *in* the space with the light, rather than being in another space looking at light *elsewhere*, as tends to be the case in larger performance spaces, and especially in partitioned spaces such as proscenium arch theatres. This matter is of course a highly subjective one, and I have no specific feedback from observers in relation to it, but my own sense was that while intense white backlight is a *pictorial* cliché at a dramatic climax, the different and I would suggest more intense affect of being co-present with such light is perhaps less of a cliché. Nevertheless, strong white backlight as a motif or idea, rather than as an affect, is familiar and I would argue clichéd. This lighting element was part of the initial lighting rig installed in the room prior to the start of rehearsals, and was motivated by the question, 'if you had a Big Lever to control lights with, what lighting would you want to use it for?' Such a stimulus might be seen as a

part of the pseudo-random process of arriving at the initial lighting palette, and so in line with my strategic intervention. However, I would note that my early research of the Benjamin theme had identified his metaphor of the Angel of History as something we might want to work with in developing the performance, and that in my mind there was already a link between the intense white backlight and the Angel of History. Despite my intention to avoid the conventional processes and logics of *design*, the cliché was – in Deleuze's terms – 'already lodged on the canvas' (Deleuze 2005, 8) and remained there until the final performance. While the backlight served another purpose in research terms in relation to the Big Lever (which I discuss in chapter III.2), in terms of my analysis via Bacon and Deleuze of cliché and affect, it provides a contrasting example to the two word-pair examples above.

I have, I would argue, demonstrated that the strategy of using a random or pseudo-random lighting palette as a starting point, or diagrammatic seed, can help avert the risk of falling into cliché. However, I would want to be cautious in my account of how the randomised lighting palette is initially arrived at; it is in my view something that requires further investigation beyond the present project. Firstly, I would note that during the process of deciding on the initial palette, I felt uneasy because I perceived a risk that making 'random' choices might simply mask a process of choosing 'what I like' or 'what I always do', and so admitting cliché by another route. In Deleuze and Bacon's account, making the diagram the work of the hand of the painter avoids this risk, removing or at least suppressing any intellectual engagement with the process. However, the nature of the lighting apparatus makes such a direct connection between hand and light more difficult than the connection between hand and paint, although further research might suggest ways this could be achieved. Secondly, Bacon notes the need to limit the chaos of the diagram: 'Bacon will never stop speaking of the absolute necessity of preventing the diagram from proliferating, the necessity of confining it to certain areas of the painting and certain moments of the act of painting … The diagram must not eat away at the entire painting, it must remain limited in space and time' (Deleuze 2005, 77). In the *Passages* project the deliberately introduced random elements were limited to the initial colour palette and rehearsal-room lighting rig; this process set its own limits, and I designed into the process no mechanism for injecting further randomness. (Of course, other factors outside my immediate control as lighting artist came into play in the form of the work and ideas of other members of the company that influence the lighting, in accordance with my proposal as I describe it in chapter II.1.) I had no sense that there was a risk of the randomness 'eat[ing] away' at the entire lighting, but I also have no sense of whether a greater degree of deliberate randomisation might have helped further my aims for the lighting. How to

achieve the optimum balance between order and chaos when introducing the diagrammatic lighting elements to the creative process (and how to know what 'optimum' is) is a matter that requires further research.

Before going on to consider the second strategic intervention, I want briefly to discuss some of the difficulties and potentials created by having the lighting artist as a performer, present throughout the rehearsal process. I have already indicated above that as lighting artist I took part with the other performers in the devising process, and the exercise using the pairs of words on postcards selected at random again provides a starting point for discussion. For the word-pair exercise the Director asked the actors to create short movement 'scores' based on the two words, but it was unclear from his brief how, or whether, he expected me to participate. As lighting artist I had several possible choices: (1) to simply observe the other performers doing the exercise; (2) to light what the actors created; (3) to do what the actors did, and create a movement 'score'; (4) to interpret the brief in lighting terms, and create a lighting equivalent. Doing (1) would be to return to the conventional role of lighting *designer*, observing but not participating in the rehearsal process. (2) is similar, in that it is a response to the work of other (*prior*, and by implication higher-status) artists – again a return to the widely perceived role of the designer. (3) is to ignore the disciplinary expertise of the actor, or to pretend the lighting artist also has an expertise s/he in all likelihood does not have. For the great majority of exercises during the devising process, I chose (4), and created a lighting equivalent of what the actors had been asked to do.[1] I had not previously discussed this choice with the Director or actors before rehearsals, but once everyone was used to my contributing in this way it became an accepted and welcomed part of the devising process. However, it also raised the question of what is an appropriate and creatively useful lighting response to any given devising exercise or technique. In some cases, the exercises the Director asked us to carry out did not appear to have a direct lighting equivalent, so I had to adapt the brief to a greater or lesser extent. There were also times when the other performers, after being asked to respond to a particular stimulus such as a piece of text, came back and discussed their ideas verbally rather than demonstrating them. I tended to demonstrate rather than discuss, suggesting an asymmetry between an actor's relationship with the process and that of the lighting artist. I would tentatively suggest this might arise from the lack of a suitable shared language to talk about the visual-affective, leaving demonstration as the only option. However, by lighting in the rehearsal room the option to demonstrate ideas becomes available, and several members of the company commented on what they saw as the value of having light in the space – a matter I return to in my Conclusion.

A further benefit I found of my being present throughout rehearsals was that the interaction between lighting artist and actors became an easy, natural one, so working in detail on matters such as the position of an actor in relation to light at a particular moment, or expressing opinions on matters other than lighting, did not feel disruptive or inappropriate as (in my professional experience) they can do in a conventional process. While it is possible as a lighting *designer* to build up a similar level of mutual trust and confidence with actors, I would argue the construction of a lighting artist as *performer* role is of considerable benefit in such a process.

The shift I have made from *designer* to *performer* in the rehearsal room is not without some disbenefits, however. I found there was a tension between the quality of attention required to contribute and to respond to the activity of the rehearsal process, and that required to reflect on past activity and to plan future activity. This tension found concrete, physical expression in the difficulty I had in choosing between being at the Theolux console ready to perform or actually performing, and being able to move around the room to observe from different viewpoints. As a lighting *designer*, I am used to being able to move around a rehearsal room relatively freely, and to spend time thinking and planning. To some extent the tension I have identified – the tension between deploying Massumi's *operative* reason and *instrumental* reason – derives from a change of working practice not yet fully assimilated, but to some extent it is inherent in the role of lighting artist as I have conceived it, since a degree of forward planning is still required: the total lighting apparatus is not (yet) directly under immediate, 'naturalised' control. Instead, the lighting artist must spend some time contemplating and planning adjustments to the lighting rig, focusing and colour, and to the set-up of the console. While I made a conscious decision that I would not try to anticipate future needs, but rather allow the randomised lighting rig to provide the materials for new requirements as they arose, some time and thought was required to meet those needs once they had arisen. A lighting apparatus that merged the currently distinct console and rig into a single entity, all under the direct, immediate and 'naturalised' control of the lighting artist might more fully realise the idea of the exosomatic organ I identify in chapter II.3, and to which I return in chapter III.2.

Strategic Intervention 2: ***To defer certain design decisions until the moment of performance***

My second strategic intervention proposes a shift away from a model of practice in which the lighting is as far as possible fixed prior to performance, and towards a model where some decisions are deferred until the moment of performance. Such a move, however, raises the question of which aspects or parameters of the lighting are to be fixed, and which are to be left open. The Theolux console was designed to control the *intensity* of lights over *time*, and so it is in this intensity/time domain that artistic choices have been left unfixed until the moment of performance. At this point, we need to distinguish a synchronic intensity domain (the balance of intensities of light sources at any given moment) from a diachronic intensity domain (the intensities of light sources as they vary over time). With Theolux, the lighting artist can operate in both domains, balancing the relative levels of threads over time. However, for the *Passages* project I tended to use any given thread at full intensity except while it was fading in or out, setting the relative intensities of individual lights by recording the levels as a morph within the thread – in other words, I preset synchronic intensity balances *prior* to performance, and worked 'live' in the diachronic intensity domain, concentrating on the speed, trajectory and relative balance of the thread intensities during transitions. This tendency represented a partial shift away from my original intentions, and was motivated by an anxiety on my part about being able to achieve a desired level of accuracy in balancing the thread intensities 'in the moment'. Specifically, this was an anxiety about my own developing virtuosity with the Theolux interface: during the performance, where a transition involves changing the levels of several threads, to arrive at a carefully judged intensity balance between those threads is certainly possible. However, my sense during rehearsals was that – with the limited amount of practice with the console I had had, to develop my *virtuosity* as a performer – it would be difficult for me to concentrate on both timing and intensity balance; the risk of egregious error would, I felt, outweigh the subtly nuanced benefits (in terms of *affect*) of success. For this reason I chose to predetermine intensity balances

and to focus on the 'in the moment' judgement of timing, not only because of my desire to produce a performance of artistic merit, but also – and more importantly – by my need to carry out a research process that would produce the required results in terms of the present thesis.[2]

Having established the reasons for my concentrating on timing during the *Passages* project, I want to turn now to the question of the relationship between the judgements of timing made by the performers (including myself as lighting artist) and *affect*. The following analysis draws to a large extent on the post-performance discussions and the company debrief, together with feedback from audience members. From the point in the rehearsal process at which the performance was first assembled from its constituent performance 'materials' (moments and short sequences) into a 'script' or 'score', the relative timing between the different elements of actors, sound (operated by the Director) and lighting was in constant flux.[3] Initially, this shifting largely arose from all of the performers learning through practice and experiment how best to perform the score in a technical sense – learning movements, sequences of events, and (for the actors) some of the quite complex manipulation of furniture and props involved. As we achieved a degree of technical mastery over our individual scores, I (and it seemed to me each of the actors) was able to give greater attention to developing a more acute sensitivity to the other performers, and to the nuances of affect that could be expressed through small changes to timing. During the discussion following the examined performance, one of the actors noted that she responded to changes in the lighting, rather than expecting the lighting to light her in a particular way in a particular time and place (as would typically be the case within conventional lighting practice); as another actor noted, this is the same as how actors work with each other in performance. To be clear, I am not referring to *cuing* of one performer by another, in the sense of a procedural process in which an action undertaken by one person is pre-agreed to be taken as the signal to act by another. While there were a small number of specifically cued events, such as when Theolux's Pad controller was used to initiate the performance (Main Camera video at 0'40") and, towards the end, to change scene (27'20"), at no point during the rehearsal process were there any of the discussions about cuing that occur extensively in a conventional process, where cues and timings are agreed (and hence pre-determined). Rather, specific sequences of events were agreed so that – where it seemed to be necessary – the order of actions was determined, but within that ordering the timing was left to the judgement of each performer.[4] Such judgement was informed by what the Director Chris Goode described as 'a shared understanding of tone', originating from the devising process, which gave all the performers a sense of the affective qualities we were trying to achieve at any given moment in the performance. In a conventional process, that understanding of tone is shared by the actors,

who develop it in the rehearsal room; with *Passages*, the understanding was also shared by the lighting artist, also present – and performing – in the rehearsal room.

