Haptic Insights – Modelmaking as Historical Methodology

Cat Fergusson Baugh

Cat Fergusson teaches applications of digital technologies in theatre and performance at the University of Hull. She has worked in the area of digital reconstruction of extant and historic theatrical spaces since 1995 and has had work exhibited at the Victoria and Albert museum and the Columbus Museum of Art.

University of Hull

School of Arts
Gulbenkian Centre
University of Hull
Cottingham Road
Hull
HU6 7RX
United Kingdom

Abstract:

This article explores the value of digital reconstruction practice to the theatre historian in general but in particular the historian concerned with exploring visual histories offered by the areas of theatre design and architecture. It will articulate differences between the expectations and reality of digital reconstruction as illustration (both fixed and interactive) and suggest caveats and opportunities offered by digital (and virtual) outputs as a mode of communication. While the article will explore practice and critical commentary related to reconstruction as illustration, it will focus in more detail on the model as practice as research. The intention is to explore the methodological value of reconstructive practice in the process of the historian and identify possibilities for communicating the tacit knowledge generated by these approaches in ways which move beyond the simple presentation of visualised outputs as illustration.

Keywords:

> [Virtuality] offers new ways of knowing; and by making visible the unknown (for example by enabling researchers to hypothesize, in three dimensions, possible reconstructions of lost or hidden structures), it promises to make knowable things that were hitherto unknowable. (Denard 2002, 36)

> A cloud of suspicion continues to hover over all historical re-creations in academia ... A case could be made that this miasma is generated by scholars who fear their expertise might by compromised if speculation, rather than authenticity, is embraced. (Favro 2006, 324)

Illustration and Interaction: computer visualisation practice in theatre history

The process of scholarly reconstruction has arguably been an essential part of our understanding of theatre history since Richard Southern's explorations of Georgian theatre practice (Southern 1948, 1952) and Richard Leacroft's subsequent work on a range of historical spaces (Leacroft 1973, 1982, 1984) confirmed the status of scenic and spatial visualisation in the field of dramatic study.

It was, John Golder's exploration of the evidence of the *Théâtre du Marais* (Golder 1984), and re-evaluation of Deirkauf-Holsboer's 1954 graphical reconstruction that introduced the potential benefits of computer visualisation for the theatre historian. Deirkauf-Holsboer's reconstruction was based on literary evidence and explored through narrative. Her findings were then illustrated by her father (a professional architect) who rendered her description into plan, section and crucially, isometric illustrations. These renderings were received extremely well and immediately confirmed with absolute authority by the academic community.

Golder's work claimed that this authority was based not on the quality of the research nor on the robustness of hypothecated choices but on the close association of this work with the architectural illustrations. In this respect, Golder articulated issues which would become the central concern of visualisation researchers; that the problem with the Deirkauf-Holsboer reconstruction does not lie in her work but in her father's illustrations and that 'his skill as a draughtsman has lent his daughter's interpretation of the evidence an authority that it does not always warrant' (Golder 1984). Or to put it another way, that the potency of the image defeats any attempt to make a detached evaluation of the underlying research.

As a 'postscript', Golder presented a short section on three illustrations included in the article but not directly referred to. These 'wireframe' models are presented to indicate the possibilities offered by the (then only bourgeoning) field of computer visualisation. Golder included a series of caveats for the reader which relate to details omitted or the use of 'placeholder' items (though this is not a term that he uses) in the reconstruction:

> Such a system […] makes it possible for one to test the practical viability of one's theoretical reconstructions. As these illustrations show, it not only enables one to rebuild but actually go inside theatres which have long since ceased to be […] It should be noted that these computer-drawn views of the Marais show only the essential geometry of the interior and lay no claim to being complete or accurate in every detail. (Golder 1984, 149-50)

So Golder confirms the opportunities offered by the computer model but his caveats also represent an embryonic attempt to describe contextual material which would later be described

as 'paradata' by the London Charter (Dennard 2009) and the 'state of knowledge concept' by Favro (Favro 2006). Indeed. this tension between visual experience and 'state of knowledge' is one which would later become central to Favro's work.

In 1996, the Theatre Department of the University of Warwick found itself host to two digital reconstruction projects. Richard Beacham's extensive work on the theatres of classical antiquity (and in particular the theatre of Dionysos and the Pompey Project) was to develop into the THEATRON project (2002) which aimed to make historical spaces available through virtual presentation while David Thomas made use of the illustrative strengths of visualisation technologies in his work on French and English theatres of the 17th century (Thomas 1996, 1999). While these projects were initially focussed on the use of visualisation to enhace accessibility in theatre history, it is clear that both teams developed extended methodological propositions in response to their own modelling practice.

Working with a computer model maker (Fergusson), as collaborator rather than illustrator Thomas' reconstructions (particularly those relating to the Marais) begin to indicate the significant contribution and insights that the *process* of computer visualisation can bring to theatre history (Thomas and Fergusson 1998b). It is clear from the correspondence that the requirements of the process made additional demands on the researcher to develop hypotheses of a greater level of detail than might otherwise have been sought. Each suggested solution created further questions, demanding a methodology which was iterative and inevitably more rigorous than illustrated literary reconstruction. The computer's 'unforgiving and relentless demand' that components fit together (Beacham, Baker, and Blazeby 2002) bacame the principal methodological strength offered by visualisation technologies, particularly in relation to the evaluation of past research.

> If VR modelling has the desirable capacity to reveal gaps or inconsistencies in previous 2D studies by other scholars, because it demands comprehensive and consistent 3D data, one of the challenges it presents us is how to reconcile this same demand with the necessity we frequently face of working with incomplete materials ourselves. How do we 'mind the gaps'? (Beacham, Baker, and Blazeby 2002)

While practically these 'gaps' could be managed through the development of hypothetical models, these hypotheses are greatly problemetised as soon as they are presented through the medium of a virtual reality which does not make distinctions between the variable levels of confidence which might exist in the final, visual output. The conclusion reached by the team was that any virtual outputs must be not only interactive but also interrogative.

The Problematised Model: from Golder to *Gladiator*

The developing sense of 'visual hypothesis' in historical discourse evident in these early VR projects mirrors the development of the role of illustrator in the field of archaeology. Here, ethical issues relating to the dangers presented by the power of visual representation have been a principal concern to a field often faced with the need to explore incomplete sets of data through the introduction of proposed contexts of varying degrees of security. Though initially focussed explicitly on physical acts of reconstruction, this debate has close conceptual links to issues of illustration. Scholarly discussion surrounding the ethics of interpretation led to the development of a series of 'charters' for the treatment of historical sites from as early as 1931 (The Athens Charter, ICOMOS 1931). The *Ename Charter* (2003) acknowledges the role played by authorship in the presentation of histories and includes in its 'principles', the absolute necessity to develop what the charter terms an 'interpretative infrastructure' (ICOMOS 2003,

principle 7.1) which ensures that the outcomes of any archeo-historical projects remain open and subject to on-going research.

In its interest in concerns relating to transparency and process, the *Ename Charter* begins to address concepts of importance to the practice-based historian, but the solutions that it seeks are limited in scope in that they are specifically directed at the custodians of sites of historical interest, where concerns relating to evidence, context and accessibility can be addressed with relative ease through the curation of accompanying museum based exhibitions. How then might these challenges be addressed by researchers on non-extant sites who do not have the luxury of dedicated education facilities (nor indeed simple physical presence) for each of their readers? The simple publication of research findings through computer visualisation can provide researchers (and 'readers') with an analogue for the excavation site but when used as 'vital illustration' this presents the researcher with a number of practical and ethical challenges.

Diane Favro's seminal article 'In the eyes of the beholder: Virtual Reality re-creations and academia' (Favro 2006) reflects upon her experiences of reconstructive visualisation at the Cultural VR laboratory of UCLA. The article is principally concerned with the reception of reconstructive visualisation by the academic community. She claims that much academic suspicion of virtual reconstruction focuses on its apparent reliance on simplification and hypothesis. She goes on to say that academic practice in this area is also tainted by inevitable associations with populist revisionings made for the entertainment industry where the aim is to 'awe, not educate the audience' (Favro 2006), this is of course not a new phenomenon (and she cites examples from the 19th to the 21st century) but it was perhaps specifically the extent and quality of visualisation work in the 2000 movie *Gladiator* that made this association – and the need to develop critical modes for the deployment of visualisation technology in academic study - crucially important. More recently, the games industry's adoption of modes which exploit our developing (and possibly inexhaustible) taste for historical fiction, in games such as the *Assassin's Creed* franchise, further problematises our relationship with reconstructive visualisation[1].

Think Responsibly: exploring the practice and ethics of the reconstructive researcher

It is perhaps an indication of the extent to which developments in digital imaging technologies have outpaced an appropriate development of legitimate concern, that there remains a deep distrust of computer generated imagery (CGI) in scholarly work. Favro's identification of an apparent fear of speculation in the academic community (and the presentation of 'speculation' and 'authenticity' as binary opposites) in this context is extremely revealing, particularly as the passing of time and commentary mean that there can be no meaningful 'authenticity' in the depiction of history[2]. In this regard, the visualised image does not engender speculation, it merely makes it manifest. It is of course this ability to make manifest (and by corollary, achivable and accessible) that renders computer visualisation an ideal methodology for researchers who wish their own historical reconstructive practice to remain open and interrogative.