Our judgement as performers was also informed, I would argue, by a sensitivity to each other – a sensitivity that is analogous (as one of the actors pointed out) to that developed by the mirror exercise, in which two people face each other and copy each other's movements as if they are the other person's reflection in a mirror. After a time, both participants lose a sense of who is leading and who is following. As lighting artist, when I detected a slight change to the timing or other quality of what another performer was doing, I could choose to compensate (and so damp the effect of the change) or to reinforce (and so amplify the effect of the change). In either case, the judgement required is informed by the 'shared understanding of tone', but it was also, for me at least, informed by a sense of where in the rehearsal process we were – whether it seemed helpful and appropriate at that moment to offer or pick up on a perceived opportunity to introduce something new, or whether it was better (in terms of my understanding of what was needed at that point) to try to damp down the turbulence caused by a change (accidental or deliberate) made by another performer. In the foregoing I have referred to a 'change' in what another performer was doing. I want to be clear that this change is not defined as an erroneous departure from the reference point of a pre-agreed, defined action, but as a variation away from what has become normalised – but not fixed – during the process of repetition that is rehearsal. In this sense there is no clear definition of what constitutes a 'mistake' (a question raised by an audience member during the discussion following the examined performance); the binary of correct/incorrect, as measured by compliance with pre-agreed actions, is an inappropriate model, and must be replaced by a spectrum of better/worse, judged against a complex and possibly contradictory set of values. As well as the obvious (but still difficult to define) aesthetic or dramatic measures, the value set might include – as another audience member noted – the value of an action as a contribution to the creative *process*. 'Worse' might mean doing something that fails to pick up on what another performer has offered, or failing to offer valuable possibilities to the other performers and so contribute to the unfolding creative work.

The account I have given above might remind us of Karin Knorr Cetina's epistemic objects, which I used as the basis for a model of the creative process of lighting designers. In the case of *Passages*, however, the lighting scheme as an epistemic object was not only *incomplete* at the time of performance, but it was still dynamic, unfolding. I discuss above the choice that performers might need to make between amplifying a change and damping it. Following Knorr Cetina's description of epistemic objects as 'unfolding structures of absences: as things that continually

"explode" and "mutate" into something else' (Knorr Cetina 2001, 182), the choice is between encouraging and discouraging mutation and explosion. In my own experience as lighting artist, I felt a tension between on the one hand a perceived need to limit and control the extent of changes in the performance – to damp down the mutation – and on the other hand a desire to respond to perceived opportunities to more or less radically change what I was doing – to trigger the mutation or even an explosion. The former need is a convergent force, seeking to hone and refine at finer and finer levels of detail what has already been established in rehearsal. The later desire is a divergent force, a want to investigate and experiment with the full range of possibilities that have been opened up by what has been done thus far. At a macro level, the creative process moves over time from the later towards the former, but of course the movement is not linear or even: some parts of *Passages* were by (mostly tacit) agreement left largely unchanged after a certain point in rehearsals, while others remained more open for change much longer.

I have argued above that the performers, including myself as lighting artist, did not follow pre-defined cues, but rather developed a consensus as to the order and timing of actions through largely tacit means, including a particular awareness of each other, guided by a 'shared understanding of tone'. In this sense, I would argue that we were more like a self-organising, complex system (Cilliers 1998) than the hierarchical model that tends to operate (for lighting and other scenographic elements, if not for actors) in conventional theatre practice. In the hierarchical model, absolute instructions are sent out from a centralised control (the director, the lighting designer, and so on) via intermediate levels (the stage manager) to operators. The self-organising system, on the other hand, exhibits 'dispersed intelligence' (Miller 2006, 230) – the behaviour of the flock. Members of the system do not have complete knowledge of the system, for they are inside the system and do not have a panoptic view of it, but they share behaviours. A particular benefit of complex systems that are 'centreless' and do not rely on absolute instructions is that they are robust against disturbance: as one actor in *Passages* noted, when she had difficulty with a complex bit of stage action (wrapping thread around furniture and props in a defined order), she felt I was able to accommodate her with the timing of the lighting without any explicit instruction or pre-arranged plan for that eventuality.

In describing the performers collectively as a complex system, I do not want to suggest that the elements of the system are undifferentiated in their behaviours. Clearly, as lighting artist my input into the system is of a different order to that of the actors, and while I can see the actors, as they can see each other, they cannot see me (in the sense of my physical body) in the same way, and what they can see does not communicate what I am doing as it does when seeing another actor.[5]

Instead, the actors are aware of me primarily through the light on stage. What we have in common, though, is the ability – within certain parameters – to change the timing and affective quality of our actions. This cannot be said in the same way of the sound and music that ran through much of the performance. This sound was pre-recorded and pre-mixed, with only the initial timing ('cuing') and volume of each sequence being controlled live during the performance. To a significant extent, this was a pragmatic choice: when assembling the project team, we were unable to find anyone available to work through the rehearsal process specifically as a sound artist, to create or control sound and music live, in an analogous way to how I was proposing to work with light. Given the research imperatives of the project, as well as the artistic ones, the presence of largely predetermined sound has been called into question by several observers, on the basis that such a fixed element (in terms of timing but also affective quality) in the performance would result in the other elements – actors, lighting artist – being only able to respond, always forced to be 'in relation to'. On this basis, what we might call the *sound design* would be a prime determinant of the performance, blocking my research aims. However, I would argue against this view in two ways. Firstly, the sound and music composition was only arrived at quite late in the rehearsal process, during the last few days. While we experimented with pre-recorded music and speech from an early stage in rehearsals, no decisions were made until each section of the performance was well defined (in overall terms). Thus the sound and music came as a response to what we had already made in the rehearsal room, responding to, amplifying or counterpointing the affective qualities already established. To this extent, it worked as a conventional sound design, arrived at through a conventional design process (albeit undertaken by the Director rather than a dedicated sound designer).

Secondly, having a sound and music element that was largely fixed had what was for me an unexpected and – I would argue – important result, which I want to explain by giving a particular example. During section six of Passages, the three actors assembled what was known as the 'map' from several quite large pieces of paper; the map was then hung up on a chord stretched across the stage. Once the map was suspended, it was backlit by an intense white light, and the actors drew and wrote on it. The next sequence involved the actors dragging each other away from a shaft of yellow light apparently coming from a doorway, and was accompanied by a change in the music – a change that was fixed in the sound mix rather than being operated live. Constructing the map was a somewhat difficult technical process for the actors, which took then several rehearsals to master. It was also a relatively late element to be added to the performance, and so the actors were still refining the process of assembling the map during the final rehearsal. During the examined

performance, I became aware that the map sequence was going much more quickly than it had ever done previously, and that we were approaching the transition from drawing on the map to dragging back from the doorway much earlier in the music (Main Camera video between 24'00" and 26'00"). This occurrence might seem to support the argument for the sound to be operated live, so the sound performer-operator could adapt to the changed timing of the actors, as the lighting could. Indeed, in terms of achieving the closest possible reproduction of a predetermined performance – 'making it the same as it was in rehearsal' – live operation of the sound would be better in this particular eventuality. However, in that moment of, for me, peculiarly heightened anxiety (caused by the awareness that we had what in subjective, perceptual terms was a long time to fill before the pre-recorded music change would arrive, and layered onto the existing anxiety of an examined performance) I was strongly aware not only of the 'violent chaos', the 'catastrophe' – in Bacon and Deleuze's terms – that had opened up before us, but also the *potential* of the moment: 'a germ of rhythm in relation to [a] new order of the [performance]' (Deleuze 2005, 72). In that moment, I imagined new possibilities: stretching the timing of the lighting to fill the gap; bringing in the yellow door light earlier and not synchronising with the music; filling the moment with something entirely new; doing nothing and either waiting the actors to offer something or simply allowing a tension to build as nothing seemed to happen. I was also aware that the actors and Director might also be thinking of possibilities, and that there might be other possibilities that no one had thought of (and – to be even more speculative – possibilities that only the audience imagined).

My purpose in detailing this moment, which would within conventional theatre practice be seen as a 'mistake', is to point out the risk that if all the performers are so attuned to each other, so sensitised and so in agreement as to the desired performance outcome, then the result may be a kind of dynamic stability, in which any variation from the normalised performance is immediately damped down and eliminated.[6] Paradoxically, rather than providing the predetermined reference point to which all other performance elements could be fixed, the recorded sound and music might be seen as a source of resistance, of obstinacy, of *diagrammicity*, to prevent the performers settling into clichéd equilibrium. Where 'Bacon will never stop speaking of the absolute necessity of preventing the diagram from proliferating' (Deleuze 2005, 77), I would also argue for the necessity of ensuring that the performance as an unfolding, epistemic object retains elements of diagrammicity in order to avoid stagnant cliché. In Bacon's paintings, the diagram is retained in the painting; in *Passages*, the diagrammicity of the fixed audio element continued to act as we

moved from rehearsal to performance. While the diagrammicity need not come from the sound and music, or from any prerecorded element, it should, I would argue, continue to be present.

Strategic Intervention 3: ***To strategically position the lighting artist in the geometry of the performance space in order to engage her/his interrogating gaze, thus connecting her/him into the 'circuit of energy' between lighting artist, activity of the stage, and spectators, and promoting her/his role as a performer***

My third strategic intervention addresses the spatial and other relationships between the lighting artist, the audience and the stage. In chapter II.2, I argued that for the lighting artist to be connected into the 'circuit of energy' s/he must see and be seen by the audience and the actors, that her/his interrogating gaze must be invoked, and that an ambivalence must be sustained between the lighting artist being a spectator and being a participant. As lighting artist for *Passages*, I was positioned with the Theolux console at the end of the arc of audience seating that wrapped around two sides of the stage space. I want at this point to consider how and to what extent this geometry met the aim of engaging my interrogating gaze and connected me into the 'circuit of energy', so promoting my role as a performer.

The first question to be asked in the discussion that followed the examined performance was whether I felt differently after operating/performing *Passages* than I would after operating a conventional theatre show. In my response I focused first on the physiological, noting that I felt 'sweaty' and 'exhausted', ascribing these feelings to the intensity of concentration required to perform the lighting. Even allowing for the anxiety attributable to the examination aspect of the event, such a physiological response is not that which I would associate with either the conventional theatre lighting operator's experience, nor indeed the typical experience of the spectator. However, there is more to the idea of the interrogating gaze I develop in chapter II.2 than simply *intensity*. The interrogating gaze also involves a self-aware questioning, both of what

is being observed and, reflexively, of one's own responses to it – an openness combined with an inquisitiveness towards what is being experienced both externally and internally to oneself. My own notes, made on the day of the examined performance, list the following activities during the performance in addition to the business of actually operating the lighting: 'worrying about what comes next and what I need to do to be ready; watching the performance; watching the audience and their reactions and locus of attention; watching the light in the performance; reflecting on how the timing [of the performance] is constantly shifting'. I also noted that 'I do not feel in control of the performance, or that what I do is (wholly) determined by the performance.' In addition, my sense was that I was physically present in the same space, and part of the same activity, as both the actors and the audience (in distinct contrast to the reading of the typical theatre lighting operator's experience I recount in chapter II.2). On the basis of the above observations, I would suggest that my interrogating gaze was invoked or at least boosted by my positioning in the performance space, and that it was directed at both the activity of the stage and (perhaps to a lesser extent) at the audience.[7] At this point the reader might argue that the lighting artist's interrogating gaze is engaged not by the spatial configuration but by the fact of performing the role as a part of the performance. However, my experience during the performance was of a particular state of alertness, a particular *quality of attention*, that was intense but also complex, and my sense was that being able to see not only the other performers but also the audience – and being aware that I could in turn be seen – promoted that alertness. Performing as lighting artist from a hidden 'backstage' position, unseen by and unable to see the audience, would not – I would argue – promote the interrogating gaze to the same degree.

Since my formulation of the 'circuit of energy' implies the interrogating gaze is active in both directions, I want now to discuss how I as lighting artist was seen by the audience and the actors. The question of how the lighting artist was perceived as a performer by spectators was the subject of more feedback from those who saw *Passages* than most other aspects of my research, which I would (speculatively) attribute to its being both a visible and indeed highlighted aspect of the performance event, and to its being of interest to and open to discussion by lighting non-specialists. Many observers commented on how being able to see the lighting artist (and having an understanding of the event as part of a research process as well as a theatrical performance) influenced their perception of the lighting and its role in the performance: as one audience member wrote in an email after the event, 'the lighting seemed to take on a new meaning in the knowledge that it was flowing from a performer, and a feeling there was a relationship between the lighting and actors'. Another wrote that he, 'was very aware of the presence of the lighting operator

throughout – his consciousness and his status as an interested observer. His relation to the action remained ambiguous, but it was easy to fantasise him as a figure in the drama, whose connection extended beyond the lighting role.' One spectator went further, interpreting the light, and the lighting artist, as Benjamin's nemesis in the play; another proposed an analogy with the character of Prospero in Shakespeare's *The Tempest*. These kinds of readings, in which light and/or the lighting artist becomes a *character* in the drama, while going further than my own intentions, contain the implication that the lighting artist is indeed in some sense a *performer*, and being read as such by the spectator, since characters are generally played by performers. Other spectators, in their feedback, appear to have read the role of the lighting artist not as a character, but still as a performer – one person writing of being 'very aware that light was to some extent "live and conscious" through a present human interactive consciousness', while another wrote of '[t]he synergy between performers and lighting designer'.

The kinds of audience responses I have indicated above strongly suggest, I would argue, that spectators were reading (in somewhat different ways) the role of the lighting artist as that of a performer. However, one person's feedback also points to an awareness of the lighting artist as an (actively engaged) spectator: '[w]hat you could see was the lighting operator "anticipating" a crucial moment in the amount of energy invested in a specific cue.' Here, the perception appears to be of the lighting artist watching the action (as the audience is) and waiting to take part in that action: the watcher is watched, and – we might infer – the audience sees the stage action through the eyes of the lighting artist as well as their own. Spectators become sensitised to both the role of the lighting artist and to the role of light within the performance; as one member of the *Passages* audience put it, being able to see the lighting artist 'made the whole experiment interesting to watch: to discover the cause and effect in a performance.' If the audience's sense of anticipation and discovery are activated, then we may infer that the interrogating gaze of the lighting artist towards the audience is returned.

The returning of the lighting artist's interrogating gaze by the actors is in some ways more difficult to evidence. Clearly, the actors do not, for the most part, return the gaze in a literal sense, since their eyes cannot generally be directed towards the operating position for any sustained period. However, in my experience the actors were sensitive to me as the lighting artist because they were sensitive to the light that I was performing *through*. This sensitivity arose from the extended rehearsal period during which the actors had worked with me and with light in the room: one actor made the distinction between 'working in the light' (in a conventional process where the lighting arrives towards the end) and 'working with the light' (where the light has been present

throughout rehearsals). It is just this kind of sensitivity to each other as performers that I have described above when considering my second strategic intervention: members of a complex, self-organising system must be aware of themselves, alert and responsive to one another, but not commanding (since there is no centralised command in such a system). For a group of people to form a self-organising system – as I have argued the performers in *Passages* were – they must all adopt the interrogating gaze, with its inquisitive openness and reflexivity. On the basis of these arguments, I would assert that, positioned as I was, as lighting artist my interrogating gaze was invoked, and returned by both audience and actors, thus connecting me into the 'circuit of energy' of the performance event.

Notes

[1] I also lit the actors' contributions when specifically asked, not so much because I felt it was useful in generating performance material, but rather because it helped other members of the company become familiar and comfortable with having light and the lighting artist in the rehearsal room.

[2] The same anxiety regarding the matter of balancing levels (amongst other factors such as cost) appears to have underlain the opposition to Bentham's Light Console. Strand sold only sixteen Light Consoles, which could not preset intensity levels and so relied on the operator's ability to control intensity balance and timing simultaneously. The Light Console's successor, System CD, which offered intensity presetting, achieved over one hundred installations.

[3] The score for *Passages* was never written out in full. A chart showing the overall structure (which had, in final form, six sections) was drawn up by the Director and put up on the rehearsal room wall for reference. I created a series of graphical representations of the lighting for the performance, initially as an aide-memoire during rehearsals as each section took shape, and later as something akin to a lighting score to perform from (see appendices B11, B12, B13).

[4] A personal frustration, arising from my professional experience, with the mainstream practices of cuing is that within that conventional system only certain parameters can be used as the basis for setting timing relationships. For example, the conventional system allows for the *start* of a lighting change to be synchronised with another action (such as a particular word in an actor's speech), but it has no widely agreed method for synchronising the *end* of a lighting change with another action. The later is inherently more difficult since it requires a greater and more difficult degree of anticipation, but it can be done. Nevertheless, I have always been reluctant to attempt it unless I have a particularly high level of confidence in the stage manager calling the cues, because such a task (and the exercise of that particular kind of judgement) is not widely seen as part of the stage manager's or the lighting operator's remit.

[5] As one member of the production team pointed out, the design and orientation of the Theolux console was such that the actors, from their position onstage, could see only the back of the console, and – except when operating the Big Lever and perhaps the Pad – they could not see what my hands were doing. The actor's awareness of my physical presence as lighting artist was thus primarily through being able to see my eyes and face.

[6] In physics, a system that is dynamically stable returns to the same state when perturbed – for example, a ball bearing in a bowl will tend to settle back to the centre when moved away from it. By contrast, a system that is dynamically unstable will change state when perturbed – for example, a pencil balanced on end will topple over at the least disturbance.

[7] My sense here is that while I was at times observing the audience's reactions and locus of attention, I was not – consciously at least – making much use of this information. I would speculate that, had we run the production for more performances, I would have learnt how to shape my own performance in response to the audience; this is a matter that would benefit from further research.

III.2 Reflection and Evaluation 2: The Interface

Chapter III.2 is structured in terms of the two strategic interventions I develop in chapter II.3. What follows in the present chapter assumes the reader is familiar with the practical research of Part III through either direct experience or the documentation presented in the appendices, including the summary description in appendix A0. I do not evaluate here every feature and function of my Theolux console; rather, I concentrate on those aspects that relate directly to the strategic interventions and my project as a whole. To place the following evaluation in context, I want to make it clear in what ways I consider the Theolux interface to be innovative. Firstly, I would note that such innovations as I have made appear entirely in the area of operation in rehearsal or performance, not in the area of editing lighting data as part of the preparation for performance ('plotting' or 'programming'). I also acknowledge that the idea of multiple parallel lighting elements that are combined to make up the totality of light on stage is already possible, though not widely used, on many theatre lighting controls, and both possible and extensively used in concert, event and broadcast lighting practices. However, I would argue that the formulation of what I have termed the thread/impulse model together with its realisation in a lighting control interface is innovative in the context of theatre lighting practice. Furthermore, while lighting controls intended for performance forms other than theatre offer comparable data structures, they are not designed overtly to support the kind of systematic structuring of lighting *affect* I argue for here. Indeed, I would go so far as to maintain that I am inverting the conventional *telos* of such lighting controls: interfaces intended for use when lighting a variety of performance forms generally claim to offer flexibility and multiple ways of working – a supposed 'freedom' for users to work as they choose – while Theolux proposes and is designed to encourage (and in some ways even enforce) a specific conceptual approach to thinking about and working with light for performance. While theatre lighting is, as I argue in Part II, almost entirely locked into the state/cue model, concert and event lighting controls propose a choice of ways of working without overtly promoting one particular conceptual model. My innovation in the field, I would argue, has been to design a lighting control based on a particular *aesthetic* logic – it is, therefore, a self-consciously performance-political gesture.

The second main area in which Theolux is innovative is in providing multiple physical interfaces that are *idiomatically* the same while requiring different physicalities of the lighting

artist. As far as I have been able to establish, all commercial lighting controls that offer different ways to achieve the same end do so in order to provide different functionality rather than to provide different physical qualities that can translate into different aesthetic qualities of lighting change. Theolux's Impulse and Chord controllers are idiomatically different from each other (they have a different operating 'syntax'), but the Crossfade Pair, Texture Lever, and Big Lever sub-controllers of the Impulse controller are idiomatically the same, and have been specifically designed to offer different physicalities with resulting different aesthetic potentials. It is this specific provision that I would claim is innovative.[1]

Strategic Intervention 4: ***To redesign the lighting interface to promote a conceptual model of the control of light structured in terms of affects and temporal dynamics***

My fourth strategic intervention, regarding the structuring of the conceptual model of the control of light, and so of the data model and interface design of the control system, was implemented in both the software and hardware aspects of the Theolux console. The 'thread', as a unit of affect, is the primary unit of lighting in both data and control terms, with the 'morph' as the secondary unit from which threads are made up – a structure that follows the principles of the thread/impulse model I establish in chapter II.3.[2]

I want to begin with what I regard as a particular success of the thread/impulse model and its implementation. The reason for allowing each thread to have one or more 'morphs' was to accommodate the anticipated need to have the same affect produced by a different combination of lights or a different balance of light intensities – for example, where the same colour and direction of light might be wanted at different locations in the stage space. In other words, morphs rebalance intensities *within* a thread. My intention, then, was that changing from one morph to another in the same thread should be a discreet, if not invisible, process, since such a change should not bear any

dramatic or aesthetic significance (unlike a rebalancing of intensities *between* threads). Since there might be times when it would be necessary for the change from one morph to another to take place 'live', I created facilities to preset the fade time from one morph to another (in exactly the same way that the crossfade times between cues are preset in conventional theatre lighting practice), and to synchronise these fades across multiple threads, so that the change from one morph to another could be done as slowly and discreetly. However, during the *Passages* project I found there was no point where I required a change of morph while the thread intensity was above zero – morph changes were always made invisibly (in lighting jargon, they were done 'blind') so that the thread was in the required morph for when it was next used during the performance. While it meant that some Theolux features were redundant, I would argue that this outcome vindicates some of the principles underlying the thread/impulse model.

The success during the *Passages* project of the threading model as a whole was perhaps slightly more qualified. A key issue that emerged during rehearsals relates to the definition of threads in aesthetic and dramatic terms. As I describe in chapter II.3, my proposal was that each thread should represent a single lighting *affect*, which could be mixed with other threads – and so other affects – to provide the lighting's affective contribution to the performance at any given moment. To be clear: the total affective contribution comes from the sum of the individual affects (threads), but also from their relationship to each other and to the other elements of the performance (one affect modulates other affects), and from the affective qualities arising from the dynamics of the thread intensities as they are changed. And herein lies the difficulty – affects are not atomic, indivisible, but are in constantly shifting relationships with each other, *modulating* each other (to use the Deleuzian term I introduced in chapter II.1) in a complex, woven pattern. Thus threads cannot each contain a discrete, monolithic affect, but a zone from a field of possible affects – a range of possible affects that may overlap with or be modulated by other zones. In creating the threads during rehearsals, I had to make decisions as to what affects to group together (perhaps as a series of morphs within the thread) and what to put in separate threads.