For Favro though, there are also more fundamental issues to consider:

> An equally strong argument could be made that [suspicion] derives from a scholarly discomfort with visual representations of ideas. After all, images operate differently from texts. Once a visualization becomes part of the cultural memory, it gains a life and iconic power of its own, freed from academic constraints. Simply, images are potent bearers of meaning which forcefully shape thinking. Rather than

addressing these characteristics, archaeology and related academic disciplines have largely ignored the rôle of images as constituents of knowledge. (Favro 2006)

Favro's sense of image as constituent of knowledge begins to address the potential methodological role that reconstruction can play in scholarship. The *caveat* that the image may gain an iconic power of its own when freed from academic constraints lies at the heart of any attempt to shape the documentation and presentation of research outputs based on such methodologies. She clearly articulates the paradox that jeopardises any attempts to de-problematise visualised histories:

> …while observers intellectually acknowledge that the virtual recreation is an approximation, not a *Doppelganger* for a past reality, this concept is almost immediately subsumed by the experiential power of the presentation. The heightened visual realism, kineticism, sensory stimuli, and inter-activity of Virtual Reality models eclipse any intellectualization of reconstruction theory… Even when the digital re-creations incorporate graphic distinctions to differentiate between the actual remains, reconstructions based on archaeological fieldwork, and those based hypothetically on analogs, the potent visual and kinetic experience of the models 'trumps' the 'state of knowledge' concept. (Favro 2006)

We might here also begin to consider issues of perception, interpretation and authority in the deployment of interactive virtual models as research output (as distinct from heritage artifact). In the deployment of VR technologies, the end user's proficiency in handling information can be extremely ambiguous and that this greatly compromises the value of any material presented in this way. Given recent development in 3D technologies, it is likely that the end user has a highly sophisticated relationship with the interpretation of virtual and mediatised realities. This familiarity strongly inflects the confidence with which users may engage this kind of material. Furthermore the linguistic implications of terms such as 'virtual' and of course 'reality' impact on the attitude of the user to what Favro terms their 'state of knowledge concept'. The perseverance of the term 'virtual reality' in this context is significant since where this technology has received the greatest consideration and investment (the games industry) it has long since been replaced by the arguably more helpful terms 'first person' and later 'third person', which are conceptually and linguistically linked to the nature of the point of view of the user rather than the nature of the environment which they inhabit.

Problematically, in most cases the confidence that the user has in the mode of delivery is in no way related to their proficiency in handling issues of interpretation and authority, so the greater the freedom afforded to the user to explore the product of the research, the less likely they are to genuinely engage with its process or implications.

Since 2002, The London Charter group (formed by the original THEATRON team) has sought to offer a framework for researchers using viualisation technologies in culture and heritage. As with its archaeological counterparts, it considers a range of issues relating to the ethics of interpretation but unlike the archaeology charters, *The London Charter* (Dennard 2009) moves beyond the consideration of the virtual artefact as illustration and approaches these issues with the explicit assumption that the act of reconstruction *is* an act of scholarship, placing on the artist the responsibility to make manifest the evidence, process and findings of their research in a form which is inseparable from the final image (which by corollary becomes of secondary importance).

The London Charter then seeks to encourage researchers to explore modes of presentation which are not reliant on simple images but on discursive or interactive models (static or virtual) which allow end users to enter into a dialogue with research outputs. In order to achieve this,

the *Charter* identifies the need to adequately document and evaluate any research sources, processes, methods and judgements which contribute to 'knowledge claims'. It identifies the need to clearly identify distinctions between decisions based on source material, contextual knowledge and inference or hypothesis, termed by the *Charter* as 'paradata'. This term was conceived by Baker and is intended to account for the cognitive processes that impact upon the researcher's implementation and interpretation of a given cultural artifact. In Baker's conception, the process must be considered a distinct outcome of the project.

It is clear that a visual mode of presentation is essential in conveying a sense of space – which is almost inevitably one of the principal aims of reconstructive research. While the caveats may be legion, they simply do not outweigh the obvious necessity for illustration and the potential that interactivity lends to the development of critical discourse. To suggest otherwise would be perverse. However, it is equally clear that the visual image is not conducive to critical interrogation.

The Treachery of Images

Favro (2006) and Hann (2010a) have both identified ways in which interactive and visual material actively disrupt critical engagement on the part of the end user, while Thomas reported that the first visualisation of the Théâtre du Marais was mistaken for a recent photograph by one colleague who manifestly knew that the space was no longer extant (Thomas and Fergusson 1998a). That this phenomenon of 'critical disengagement' represents a caveat of which we must be aware is clear, but we might usefully at this stage explore *why* this might be the case. To date, all significant debate on this subject has focussed on the quality of the image. The assumption has been that the closer that the image approaches to a convincing rendering of reality - whether this is in the form of Deirkauf-Holsboer's architectural isometrics (see Golder 1984) or the compelling CGI of *Gladiator* (see Favro 2006) – the more willing the end user will be to accept it as reality. This has led to the proposition of a number of strategies which either seek to limit the quality of (Dennard 2011) or annotate (Hann 2010b) the image. Though these projects have led to some work which has improved the possibilities for engagement by the end user, the assumptions on which they are predicated reject the possibility of more fundamental barriers to critical discourse. This in turn has limited the scope of proposed solutions.