Pragmatically, there is a limit to the number of threads that can be deployed, since each thread used in the performance is controlled via a set of physical controls on the console; Theolux had twelve such sets of controls. To give an example of the difficulty, the initial 'randomised' rig we set up for the first few days of rehearsals included a series of down lights producing a row of four sharp-edged circles of light in two alternating colours (Figure 19).

Figure 19: Three of the four down lights in the original randomised lighting palette

Conceptually, in my mind, these four lights were a single entity, creating a pattern or the possibility of a range of patterns. Affectively, the pools of light had much in common (due to their shared direction and edge quality) but they were also distinguished by their colour. Furthermore, combining them statically and dynamically (all four lights at the same intensity; all four at graduated intensities; stepping through each in turn in a 'chase', etc.) could create further affects. I had to decide whether to place all four lights in a single thread, with morphs to give a range of (static) combinations of intensities, or to create four threads, one for each light. The question, conceptually, was: are the affects created by these lights (singly and in combination) sufficiently similar to qualify as a single affect, or should they qualify as distinct affects? The judgement this question implies must be informed by a sense of the overall range of affects being used in the performance: if the 'dynamic range', as it were, of affect used during the entire performance is small, then one can afford to distribute subtly nuanced affects across the limited number of threads available, whereas if the range required is large, then quite different affects may have to share a single thread in order to accommodate that total range.

During rehearsals for *Passages*, as the affects that would be wanted for the performance became more clearly defined, I became aware of a tension between myself as a *designer* wanting to increase the number of distinct affects available as threads to be part of the 'palette' from which I could compose the lighting, myself as a *performer* wanting to limit the number of threads and to have them fixed as early as possible in the rehearsal process so I could be as fluent as possible in manipulating those threads in performance, and myself as *theoretician*, wanting to maintain the

'purity' of the conceptual definition of a thread as a single affect (although as I have pointed out above, such purity is conceptually doubtful in any case). In practice, this tension was resolved by allowing some threads to contain several affects (in the form of different morphs) that were only loosely related to each other. As can be seen from the list of threads and their morphs (appendix B14), the fourth thread entitled 'Environment' contained all the lighting outside the central stage space, including the houselights, orange roof lighting and green wall lighting, as well as a green sidelight lighting the bed which was only placed in this thread because of its colour association with the green wall lights. This grouping of lighting elements was based more on an *intellectual* idea (lighting outside the stage space) – and then only loosely – rather than having a basis in *affect*. For this thread, at least, the conceptual definition of a thread as an affect was abandoned entirely, for the pragmatic reason of not having enough threads available on the console. On the other hand, many threads retained their clarity of definition: perhaps eight of the twelve were truly defined by affect, and it is noticeable that these threads tended to have few morphs (in many cases, only one).

The decision to limit the number of threads on the Theolux console was both pragmatic and conceptual. Pragmatically, each thread on the console required several physical buttons, each of which required a channel on the MIDI input and output hardware, and also each thread occupied screen space on the Timeline display built into the main console control surface. The available budget for the project put a limit on all of these hardware requirements, and the decision to have twelve threads was in part determined by these factors. There were several more philosophical considerations. Firstly, since the number of controls that constituted the hardware interface would increase in proportion to the number of threads, the overall size of the console would also increase. One of Bentham's design principles for a lighting console was that all elements should be within easy reach of a seated operator – a principle I also wanted to adopt, in line with my conception (again following on from Bentham) of the console as a playable instrument. Secondly, having more controls increases the difficulty in becoming fluent with the console. By fluent, I mean acquiring muscle-memory so the lighting artist can reach for the required control without having to consciously work out (from reading a label, by counting within a group of controls, or by visual memory that requires the control surface to be looked at) which is the correct one.

My third conceptual concern with the number of threads touches on a question that is for me philosophically fundamental to lighting as an artistic practice (and perhaps to other creative practices). To put it at its simplest: to what extent is there a value in limiting the materials from which a creative work is made?[3] While this question is very complex, I would argue that, broadly, for any given creative work, and given set of artistic aspirations that its creators may have for it, a

balance must be struck between a performance language that is too richly complex for the audience to learn, and one that is too impoverished to express what is intended.[4] My intuition (developed experientially, I must presume, during my years as both a lighting designer and an educator in an arts context) is that a restricted palette – within limits, and other factors being equal – does typically produce work that is expressively clearer and more articulate. I would want to underline that this is a very subjective view, but that it is also one that in my experience is shared by other practitioners and educators in the field. But again – how limited a palette is too limited? At what point does making something clear become making it simplistic? My sense with *Passages* was that the twelve threads was a little too limiting, hence some of the threads loosing their 'purity' as carriers of a single unit or zone of affect as I describe above. Sixteen would perhaps have been enough to avoid this compromise while preventing an unhelpful proliferation of affects; of course, this figure is specific to *Passages*, and might well be different for other works.

Strategic Intervention 5: ***To redesign the lighting interface to provide a playable instrument, promoting certain types of attention and expression by the lighting artist***

To evaluate the outcomes of my fifth strategic intervention, I want to return to the notion of 'playability' – a term which I adopt from Bentham, and which I discuss in chapter II.3. For a lighting control to have playability, as I use the term, it must connect the lighting artist in a very direct and immediate way with the light on stage, promoting her/his interrogating gaze, while offering its own particular expressive potentials, all in order to allow the lighting artist to take greater control over certain aspects of the aesthetic and dramatic qualities of the lighting.

Firstly, I want to discuss the matter of virtuality. Theolux, of course, has a virtual dimension, since it runs software and processes lighting data that must at some point be entered by the user (and so in some sense be thought of by the user *as data*). However, given my strategy of developing the lighting over the full duration of the rehearsal process, I found the need to enter the virtual dimension gradually diminished as the performance 'score' became more clearly defined and settled. Once I was able to finalise the palette of affects, and so the thread content, there was no longer a need for me to work in the virtual dimension. Rather, I acquired a strong sense of the directness of the connection between, say, a lever and the light on stage. Threads, as an entity, had for me a twofold existence: firstly as light, spatially located away from me in the stage space, and secondly as a group of physical controls together with an area on the display screen, located within reach and so connected to me both visually and kinaesthetically. There was not, at least until the data contents of a thread needed to be modified, any sense for me of a third, virtual, dimension to a thread. In the moment of actually altering thread intensities, with my visual attention concentrated away from me on the light in the stage space, the 'distance' between the two aspects of a thread – the physical console control and my body manipulating it, and the light with its affective quality as a part of the performance – collapsed. Hand, eye, light and aesthetic intention became one: I experienced the 'rapt attention to the visual experience folded together with pre-reflective performance via the digital interface' described by Popat and Palmer (2008, 135).[5]

I want to be clear at this point that my experience was not of being the lighting artist as an autonomous subject, performing upon a 'playable' instrument – responsive to the other elements of the performance but in full and conscious control of proceedings, working teleologically towards a predefined artistic goal. I proposed in chapter II.3 the lighting system should become an exosomatic organ, an extension of the lighting artist, offering certain enhanced capabilities and sensitivities, and my experience during *Passages* was as much about a heightened awareness as it was about a heightened degree of control. Furthermore, the artistic choices I was making in the moment were as much to do with the potentials available within the lighting system (including the kinaesthetic, expressive potentials of the combination of my body and the console's controls) and the particular aspects of the performance of which I was especially aware, as they were to do with an overall sense of artistic direction: Massumi's *operative reason*, 'guided … by a pragmatic sense of the situation's responsivity (as opposed to its manipulability)' (Massumi 2002, 112). On this basis, we might see the lighting artist not only as a performer (in the everyday sense that an actor or a musician is a performer) but also as performing the role of Lighting Artist. We might indeed see being the lighting artist as a *performative* act, in the sense Judith Butler and others have used

the term: that the role of Lighting Artist is constituted by the very act of performing it, and that the lighting artist is not entirely, or even largely, in conscious, autonomous control of that process (Butler 1990). Rather, the role is determined to a significant extent by the nexus of values, assumptions, desires and other forces in which it is situated, and while my project has been to reinvent the role of the lighting artist, it has done so by shifting some of those factors that determine the constitution of the role, rather than somehow liberating the lighting artist from all external forces.

I want at this point to mention two detail aspects of the design of Theolux which I would suggest help to suppress any sense for the user that there is a virtual dimension to a thread. Firstly, all of the buttons on the console are illuminated, with the great majority of them using this illumination to indicate the state of what they control (the remainder are permanently lit, to show that their function is always available). Thus a button to select a thread for control is illuminated when the thread is selected: the same physical device is used for both control and display, preventing it seems to me the sense that can otherwise occur that doing something *here* elicits a response *there*, so implying hidden channels of communication and processing within the machine. Pressing a button and then having the button light up in response reinforces the sense – I would suggest – that it is the button itself that 'contains' the function that it activates. Secondly, the graphics that show the state of the threads on the console's screen display are not drawn with the kind of 'trompe l'oeil' three-dimensional effects such as shadows and highlights that are a well-established convention in personal computer software. In computer software, the intention appears to be to suggest to the user that on-screen 'objects' such as windows, buttons, sliders, and so on are physical, with solidity and depth, existing in a separate (virtual) world with its own light source. My approach is the reverse of this: I have chosen to draw text, lines and shapes for each thread in flat colour against a plain background, without anything intended to suggest there is depth behind the screen (Figure 20). While some shapes are drawn with partial transparency where they overlap with other shapes, the effect created, I would argue, is of two-dimensional shapes all occupying the same plane – that of the screen itself. Furthermore, the console display screen always shows the same information about the threads, rather than offering a range of views of the same data. Again, my intention is to suppress any illusion of a visual or virtual data space within the console wherein the threads might be felt to have an existence: the data aspect of the threads is (or rather my intention is that it appears to be) immutably embedded in the physical hardware. Such a perception is of course quite subjective, and I have not tested this aspect of the console's design in any rigorous way, but my own experience and informal feedback from others allows me to

tentatively suggest it has been successful in meeting my aim of, in Hayles's terms, giving data back its body.

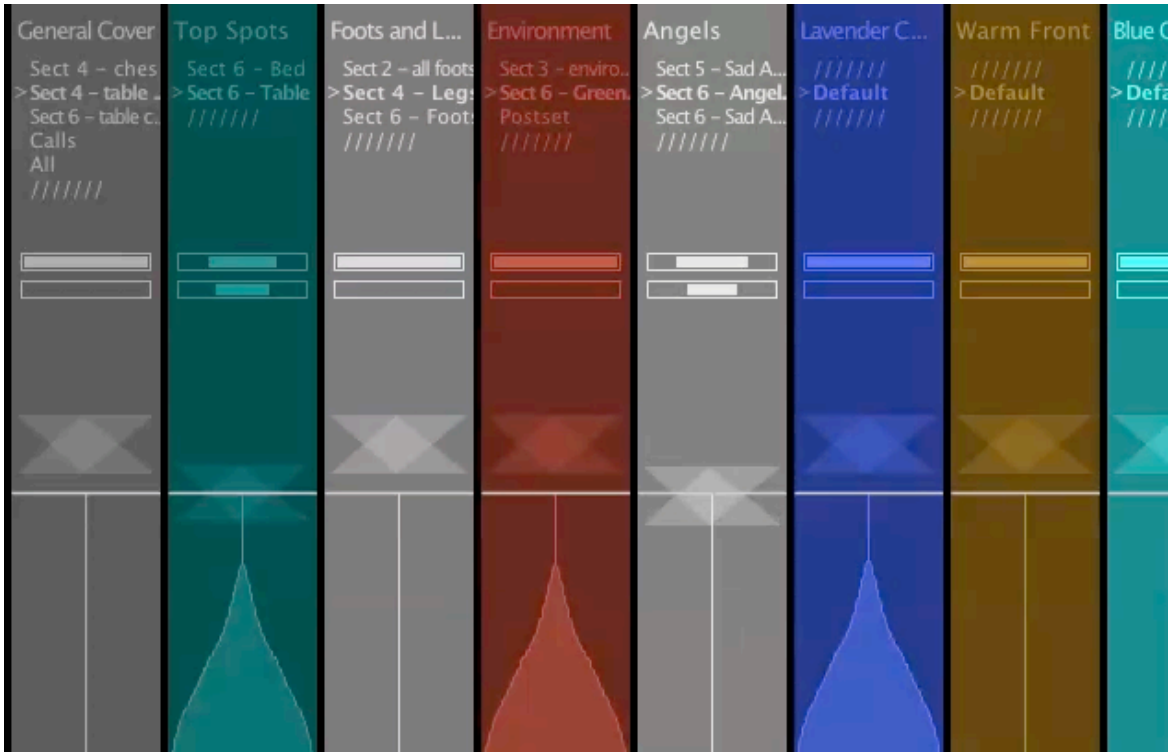

Figure 20: Close-up of the Theolux display screen graphics

In the foregoing, I have described the experience, when performing as lighting artist, of feeling in a very direct way connected to the light on stage through the console as a result, in part at least, of a console interface designed so as to resist virtualisation, and of a rehearsal process intended to separate as far as possible the activity of the manipulation of data from the performance of the lighting. However, having to navigate the data-space is not the only activity that can disrupt the 'rapt attention' towards the light as a part of the performance I am seeking to bring into play. A difficulty I correctly anticipated with the *Passages* project was having sufficient time to develop the kind of naturalised, habituated facility with the console that the idea of the exosomatic organ might suggest. If we are seeking that the console and through it the entire lighting apparatus becomes an extension of the body for the purpose of being expressive with light, then we might reasonably presume that the lighting artist should not have to devote much, if any, time or attention to the mechanics of using the console. However, as I discovered, there is a twofold difficulty: to become habituated to the console, but also to learn the specifics of the performance. The later is separate from the former since the affective function and the location of the threads in

relation to the twelve possible positions for them provided by the hardware is specific to the set-up for a particular production. I found that while the 'score' for *Passages* was still developing, there were regular changes to the contents and order of the threads, so the thread that one day had been (for example) on the first black key of the Chord Controller might the next day be on another key. As I describe above, I felt a tension between, as a *designer*, wanting to continue to develop the lighting with the ongoing rehearsals, and, as a *performer*, wanting to refine my performance.[6] I felt I had a good degree of familiarity with the console, to the point where I did not see the need to label any of the buttons with their functions, allowing colour (red, green, yellow), shape (round and square) and position to identify them. This familiarity was based on some two years of designing and building the console, together with several testing sessions and the rehearsals themselves which gave time to acquire visual and muscle-memory, building on an ingrained understanding of the design and technical principles I had established. However, with the affective content and arrangement of the threads only settling into their final form a couple of days before the examined performance, I had limited time to develop visual and muscle-memory for – in particular – the keyboard-based Chord Controller, although by the end of the second performance I could find the keys for some of the more frequently used threads by muscle-memory, without looking. For the last few days of the project, I marked up the keys with small colour labels (without text) to help identify them, replicating the colours used for each of the threads on the console's display screen, which certainly helped me to find rapidly the correct key visually. However, while this measure ameliorated the problem it was not a solution.

I want now to consider the Theolux console as an expressive instrument – as a means to allow the *hand* of the lighting artist to be a part of the process of expression. For the lighting designer in conventional theatre practice, the hand has no direct expressive role, since the lighting designer does not operate the lighting during the performance; equally, the lighting operator's hand does not play a role because of the almost universal use of the 'go' button to trigger automatically timed lighting transitions. My proposition, with Theolux, was to offer the lighting artist a range of expressive potentials through the different controllers available. Rob Halliday, commenting from the perspective of an experienced professional lighting designer and lighting programmer, wrote in response to seeing *Passages*,

> I loved, loved, loved the fade up of the par cans on the paper, which I believe was the cue you used the big lever for. [see the video of the Main Camera View of the performance, between 23'50" and 24'30".] That fade had such an incredible sense of damped dynamic, which I know would take endless amounts of fiddling to achieve in a 'programmed' way (and then would then be wrong at the next

> performance). I long to be able to achieve that once per production. To be able to achieve it once a night would make life so much better!

Halliday, as an expert spectator, identifies a quality in the dynamics of the lighting change that in his view could not be readily reproduced using conventional, automated, lighting control systems. He also points to the importance of the live operation of the lighting change, enabling the expressive quality of the change to be modulated by shifts of timing and expression by the other performers from performance to performance. From the perspective of the lighting artist performing the lighting change Halliday refers to, I can concur with his sense of the quality of 'damped dynamic', which I would in part attribute to the mechanical qualities of the Big Lever. Working against a gas spring to give a constant resistance to movement throughout its travel (unlike a conventional spring), the length of travel of the Big Lever is such that the operator must use her/his whole arm and upper body to complete the movement smoothly. My sense is that the gas spring, together with (I suggest more speculatively) the large muscle groups used in the arm and back, help prevent jerky or rapid movement of the lever, producing the 'damped dynamic' Halliday refers to. Technically, the lighting change was a simple crossfade between two lights in a pale blue-green washing the stage going out, and six intense white backlights coming in; both incoming and outgoing parts of the fade started and finished at the same time, and followed the same path of travel during the fade. The only aspect of the fade under the control of the lighting artist was the timing, and hence the 'shape' or 'profile' of the changing intensity over time. In this sense the Big Lever offers nothing different to any of the other levers on Theolux, or indeed any fader on a conventional console. Theolux has no means to capture or use any data other than the position of the lever as it changes over time – it is a one-dimensional device. Therefore, whatever expressive potential it offers that other controls do not must come from the relationship between the *mechanical* properties of the lever and the lighting artist, with her/his bodily characteristics and behaviours as well as aesthetic and other sensitivities and desires. I would emphasise here that the relationship between lever and user is not a unidirectional, commanding one: the lever proposes certain aesthetic possibilities through its particular quality of *resistance* to movement rather than simply being an open channel, receiving and passing on what the lighting artist wishes to express. As I became familiar with the Big Lever, I realised that it sensitised me to the many gradations of a fade in a way I had not experienced before: although the lighting change was smooth and stepless, each few centimetres of movement of hand, arm and torso brought a meaningful and distinct (in aesthetic terms) stage of the building intensity of light.[7]

The Crossfade Pair was intended to offer a different expressive potential. Its two quadrant faders placed next to each other allow operation by thumb and fingertip, one hand for each, while the side of the hand and wrist can rest on, and be steadied by, the console's surface.[8] From my experience during *Passages*, the Crossfade Pair offers the most nuanced subtlety of fade of all the various Theolux controls, partly because having a pair of faders means the incoming and outgoing parts of the fade can start and finish at different times and proceed following different 'paths'. Equally important, in my view, is the Crossfade Pair's physical 'feel': the faders are smooth but offer some resistance to movement so they don't move accidently when you first touch them. The posture the Crossfade Pair encourages is one of leaning forwards, with a little body weight transferred to the console's front panel, hands together cradling the two faders. I found the focus was directed from the whole body through to the fingertips – an intensity of proprioceptive (Massumi 58-60, 2002) concentration on the movement of the faders in relation to my finger, hand, arm and body muscles, combined with an intensity of visual concentration on the light on stage. Once again, I would draw comparison with Popat and Palmer's work, and their description of a 'duality of the aesthetic experience of visual engagement with the stage picture and kinaesthetic engagement of embodiment' (Popat and Palmer 2008, 135). I would also want to argue that the physicality of the lighting artist proposed by the Crossfade Pair supports and encourages – indeed becomes part of – the *interrogating gaze*.[9]

The third lever provided as part of the Impulse Controller is the Texture Lever. Unfortunately, a series of technical problems meant this lever was not working during the rehearsal and performance period. My intention with the Texture Lever was to examine the idea of having mechanical resistances or textures against which the lever worked, so disturbing what would normally be a smooth movement, but the expressive quality this might provide remains untested. However, the idea of a 'textured' fade profile informed the performance of 'sad-angel' described in chapter III.1, for which I gently 'vibrated' the levers of the Crossfade Pair. The video gives some sense of this affect, but the camera tends to flatten the subtle dynamics that could be seen directly by the eye (see the video of the Main Camera View of the performance, between 17'11" and 19'04", and between 28'16" and 30'19"). Figure 21 shows an excerpt from the Theolux thread display during the performance of 'sad-angel'. (The image has been rotated into a horizontal format, so time runs from left to right. The 'thickness' of the lighter figure represents the intensity of the thread, and so of the light; where it fills the height of the timeline it is at full intensity, and where it collapses to a thin line, the thread is at zero intensity. A complete video of the timeline display for the examined performance can be found in Appendix B4.)

Figure 21: Theolux timeline display for 'sad-angel'

The rippling profile of the light intensity, with detail at different scales of resolution (from coarse to fine) might remind us of Wertheim's 'curling and crenellated forms … fluted surfaces … frilled skirts … and … animal undulations' (Wertheim 2006, 11) I introduce in chapter II.3. Figure 22 shows some further examples from other points during the performance, showing how the manual operation allows the fade profile (the 'shape' of the fade) to move away from the linear, Euclidean geometry that would pertain had the fades run as standard automated crossfades on a conventional theatre lighting control. Instead, fades speed up or slow down at the hand of the lighting artist. Organic, curving forms emerge in response to the unfolding performance, or from the creation of a desired affect: light rushing in, light collapsing, light growing, light lingering.

Figure 22: Theolux timeline excerpts

Figure 23 shows an excerpt from the timeline display where three threads are changing intensities, demonstrating how not only are the fade profiles all different, but that they overlap, and the start and finish times are also all different.

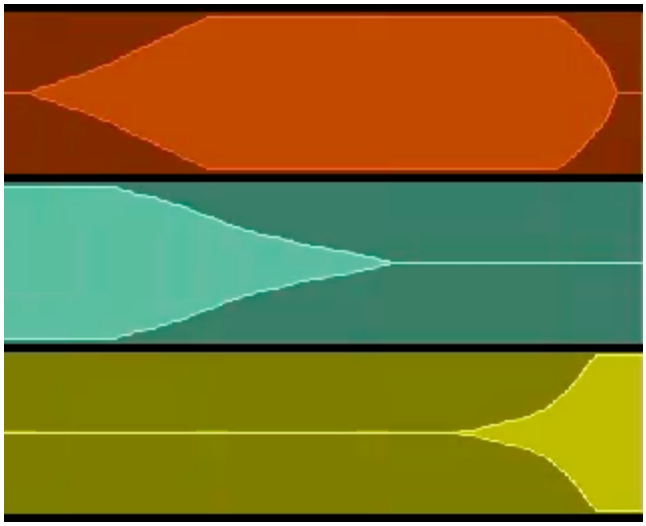

Figure 23: Theolux timeline excerpt showing overlapping fades

Such a sequence of lighting changes would be possible to programme with a conventional lighting control, but it would be very time consuming, and of course would still not be responsive to the particularities of each performance. It is the ability of the lighting artist to respond and propose, to *perform*, through an instrument that allows the hand of the artist to be expressive with light, that – I would suggest – led one spectator to remark, 'it felt like a very live experience because the transitions and the states were very fluid'. Another respondent made a direct connection between lighting dynamics, other elements in the performance (the actors) and *affects*, writing, 'I was subliminally "aware" (if that's not a contradiction in terms) of the delicacy of the relationship between light dynamics and actor movement in transitions, which greatly added to the air of ruminative and reflective sensitivity of the piece as a whole, its "listening" quality.'