Processes of visual perception involve significant acts of unconscious interpretation which allow us to extrapolate incomplete or ambiguous information in order to make sense of visual stimuli. What is important here is that this process of 'conceptual constancy' happens passively and unconsciously and perhaps most importantly, that it happens precisely because the brain is unwilling to admit incomplete or ambiguous visual material – a process which significantly complicates Beacham's task of 'minding the gap'.

For the researcher who aims to explore the nature of ambiguity, possibility and contradiction, this does of course render the two dimensional image (and all virtualised realities are fundamentally derived from two dimensional images) extremely problematic in its tendency to disengage the viewer from critical thought. Indeed, it might even suggest that a physical model would be far more conducive to critical discourse than any visualised outputs that computer based reconstructive processes might produce.

The British stage designer Bill Dudley has articulated the relationship that theatre professionals have with physical models:

> Many directors and theatres still request a model… When we are all much more down the road to 3D on computer, that might change, but for now the fact that each carpenter and scene painter picks up the model that they're looking at and inspects

it from every angle several times an hour is significant. I would only be confident
if I had the tangible model to offer them. (in Davis 2001)

In conversation, he articulates this relationship differently. People *understan*d the model in a
way that they do not necessarily understand the sketches or the storyboard. He describes the
initial modelbox presentation as everybody's favourite bit of the first day of rehearsals and
identifies in our affinity with models an association with childhood:

The funny thing about the model is that it appeals to the child in everybody. If you
do a beautiful minaturised model people fall in love with it. (Davis 2001)

In his observations on experience, Dudley makes it clear that the physical model suffers none
of the issues of passive disengagement so problematic in computer visualisation. On the
contrary, the physical model seems to engender an intensely interrogative relationship with the
reality to which it refers. By invoking a strong sense of imagination and play, processes of
passive disengagement are 'short circuited' and the attractiveness of the model invites
discourse. The physical model becomes richly imbued with possibility in a way that Favro
claims that the virtual model can not.

Wade's identification of the image as 'allusion' rather than representation (Wade and Swanston
2013) is important in this context and of course it is a concept that has been frequently explored
in the field of fine art, particularly in the work of the early Cubists and in the work of some of
the Surrealists. The works of René Magritte for example often provide an active challenge to
the perceptions of the viewer. Here there is an explicit and often very effective attempt to
disrupt 'passive disengagement' by presenting a contradiction so obvious that we simply
cannot discard it. In order to reconcile the image, the viewer must make a conscious intellectual
intervention without which the art is incomplete because the artwork is both a visual artefact
and the replication of a thought process designed by the artist. This process of compounding
image with conscious thought has obvious conceptual applications to the presentation of
visualised research. Indeed it is possible that Thomas's experience with the Marais
reconstruction might have been entirely avoided had he simply captioned it 'ceci n'est pas le
Théâtre du Marais' – though this may of course have impacted on the perception of the
knowledge claims of that research.

So it is clear that we habitually regard visual material as definitive and that this is not simply
as a result of the quality of the image but is rather a function of the way in which we process
visual data. Seeing is a passive act and looking beyond that is often difficult, even with
guidance. The importance of Magritte's work here is obviously only conceptual, it
demonstrates the possibility of disrupting 'passive disengagement' and of designing visual
material that replicates thought processes. As a practical example for how this might actually
provide models for the visual researcher, it is less useful but it is clear that in order to begin to
engage the user in a debate which is reliant on visual material, the researcher must follow
Magritte's example and find ways to disrupt this process of 'passive disengagement' and
'activate' the 'reader'. Perhaps more importantly this phenomenon renders the need to clearly
author the experience of the reader an essential part of the presentation of outcomes of
visualised research.

Haptic Insights

In the last fifteen years, academic discourse has begun to shift in focus. Recent developments
in reconstructive practice as a recognised mode of research has led to a refocusing on
exploration rather than simple justification. The completion of a number of projects which have
had the opportunity to respond to the concerns raised by the likes of Favro and the Ename and
London Charters has provided the community with material which might be considered as part

of a body of responsive evaluative research which moves beyond the process of problematising the presentation of practical historical research and into areas which might suggest concrete solutions (or indeed simply prove the complexities of the task un-navigable).