I want now to discuss the Chord Controller, designed to allow the 'parallel' operation of multiple threads, and based on a conventional musical keyboard. If, as I describe above, a fader is one-dimensional (capturing a single value over a range – the position of the fader), then we might think of a key of a keyboard, like a button, as being zero-dimensional, since it is either pressed or not pressed, either on or off.[10] For this reason, the Chord Controller cannot have the nuanced expressivity of a lever when controlling an individual thread, but it does offer what I found to be an important potential for controlling multiple threads simultaneously. Figure 24 shows the Theolux timeline display for section two of *Passages*; the fades into and out of the section (at either end of the illustration) were performed using the Crossfade Pair of the Impulse Controller, while the changes of intensity of threads during the section were performed on the Chord Controller.

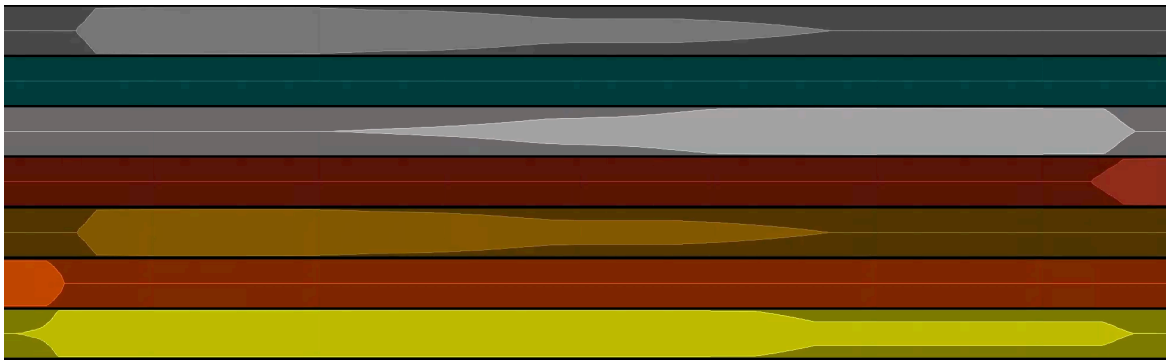

Figure 24: Theolux timeline for *Passages*, section two[11]

Unlike the Impulse Controller, where the position of a lever determines the intensity of a thread, with the Chord Controller the position of the time lever or (as used to perform section two) the foot pedal determines the *rate of change* of intensity, while the keyboard selects which threads are

controlled and their direction of change, up or down. Controlling the rate of change of intensity rather than the intensity itself is important, I would argue, particularly when performing long, slow changes (the fades during section two ran over about two minutes). Performing such a lighting sequence on four separate faders, trying to keep them all moving continuously and smoothly, would require considerable dexterity – a degree of dexterity that would risk dominating the lighting artist's attention that might be better focused on the affective qualities of the lighting change in relation to the rest of the performance. As Figure 24 shows, the Chord Controller allows four threads (and potentially more, up to the ten fingers of the operator) to be controlled with different starting and finishing times to the fades, with the fade rate adjusted – in this case via the foot pedal – during the sequence as required.

My subjective experience of performing the section of *Passages* shown in Figure 24 was one of 'steering' or 'guiding' the threads towards a projected end point, while checking that the immediate balance within the lighting was right at each moment. I was constantly checking the progress of the lighting against the progress of the actors through the scene, not just in terms of pictorial composition, but in terms of emerging dramatic and aesthetic qualities: lighting unfolding, as a part of an unfolding performance. I would contrast this sense of *futurity*, of my attention being as it were drawn 'forward' along a timeline into the future, with my perception of using the various levers of the Impulse Controller, where my attention was more on the affective quality of the rate of change in that moment – a sense of being in the immediate *present*. Where the Impulse Controller gives the lighting artist a sense of intensely focused control, sustainable for short periods, the Chord Controller gives a sense of guiding lighting affects that are changing 'on their own', nudging and tweaking them towards a constantly shifting desired composition (of all the performance elements, not just of light). My desire constantly ran ahead of the actual, drawing it along.

I have discussed in some detail my experience as the lighting artist of performing with Theolux as an expressive instrument, in relation to the affective qualities of light on stage. I want to turn now to a different aspect of Theolux – its perception by the audience and by other members of the *Passages* company. The console has two features that particularly draw the attention of non-specialists: the Pad and the Big Lever. Both of these controls are overtly and self-consciously theatrical, since they signal clearly how they are to be used (in Norman's terms (1998a, 9), the lever *affords* pulling while the pad *affords* hitting) and the gestures they imply are – viewers appear to presume – large and demonstrative.[12] One actor in the *Passages* company said Theolux looked like a 'performative piece' that made one want to approach it and use it, and contrasted it

with the ‘big grey boxes with loads of buttons’ of commercial lighting controls, which seemed to her very ‘foreign’. My intention in the design and construction of the console was to give it a different ‘character’ to that of commercial lighting controls, so as to suggest as far as possible an artistic instrument rather than a piece of technical equipment. I wanted the choice of materials, finishes and components to emphasise the console as something to be touched and manipulated, and which is overtly *crafted*, not *manufactured*. Thus materials – wood, aluminium, copper, and so on – reveal themselves for what they are, and screws are left exposed. With the auxiliary wing that houses the electronics and provides a surface for the notebook computer running the software, the usual ‘backstage’ black of a technical equipment rack is replaced with oiled and waxed wood, in a gesture we might read as a shift to ‘front of house’: that which is usually hidden behind the scenes as a part of the technical apparatus that supports the performance has become a visible part of the performance aesthetic, and indeed part of the performance itself. Furthermore, this shift from ‘backstage’ to ‘front of house’ (echoing Bentham’s similar proposal made through the Light Console, itself built with the craftsmanship of the furniture-maker) brings the lighting artist with it, presenting to the audience as well as to the other production personnel the lighting artist as a performer of an instrument.

The Theolux console was not a perfect, or the only possible, realisation of my strategic intervention to create a lighting interface as a playable instrument, and I conclude the present chapter with some brief notes suggesting areas for further research. During the process of designing Theolux, my focus was on an interface for *performance*, assuming such an instrument would also serve the needs of *rehearsal* – a presumption I found was only partly correct. I describe above some of the difficulties in determining how many and what threads (and so affects) to make available on the console. With Theolux, creating and editing threads requires the user to work with an interface presented on the notebook computer located on the console’s auxiliary wing, which in turn requires a reorientation of the body and of the visual locus of attention, as well as an engagement with the kind of (partially) immersive data-space I describe in chapter II.3. My intention was that this physical and mental reorientation would not take place during rehearsal activity, but only in preparation for it. However, in practice, and especially during the early devising stages of the rehearsal process, I felt the need to be more responsive in more different ways than I was able to be with the twelve threads available at any one time – there were potential lighting affects ‘in the rig’ that were not immediately available on the console. This difficulty reveals an important distinction between a lighting control designed for live operation of a pre-rehearsed performance, and one designed for *improvisation*. I designed Theolux as the former, but

did not allow sufficiently for the later requirement during the kind of devising process we adopted for *Passages*.[13] A future area of research would be to investigate what kind of interface would better suit improvisation (as part of a creative process, and perhaps in performance), and whether such an interface could be incorporated into the one I created for Theolux, or whether a separate interface would be preferable.

Reviewing the performance video showing the console and the lighting artist (appendix B3), I note the quite large number of required operations that are preparatory, rather than being the actual performance of the lighting: selecting morphs and threads, reading the cue sheets, and so on. All of these operations take the attention of the lighting artist away from the performance and the light itself, and we might read this effect as a dilution of the 'playability' of the console. An interface with fewer controls, and which requires less pre-setting of the controls, might help maximise the lighting artist's attention on the light in performance itself. To some extent, the number of controls Theolux has was determined by the range of research questions I wanted to investigate – the number of different ways in which the thread intensity can be controlled came from my wanting to try out a variety of ideas as well as offer the lighting artist in performance a variety of expressive potentials. For a simpler interface that requires little or no presetting (once the threads have been programmed) we might imagine – amongst other possibilities – a keyboard-style control similar to Theolux's Chord Controller, and such an interface would perhaps have reduced the time required to learn the console and develop muscle memory, so helping to ensure the lighting artist's attention is fully on the performance at all times. Such a controller would also more fully support the constantly changing thread intensities I theorise in chapter II.3, although in *Passages* intensities were changing for a large proportion of the performance in any case.

A reduction in the number of controls presented to the lighting artist would also offer the opportunity to change the overall arrangement of the console. The layout of Theolux is based on the lighting artist using ten fingers and two feet, and the need for the large number of controls, some grouped around the display screen, to be within reach. With fewer controls to accommodate, other bodily postures for the lighting artist might become possible, which in turn might open up other possible expressive physicalities that could be captured and conveyed to the light on stage. An alternative approach to further development would be to 'modularise' the interface, so that different controllers, offering different physicalities and expressive potentials, could be selected and deployed for a particular production, rather as an orchestral percussionist is equipped in accordance with the requirements of a particular piece of music.

[1] Strictly speaking, the Crossfade Pair is idiomatically different to the Big Lever and Texture Lever sub-controllers because of the possibility it offers for separate control of threads increasing in intensity and threads decreasing in intensity. However, the principal idiom of a lever, the movement of which corresponds to a change of intensity, is the same in each case.

[2] I do not discuss the software architecture here, since it is not directly relevant to the research aims, process or outcomes of my project. For those interested, the software code files are included in Appendix A6 in REALbasic format (www.realsoftware.com).

[3] This question is one that merits, I would suggest, a substantial study of its own, but I will attempt to outline my thinking on the matter briefly here. For a lighting gesture – the use of a certain quality of light at a given moment – to have a significance for the spectator, it must fit into a network of reference and relation of some kind. This network of interrelationships will in part derive from the wider cultural experience the spectator brings to the performance, but my desire is always to establish in addition systematic relationships and connections within the performance. I do not necessarily mean the semiosis that arises from, say, associating a particular colour with a particular character; significance may be expressed through (in Deleuze's terms) analogical as well as digital language, and be a significance of affect. In either case, if the language is to be – in part at least – specific to the particular production, then the production must, in the terms used by Chris Goode, the director for Passages, 'teach the audience how to watch it'. This teaching requires repetition within a relatively stable set of interrelations, and herein lies the difficulty: if the language is too rich and diverse, then – within the duration of the performance – there is insufficient time for the audience to learn it, and to appreciate its subtlety of nuanced expression. If the language is too impoverished, then it does not have the scope for nuance. Of course, no spectator begins to watch a performance as *tabula rasa* – the expressive languages of the work, both digital and analogue, can build on and extend the (assumed) prior understanding of the audience. Furthermore, the languages can be fitted to that which we desire to express, so a pantomime relies on what elsewhere would be seen as cliché, while an avant-garde work may extend its languages so far that it can only be appreciated by spectators with very particular previous experiences or with a highly developed ability to learn to read new performance languages.