While *The London Charter* accepts the importance of locating the *process* of research in the public domain, it is Baker's notion that the process must be considered a distinct outcome of the project which is of most immediate interest to the modelmaker.

The act of reconstruction provides the researcher with unique insights into the project at both the level of source material and final model. In the most basic terms, the act of computer reconstruction requires the researcher to account for all choices either through direct reference to source material or by proposition and hypothesis. It is simply not possible to enter any data object into the reconstruction without making explicit choices about every aspect of its visual appearance. In this respect, the computer provides a kind of structured pedantry which requires the researcher to develop more complex and more sustained models of hypothesis than other forms of material research.

It is perhaps ironic that the computer's need for these models to be broken down into precise mathematical detail leads to an intensely *human* relationship with the histories under investigation; the processes of computer reconstruction closely mirror the processes of the architect and the craftsman, and the researcher inevitably develops sensitivity to historical working practices. So much so that the process of reconstruction might often be more appropriately termed 're-enactment', as the researcher not only asks what the architect did but also why and (crucially) how. This often leads to quite uncanny moments of 'haptic' insight where the understanding of elements of history are embodied rather than conceived.

Processes of reconstruction have for example revealed the likely existence of an error in the sectional drawing attributed to Sir Christopher Wren and tentatively linked to the 1674 Theatre Royal Drury Lane (Wren 1674). The computer's requirement that the researcher developed a complete solution for the non extant plan of the building led to an exploration of the variables which would need to be addressed in order to account for the available evidence. Arguments have been made to suggest that the Wren section should be assumed to represent the 1674 Drury Lane and are well documented from Bell (Bell 1913) to Thomas (Thomas 1999) with much in between but no groundplan has been suggested. The dimensions of the plot and of the Robert Adam design for the ceiling (Adam 1775) are consonant with the measurements implied in the section but the process of reconstruction shows closer correlation in the correspondence of the widest part of the ceiling designs (there is more than one and all demonstrate an unchanging 'footprint') and a section of the auditorium clearly set back from the front of the boxes apparent in the Wren section. With this material it is possible to propose a groundplan, since the width of the Adam ceiling and the depth of the curve of the first balcony of the Wren section provide three points on a curve from which one may interpolate the centre of this curve (and by extension all of the other curves suggested by the section). The only variable which remains is the nature of the curve. If one assumes that this represents a section of a circle rather than oval[3] then this reveals an error on the section at the level of the first balcony. This is of course a significant finding in itself but the immediacy of the understanding gained by the researcher that the error was made and went unnoticed until the drawing was completed, inked and shaded, whereupon the drawing was torn through (twice), discarded and retrieved (possibly as a reference for a corrected version) provides an experiential moment which moves significantly beyond the simply intellectual (Fergusson 2007).
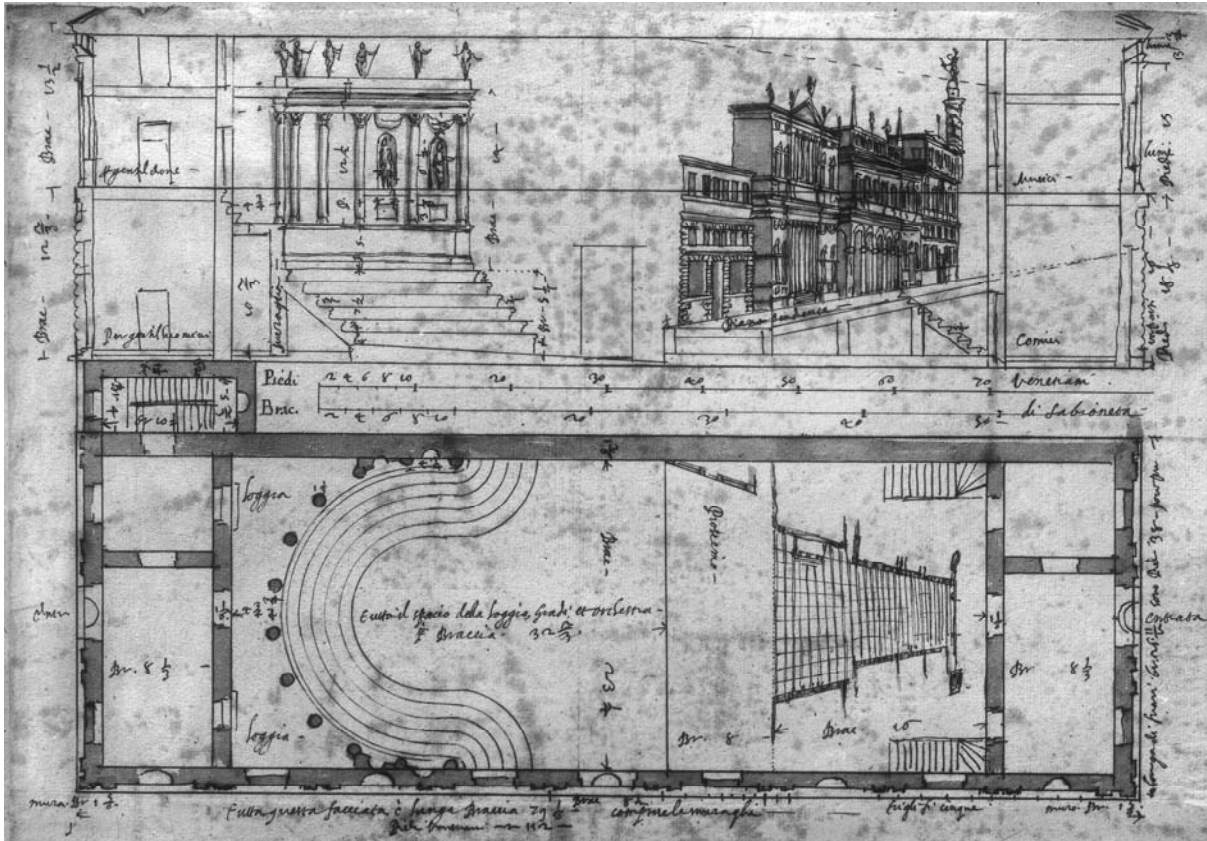
Figure 1 – Plan and elevation of Modern Theatre in Sabbioneta, Vincenzo Scamozzi (1548-1616), Cabinet of Drawings and Prints, The Uffizi Gallery, Florence. Archivi Alinari, Firenze

Likewise, an investigation of the sketch design for the theatre at Sabbionetta (Scamozzi 1588, figure 1) clearly shows the deployment of two discrete systems of measurement, the Vanetian 'piedi' and the local Sabionettan 'bracia'. With a closer examination it is possible to be reasonably confident in an assumption that the fabrication of the building's shell was undertaken by local craftsmen but that specialist expertise was most likely brought in from Venice to complete the statuary and the stage area (Fergusson 2013). Even with this understanding though, the detail of building is difficult to extrapolate from the drawing - in reconstruction, some of the measurements simply do not add up. This is partly due to the fact that the artist has discovered, some way into their process, that the paper on which they are working is not big enough (the top of the sectional drawing has been truncated and the artist has made some attempt to indicate this) but can be more fully explained by the supposition that at times the wrong scale has been used to mark up the drawing. Some parts of the drawing are certainly rendered with more care than others and many of the measurements relating to structural detail seem to have been added in haste. So in this case, the computer's 'unforgiving and relentless demand' for the resolution of such ambiguities has led the researcher to engage in a moment of 're-enactment'. It seems that this drawing has been used as a discussion document, probably in a meeting between the architect (the handwriting of the hurried annotations bears sufficient similarity to that of the more considered comments to support the assumption that they are by the same hand) and representatives of the local Sabbionettan and specialist Venetian craftsmen. As the meeting has progressed the designer has inadvertently used the wrong scale (perhaps a two sided scale rule?) for some of the mark up. Again, while perhaps less historically significant, this procedural insight gives the researcher a particularly human sense of 'ownership' of the history in question.

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Figure 2 – Reconstructions of Wren's sketch for a play house and Scamozzi's design for the theatre at Sabbionetta.

Robin Nelson's model of practice as research (figure 3) might be useful in this context. However in its primary focus on performative modes, it fails to fully account for this form of 're-enactive' insight which does not relate directly to the skills of practice or to the abstraction of critical analysis or to contextual knowledge but lies somewhere between. The addition of a category of 'know-because', derived from 'know-how' and feeding into the categories of 'know-what' and 'know-that' would be necessary in order to fully engage with Nelson's conceptual framework.
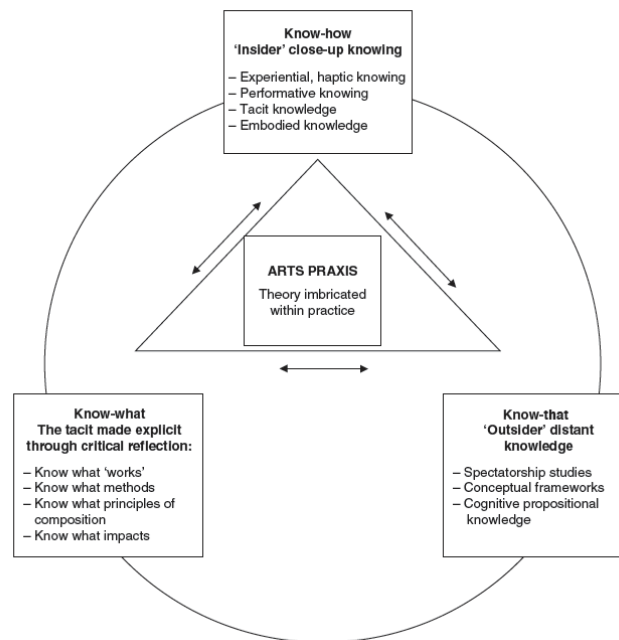