[4] Not all artists would accept they have 'intentions' to 'express' anything in the way I have formulated it here. Nevertheless, I would argue the same question of richness or poverty of means is relevant to artists who might think more in terms of a formulation such as 'seeking that their work more fully becomes itself'.

[5] I can confirm the closeness of my experience with Theolux to that described by Popat and Palmer, having myself used their digital sprite system. The closest I have come during my professional experience to being able to eliminate the virtual dimension while retaining the close and immediate relationship between physical gesture and lighting affect I have described was when using a Strand Compact 80 lighting control. This console, dating from the nineteen-seventies, was a very basic memory system, with a cross-fade pair

similar to that used on Theolux, which allowed the operator to fade between pre-recorded states. Once the faders completed their travel, the next state was automatically loaded, so the operation was simply a matter of moving the fader pair backwards and forwards as changes were required, largely eliminating the need during the performance for the operator to think in terms of *data*. Later control systems adopted the 'go' button, leading to the disconnection of the operator from the affective dimension of the performance I describe in chapter II.2. My experience of operating the Compact 80, the sense of artistic engagement that it engendered, and the kinaesthetic, embodied sensitivity and expressiveness I developed using it regularly, have been influential in the present project – most particularly the cross-fade pair of Theolux's Impulse Controller, which uses very similar faders and ergonomics to the Compact 80.

[6] That actors and other theatre personnel in a traditional process may, in my experience, feel the same tension, as a director seeks to continue to experiment and invent while they wish to hone and make 'presentable' what they have, is perhaps some comfort but little help.

[7] Curiously, at a technological level the electronics used to capture digitally the position of all the faders on Theolux, including the Big Lever, are at 7-bit resolution (128 steps) rather than the more common 8-bit (256 steps). In other words, the lever's travel is captured only half as often as is usual on commercial lighting desks. This underlines the point, I would argue, that it is the mechanical properties of the lever that give it its perceived sensitivity and expressive potential, not the data capture and processing.

[8] The faders I used are taken from a Strand Threeset manual lighting control of the nineteen-seventies, belonging to Jim Laws and loaned to me for the present project. The quadrant faders (where the lever moves in an arc rather than a straight line) used by Strand in the Threeset and other consoles of the period were custom engineered for the specific application with – I would judge – a strong interest in the ergonomics of operation as well as technical requirements. Quadrant faders are not commercially available today, as far as I have been able to establish.

[9] It is perhaps worth acknowledging here that the Crossfade Pair can be operated in a much more casual fashion than I have indicated. However, my experience is that, if the operator chooses to operate a lighting change with the Crossfade pair as it were 'seriously', then the kind of engagement I have described is invoked. There seems to be little in between the extremes of 'casual' and 'intense'.

[10] In technology terms, the keyboard I used also had velocity sensing and after-touch (i.e. it can detect how hard the key is pressed, and the pressure applied to the key when it is held down). However, Theolux doesn't make use of this data.

[11] Several threads not involved in the sequence have been omitted from this illustration for clarity.

[12] Indeed, the Pad is *all* performative gesture, since at a technical level it does no more and no less than any button or switch; in the terms I introduce above, it is a zero-dimensional control. Hitting the Pad triggers a snap lighting change, and – as it is currently implemented – it has no means to capture any expressive qualities the 'hit' might have, such as how hard, how sharp, or where on the pad it is.

[13] As a temporary solution, during the rehearsal period I modified the Theolux software to provide a mode that allowed the individual morphs within a thread to be directly accessed from the keyboard used for the Chord Controller. This highly contingent interface idiom contravened several of the principles I had adopted for the interface design, but was somewhat helpful for a few rehearsals.

Conclusion

In drawing my thesis to a conclusion, I want – before summarising my project's outcomes – to consider some findings beyond those directly related to my strategic interventions (discussed in chapters III.1 and III.2), and also to identify some potential further investigations arising from it.

Aesthetics, Authorship and the Politics of Performance-making

My stated intention for the present project has been to reposition the role of the lighting artist in order to promote her/his engagement with the moment of performance. I have not attempted, however, specifically to investigate in full the artistic possibilities arising from the shift I have proposed, only the strategies by which such a shift might be achieved. My project is based on the premise that, through the kinds of interventions I describe, new or extended possibilities for light and for the lighting artist's contribution to the performance will arise. This presumption is based on my understanding gained through my professional practice as a lighting designer and educator that the aesthetic and dramatic potential of light tends to be constrained in particular ways by the present theatre economy. My object here has been to partially loosen these constraints in certain respects, in order to 'see what happens', but with a no more overt and specific artistic agenda in view than a broad sense that lighting created with a greater sensitivity to timing in relation to the other elements of the performance will have an extended or renewed artistic value – without trying to pre-empt what that value might be. (I would also note that while I haven't in my research actively and consciously pursued a particular *artistic* agenda, the whole project is inevitably informed by my own interests and values regarding theatre as an art form and as a set of practices.)

Nevertheless, while not a primary goal, the making of *Passages* has led to some insights relating to the artistic possibilities arising from my proposals – insights that arise both from my own experience as the lighting artist and from the reported experiences of spectators. My sense was that the lighting throughout *Passages* achieved a quality of continuous flow that was helpful in bringing together the multitudinous elements of our bricolage, which otherwise risked becoming episodic and fragmented, and that this fluidity arose both from the expressive potential of the Theolux console and from the close relationship between lighting artist and actors. By contrast, in my extensive previous experiences of designing lighting through more traditional processes, I have

often been aware that pre-set cue timings are my response to observing a *previous* rehearsal or performance rather than the current one; the timing of the lighting is thus one iteration behind the unfolding, mutating, live performance.[1] For *Passages*, I was a part of the complex system of responsivity and interaction that I identify in chapter III.1, and so able to adjust the timing of a lighting change *during* the change itself, rather than retrospectively. There is evidence that my perception of fluidity seemingly arising from this in-the-moment sensitivity was shared by at least some of the audience: as one spectator put it, '[t]he synergy between performers and lighting designer seemed to have a bearing on the smooth lighting transitions and seamless scene changes.' Furthermore, *Passages* was in my view a work interested thematically and in terms of its aesthetics in the 'past tense', and again I would suggest that the fluidity that I was able to achieve with the lighting contributed to and supported a dreamlike or memory-like quality of experience. (I refer here to the way that, in dreams and memories, logically, spatially or temporally disjointed ideas or episodes can sometimes segue from one to the next in a way that seems – during the dream or memory recall – coherent and 'natural'.) As another spectator put it, 'the delicacy of the relationship between light dynamics and actor movement in transitions … greatly added to the air of ruminative and reflective sensitivity of the piece as a whole, its "listening" quality.' The same spectator also noted that he was,

> very aware that light was to some extent 'live and conscious' through a present human interactive consciousness, [which] made us much more conscious of its 'play' on surfaces, and also therefore more aware of the full sensual reality and density of the piece as a whole – for example of sound and texture. This seemed very appropriate for a piece interested in exploring the texture of writing on a page, the sound of words, etc. It made what would otherwise have been taken for granted, consciously and playfully present.

Clearly, for this spectator at least, the lighting, and the way that it was made (including the visible presence of the lighting artist) was not only an important contribution to his experience, but was also 'appropriate [to the] piece'. I would go so far as to argue that my strategic interventions in the creative process were at least partly responsible for the quality of the work, contributing to what Chris Goode described as the company's 'shared understanding of tone'. Such reflections begin to point to aesthetic and dramatic potentials that, while outside the scope of the present project, might be explored in further research. They may also remind us that the choice of creative process significantly influences the nature of the art work that is made (practitioners and companies that make distinctive work generally do so through distinctive working practices, and vice versa). Again, further research is needed to develop an understanding of what kinds of work can be made – and what kinds cannot – through the adoption of the creative processes that I have established.

Another matter that is beyond the stated aims of my project, but which is an outcome of my research, is the impact of my strategic interventions on the creative processes of the other production personnel. During the company debrief, one of the actors described her experience of finding it easier to escape the 'here and now' of the rehearsal room and enter an imaginative space when (theatrical) light was present in the room. The Associate Director observed that the actors have a physical response to the light that they use and build on in their performance. Having light in the rehearsal room also, I would argue, created a geometry that the actors began to use, with particular spatial relationships, axes, and points of focus being defined by the lighting (such as the 'activated' position on the bed used during the development of the 'slow-dark' gesture that I describe in chapter III.1, and my introduction of 'corridors' of light that informed actor's journeys through the performance space, to point to just two examples). This was a reversal of my usual practice as a lighting designer where I am seeking to identify the geometry of the activity of the rehearsal room in order to reflect it subsequently in my lighting choices. The Associate Director also claimed that having light in the rehearsal room during the devising process gave all of those present an awareness of dramatic and aesthetic potentials that might otherwise be missed, or a more ready access to – in Massumi's terms – qualitative transformation.

For the Director, Chris Goode, having light in the rehearsal room helped to overcome his perceived problem that he lacks a language and way of working with a lighting designer (within a conventional theatre process) to achieve lighting that matches his feel for the moment. As Goode put it during the company debrief, 'one of the things that excites me about what we have been doing is that it begins to make possible a sort of intuitive reach for … a kind of lighting state that matches something that I can feel, without having to translate that into a code or a language that I don't speak.'[2] As lighting artist, I found that the need to spend time talking with the director (both inside and outside the rehearsal room) was reduced compared with a conventional process; action and demonstration partially replaced discussion. On this basis, I would argue the partial reinvention of lighting practices I have proposed here helps enable the lighting artist to actively – and through action – *contribute* to the rehearsal activity rather than to (primarily) respond to it some time later: a repositioning of the role of the lighting artist.

I want to turn now to the matter of authorship. While members of the company appear to have been content to see me as the leader of the project as a piece of research, and Goode as the director of the theatrical performance we were making, for several witnesses of the performance at least, the matter of the authorship of *Passages* seems to have been a concern, perhaps even a point of anxiety in some cases. By an 'anxiety' I mean an urgent need to locate the authorship of the work

with some specified individual(s) in the company, and perhaps with the role of the lighting artist. At a personal level, I found this desire to specify where authorship lies both curious and rather uncomfortable, suggesting to me that I was being perceived as making a claim to a status and degree of control that was not my intention. I want to be quite clear that my purpose in the present project is certainly to promote the role of the lighting artist and to develop further the artistic contribution of light in theatre performance, but it is to do so by flattening the hierarchies often found in conventional practice and perhaps reconfiguring them into a network model of organisation and interrelation (models that parallel the distinction Deleuze and Guattari draw between rhizomatic and tree-and-root-like structures (1980)), rather than simply shifting the lighting artist to a higher point in the hierarchy at the expense of other roles.

My experience during the *Passages* project was that authorship was quite diffused through the members of the company – not equally, since members of the company still had areas of expertise and responsibility, but in such a way that with respect to different aspects of the making of the performance different members of the company might be leading or responding at different points (precisely the model that I have described in chapter III.1 as functioning during the performance itself). Thus the director becomes the coordinator of authorial activity, rather than being a primary or dominant authorial figure. As Goode said during the discussion after the evening performance,

> what [the project] has done for me is to radically destabilise the idea of authorship … as a director I have always had this desire to get rid of as much authority as I can … I was thinking what is it about this that has done that, and I am still not sure I know … is it about a power-sharing agreement or is it about the fluidity of the light meeting the fluidity of the process … that's been the liberation for me – for the first time it feels like a kind of collaboration I have been searching for for ages and never really being able to find in a process because the buck always seems to end up somewhere, and … it might as well be with the director.