Figure 3 – Model of Practice as Research in Robin Nelson, *Practice as Research in the Arts : principles, protocols, pedagogies, resistances*, published 2013, Palgrave Macmillan. reproduced with permission of SCSC (Nelson 2013)

Nelson also locates material relating to accounts of process (in the terms of *The London Charter*, 'paradata') within the 'complementary writing' part of a package. Here again, it is necessary to make adjustments to his scheme. In Baker's model, the process is a discrete outcome and should not then be simply subject to a narrative account but acknowledged as a practical artefact and subject to appropriate archival techniques. These techniques should

preserve a sense of outcome while ensuring that the user retains access to the *mechanism* of research. A parallel here might be the recording of rehearsal sessions which (while by no means a substitute for actual presence or participation) retain a greater sense of process than narrative description.

It is possible that Nelson's model fails to fully account for processes of reconstructive practice because of its reliance upon models of 'knowledge' that are derived from assumed hierarchies that are implicit in western epistemological traditions.

Consider for example the distinction the Nelson model makes between the art artefact, the commentary (symbolic articulation/know that which exists in the complementary writing) and the embodied understanding of the researcher (know how). In the examples above, moments of 'haptic insight', can not really be accounted for as 'know how' as the knowledge gained is not simply a knowledge of acquaintance (as termed by Bertrand Russell) but constitutes an understanding beyond that. In this sense it is necessary to conceive of knowledge and understanding as distinct, the skilled model maker may possess a range of embodied knowledge (know how/insider practitioner perspectives) but the practice of model making as research methodology also delivers an embodied *understanding* which moves beyond knowledge.

In Nelson's model, 'know how' exists as a tool – a tacit rather than explicit element of the research process - the artist has embodied knowledge that when applied to the research questions might render results by doing. This is static and rightly described as embodied 'knowledge' but the process of modelling is procedural and dynamic, the embodied element is *realised* through process and remains fluid, the developed understanding remains tacit but it not described or communicated through the existence of the model (as with the artwork in Nelson's example) but evidenced by it.

While it is easy to think of modelling software as a tool for the visual researcher, it is perhaps more helpful to think of it a simulation environment in which the reconstructive researcher is provided with opportunities to develop and simulate visual hypotheses. The parameters of this simulation are not necessarily fixed by the medium, they can be designed by the researcher but the hypotheses must be accounted for in appropriately extended ways which support rigorous interrogation in 'modelled reality' (the use of the term 'virtual' in this context can be unhelpful). Perhaps more importantly, the visual researcher must occupy this 'simulated' environment principally as a maker rather than a commentator, and this role significantly changes the relationship between the researcher and their evidence.

It might be useful here to consider an alternative view of the impact of 'doing' on knowledge and understanding. In his book *Making* (Ingold 2013), Tim Ingold explores the concept of 'thinking through making', drawing together disciplines of anthropology, archaeology art and architecture he presents an alternative view of embodied knowledge that moves beyond the assumption that that which is embodied by practice may be tacit but must be discrete and quantifiable and suggests a more complex relationship between maker and artefact. During early experiments in which he re-framed seminar discussions which addressed the interface between art, architecture and anthropology in the context of acts of making and doing (basket weaving, pottery, Alexander technique etc.) he found that the nature of the discussions was qualitatively different to anything that the group had experienced in the context of the seminar room and frequently produced 'tremendous new insights' in to the topics under discussion (Ingold 2013).

While he is not immediately able to articulate why this might be the case he does present an interesting analysis of the apparent effect that acts of creation have on cognitive processes. For

Ingold the difference lies in the understanding of things as materials rather than objects. The maker is not primarily concerned with the narrative of an object but its potential, 'in treating… erstwhile objects as materials we rescue them from the cul-de-sac into which they had been cast and restore them to the currents of life' (Ingold 2013). Perhaps more importantly, the consideration of potential is an iterative act where the construction of narrative is primarily reflective. For Ingold this fundamentally changes the way in which 'things' are received and his characterisation of the relationship between maker and material as 'correspondence' (rather than the more familiar 'interrogation') usefully captures the immediacy of the experience of the visual researcher.

The visual researcher who concerns themselves with making as methodology approaches evidence as material rather than object and this distinction inflects both the ways in which evidence is deployed and the mode of the investigation. To treat evidence as material rather than object is to admit that even when distanced by time the relationship between artefacts and the history that they represent remains vital and dynamic.