Goode's description suggests a *democratisation* of the creative process, brought about largely I would suggest by the early establishment of the 'shared understanding of tone' I have previously referred to; creating a common understanding of the material made possible a shared conversation for the whole company during the devising process. This of course is not a new way of making theatre, and many theatre practitioners and theorists have proposed and implemented various models of 'ensemble' in which authority and authorship have been distributed in various configurations amongst the personnel involved. Including light and a person responsible for it in the way I have done in the present project has been relatively rare, however, so my project might be seen as asking (amongst other things): what defines the 'company'? Is the lighting artist a member of the company? If so, what adjustments to the creative process (both conceptual and

practical) are needed for the lighting artist to take up a full membership of the company with equal or at least equivalent rights to other members? This politicised description of my thesis should remind us that there is a dimension to the project that concerns relationships of power between theatre-makers, challenging established hegemonies. Again, this is an area I have only begun to explore, and it seems likely there would be difficulties to overcome in developing my proposals in the context of professional practice rather than the context of a research project situated in the academy, as I note in chapter I.1.

In order to test my proposals in a purely professional context there would need to be a perceived benefit for those involved, and while many professional practitioners are interested in exploring different ways of working, they might well want to do so with a view to enhancing or broadening in some way the artistic *outcomes*, not only the process. I have discussed above some of the dramatic and aesthetic possibilities my project has pointed toward in terms of the role of light in the performance, but my project's political dimension, as a restructuring of the relationships between production personnel, also suggests there might be a concomitant shift in the audience's understanding of its experience during the performance. Chris Goode captured his sense of this possibility in an email to me shortly after the completion of the *Passages* project:

> I think my identification of the 'ethical' dimension of this work obviously abuts your sense of the 'political' frame, though perhaps I would place more emphasis on how the restructuring of power contours interior to the practice can ramify in the audience's reception of the work from the *outside*. The reimagining of the terms and conditions of theatre space (as a conceptual site), and the realising of that concept in an actual theatrical *place*, seems to me to be *in itself* an experiment in social modelling which connects with an audience's experience in a way that's directly applicable rather than simply mimetic or metaphorical. I think an audience can use the kind of information and the types of signals generated by your position in the Passages project (for example) in considering and exploring their own role in the theatre encounter, and that that reflection, and the mobility of perspective and imaginative/empathic projection it requires, is principally a task of ethical thinking.

I would concur with Goode's analysis that, on the basis of our experience of the *Passages* project, the strategic interventions I have proposed seem to have the potential to activate the kind of ethical thinking that Goode identifies – a potential already suggested by what I have termed the *interrogating gaze*. For the spectator, as well as the lighting artist, the interrogating gaze in the account that I have given here – situated, self-aware, in a reflexive relationship with the performers and with other spectators – promotes, even if it does not mandate, Goode's 'imaginative/empathetic projection' as a form of 'ethical thinking'.[3] I would note that this impact on the audience's experience was not a direct intention on my part for the present research,

although it parallels my intentions for the role of the lighting artist, and is very much aligned with my personal philosophy regarding theatre as an art form. Furthermore, it is an outcome that requires further investigation before anything more than these initial and tentative conclusions can be drawn; nevertheless, it is a line of enquiry that seems to me to have considerable potential.

Summary

I want, finally, to summarise the principal outcomes of my research. In my Introduction I set out my aim: to establish, test and evaluate a partial reinvention of theatre lighting as a professional arts practice, with a particular emphasis on the live operation or 'performance' of lighting, rather than on its design prior to performance. I would claim that the strategic interventions I have proposed and gone on to test and evaluate have been broadly successful, both in the sense that they are achievable (at least within the controlled and relatively benign context of a research environment), and in the sense that they have resulted in a closer relationship between the lighting artist, the other performers, and the performance event as a whole. This closeness has made available aesthetic and dramatic potentials in the lighting that are demonstrably present (based on spectator responses), particularly in relation to the timing of the lighting dynamics relative to that of the other performers. The visible presence of the lighting artist to both spectators and actors during the performance has also introduced the potential for all those present to have an altered and (it would seem from the responses of actors, spectators and myself) an increased awareness of the contribution of light to the performance event.

Beyond these results, which were the ones that – in broad terms – I intended for the present project, there are two other outcomes I want to mention. The first of these is one that I discuss above: namely, the potential for my conception of the role of the lighting artist to change not only the working practices and interrelations of the production personnel and the audience's experience of the lighting, but also the audience's sense of (in Chris Goode's words) its 'own role in the theatre encounter'. Because this was a potential I had not anticipated, the *Passages* project was not designed to investigate it, and so it is not possible at this stage to go any further than to suggest that the potential exists, and that it would appear to merit further investigation. The second unintended outcome is one that I have not discussed elsewhere, and concerns the relationship between technologies and aesthetics. Theolux uses digital processing to achieve a conscious return to (some of) the aesthetic qualities of lighting control possible with previous analogue controls. My approach is thus contrary to much research into the use of digital technologies in performance, which has tended to be interested in (where it has been interested in aesthetics at all) the new

aesthetic possibilities of the digital specifically. Using digital technologies to capture and deploy analogue, human movement and gesture with the specific intention of investing certain elements of performance with the aesthetic qualities of such movement has been perhaps less common, although the work of Popat and Palmer (referred to elsewhere in the present thesis), and of Wilson-Bokowiec (2006) are amongst the exceptions. I would suggest that a return to the analogue via the digital (what we might call the 'post-digital') is a performance-making strategy that is as yet under-explored in both academic research and professional contexts, and my research here points to some of the potential of such a strategy.

I would conclude with the claim that the present thesis represents a modest but valuable contribution to the emerging scholarly study of theatre lighting, and that it demonstrates that there is considerable scope for further research, with the potential for innovations in practices and for new insights that can reach well beyond the specifics of theatre lighting itself. Further, my thesis demonstrates the potential of combining the research apparatus and methods of the academy with the detailed knowledge and understanding (including tacit, embodied knowing) of the professional practitioner in order to develop new insights into under-developed areas of scholarship. While my project's overt subject matter might seem highly specific and 'narrow', it raises issues, identifies opportunities and proposes approaches that are, I would argue, of urgent importance to performance scholarship and practice much more widely.

[1] In extreme cases, I have set a fade time initially to, say, five seconds, then changed it to seven seconds after seeing a rehearsal, then back to five after the next rehearsal, then back to seven, and so on, for as long as I was present at rehearsals and performances, without the timing ever settling at a value that seemed to me to be 'optimum' in relation to the continual shifting of other performance elements.

[2] On a personal note, I have long held the view that, within the conventional lighting process, the need to translate a lighting 'idea' in the mind of the lighting designer into a technical code that describes a set of changes to the state of the lighting system, in order that the lighting operator or programmer can adjust the system state so as to realise that lighting idea on stage, is a significant obstruction to the creative process. This is particularly so because while the lighting designer and the lighting programmer may have a shared understanding of the codes, the director and other members of the creative team rarely do. This observation has been one of my motivations in pursuing the present project, and Goode's remarks suggest that I have had some measure of success in addressing the issue from the director's point of view.

[3] Jaques Rancière's notion of the emancipated spectator (2009) offers an account that similarly engages with the ethics of spectatorship, and might be helpful in developing the idea further in future research.

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Appendices

The digital appendices contain documentation of the practice research elements of the project, together with additional contextualising information and documents required by Middlesex University regulations. All appendix material is provided in digital formats on the enclosed DVDs:

- DVD 1 is a data disk readable on a personal computer (Windows or Mac), containing the material listed below. To use, load the DVD into your computer and open the file named 'Open Me'. Please note that all videos are in Apple Quicktime .mov format; you will need Quicktime installed on your computer to play these files.
- DVD 2 is in DVD PAL video format and contains videos of the *Passages* project examined performance, both as a main camera view and as a composite view showing the main camera view, the lighting artist's view, the lighting console and the console's thread display.

If you are not familiar with the practice research, or want to review it, you should start with the two overview descriptions, A0 for the lighting control interface and B0 for the performance project, followed by the key remaining documents, listed below. The remaining appendices can be considered optional, to be viewed if you want to explore aspects of the practice research in more detail, or where they are referred to in the main text of the written thesis.

Key documents for the Theolux console:

A0: Overview description of the lighting control interface 'Theolux' including the development process

A1: Images of the Theolux console

A2: Description of the controls

A3: Diagram showing the features of the Timeline display

A4: Instructions to create a simple show using Theolux

Key documents for the *Passages* performance:

B0: Overview description of the Passages performance project, including the development process

B2: Main camera view of the examined performance (a full-screen version is available as a video DVD on a separate disk)

B3: Composite view, showing main camera view, lighting artist's view, the lighting console and the console's thread display (a full-screen version is available as a video DVD on a separate disk)

Full Appendix Listing:

A: Theolux

A0: Overview description of the lighting control interface 'Theolux' including the development process

A1: Images of the Theolux console

A2: Description of the controls

A3: Diagram showing the features of the Timeline display

A4: Instructions to create a simple show using Theolux

A5: Technologies, standards and protocols used in Theolux

A6: Theolux software files (NB the Theolux application runs on Mac OS X 10.5 or above - copy the application to your hard disk to run it. The software 'source' files are in REALbasic format.)

B: Passages

B0: Overview description of the *Passages* performance project, including the development process

B1: Talk introducing the examined performance

B2: Main camera view of the examined performance (a full-screen version is available as a video DVD on a seperate disk)

B3: Composite view, showing main camera view, lighting artist's view, the lighting console and the console's thread display (a full-screen version is available as a video DVD on a seperate disk)

B4: Console thread timeline display of the examined performance (see also list of thread contents)

B5: Question and answer session following the examined performance

B6: Main camera view of the second (evening) performance

B7: Question and answer session following the second (evening) performance

B8: Production team debrief discussion

B9: Images of Passages in rehearsal and performance

B10: Images of the Studio set-up, etc.

B11: Passages visual synopsis, showing the sections of the performance

B12: Examples of Timelines drawn during rehearsals to document and plan ideas for how the light changes over time

B13: Cue sheets used for performing Passages

B14: A list of the contents of each thread

B15: PDF of the Passages programme

B16: The Passages website

C: Other Documents Related to the Thesis

Published material based on the thesis:

C1: 'A Play of Light', a paper for the lighting industry colloquium Showlight 2001 in Edinburgh.

C2: 'Techne, Technology, Technician: The creative practices of the mastercraftsperson', a paper (with Professor Susan Melrose) for Performance Research 10(4), pp.70–82 (December 2005).

C3: 'Absence and Unfolding: Approaching a new understanding of the lighting designer's creative process', a paper for the OISTAT Education Commission / History and Theory Commission conference, Helsinki, June 2008. Also presented at TaPRA, Leeds, September 2008.

C4: 'One Thing After Another', a paper (with Rachel Nicholson, Rose Bruford College) for the Music on Stage conference, Rose Bruford College, October 2008.

C5: 'Lighting on the Hyperbolic Plane: towards a new conceptual model for controlling light on stage, and a control system to support it', a paper and workshop demonstration. TaPRA, Plymouth, September 2009.

C6: 'The Virtuosity of the Lighting Artist: Designer or Performer?', an article for a forthcoming reader on light in performance, edited by Scott Palmer (Leeds University) and published by Palgrave Macmillan. Scheduled for publication in 2010.

Other documents:

C7: Introduction to the thesis, sent to the examiners prior to the presentation of the practical elements of the thesis.