As an experiment, one might consider our engagement with a sliding (or jigsaw) puzzle, in which we inevitably engage differently with the final image (even though we may have access to it at the outset). This is not simply a function of its fragmentation but the puzzle is designed to cast us in the role of 'maker' and this places an active emphasis on the image as it must be decoded. It is not possible to simply interrogate the pieces, the initial focus of the 'maker' becomes in preparing a hypothesis (what is this an image of?), developing a cypher (how might I categorise colour/texture etc in order to resolve this image?) and ordering the data in ways which prove the hypothesis in extended ways (where does this piece fit? It is indeed a picture of a zebra but I also need to establish how and where it is framed in the overall image). So it is with modelling practice. The need for completion means that each piece of evidence takes on an imperative that may not be evident in other modes of research - this *is* part of the picture, it must be accounted for. Where does it go? How does it relate to other pieces? In this respect, the sliding puzzle is a better example than the jigsaw as the body of elements is fixed and irreducible. The whole must be accounted for at all times.

Modes of Process

To understand computer modelling practice as a form of simulation in modelled reality is to accept that the rules of that reality are not fixed. Just as the 'maker' of the jigsaw must develop a cypher, so the visual researcher must design the rules of their simulation. While this does of course contribute to methodological concerns, there are distinct 'modes' in which the researcher may work and this choice has an inevitable impact on the way in which they engage with their materials.

In the 1954 *Marais* reconstruction we have identified a mode of literary reconstruction which we might broady term 'linguistic' reconstruction. In this mode, analysis of visual and non visual material is essentially verbal and the presentation of the outcomes of such analysis is presented as narrative with illustrations. This form of reconstruction is most clearly demonstrated in Golder's critique of the work of Deirkauf-Holsboer but the concerns about authority lent by illustration were also the driving force behind archaeology's attempts to regulate acts of reconstruction. Since the analysis in this form of reconstruction is principally linguistic, engagement with the material is primarily verbal in nature. This mode of reconstruction is reliant on description and interrogation and inevitably tends to treat evidence as objects fixed within a narrative which is 'revealed' by the researcher. This mode of reconstruction is subject to a number of issues which the researcher must guard against. Most significantly, this is a mode in which it is relatively easy for the researcher to accept incomplete

or untested hypotheses and while this is not necessary problematic, it is the foundation of much of the criticism aimed at reconstructive research.

Conversely, work carried out by Favro, THEATRON and the Drury Lane and Italian Renaissance projects described above engaged with a mode of reconstruction which relied on a close analysis of extant plans and survey material. In this 'technical' mode of reconstruction, engagement with source material is primarily spatial in nature. In truth, the 'technical' mode occupies a spectrum rather than a position based on the extent and security of the source materials available. In the case of projects (such as the Teatro Olimpico at Vicenza) where there is a reasonably complete set of materials and consequently little need for conjecture the modelling environment provides an appropriately 'real' environment for reproduction. In projects were the data set is incomplete (as with Drury Lane) or ambiguous (as with Sabbionetta) however, this mode of reconstruction provides a particularly valuable environment in which the researcher may develop and evaluate hypotheses. Evidence is genuinely treated as material and the researcher has the opportunity to 'correspond' with source material in a process which is more iterative dialogue than narrative.

The third mode is both the most problematic in the terms of the archaeological charters and the most useful where material does not lend itself to spatial interrogation. This is a mode of reconstruction that we might broadly term 'visual'. This mode is exemplified in Hann's work on Meyerhold's 1926 production of *The Government Inspector* (Hann 2010a) and Fergusson's work on Appia's unrealised designs for Wagner's *Ring Cycle* (Fergusson 1998) and Vlastislav Hofman's 1926 design for *Hamlet* (Fergusson 2016). This is a mode that may be deployed were there exists no evidence that might be described as of a technical nature (plans models etc) but aims to develop an extended sense of space from two dimensional images. This form of reconstruction uses visual material to establish an implied (or in the case of photographs, actual) point of view and interpolate spatial information by constructing a three dimensional virtual model which corresponds to available two dimensional renderings. In this mode, engagement with material through interpolation could (in a strictly mathematical sense) be described as 'methodical', though the term 'holistic' better captures the true nature of this engagement. Both Hann and Fergusson have used this mode to develop reconstructive practice which aims to place a primary focus on the intentions of the artist rather than the reality of the stage space. In this mode, evidence is again treated as material but the extended requirements of interpretation (particularly in the case of the Hofman design) mean a greater emphasis on the original design process through attempts at re-enactment. In this respect, this 'visual' mode of reconstruction has a clear focus on the reconstruction of *process*. In the case of the Hofman reconstruction this mode was used to explore the relationship between the artefacts of the design process and the notional spaces that they were intended to represent in the context of the designer's developing conception of the production.
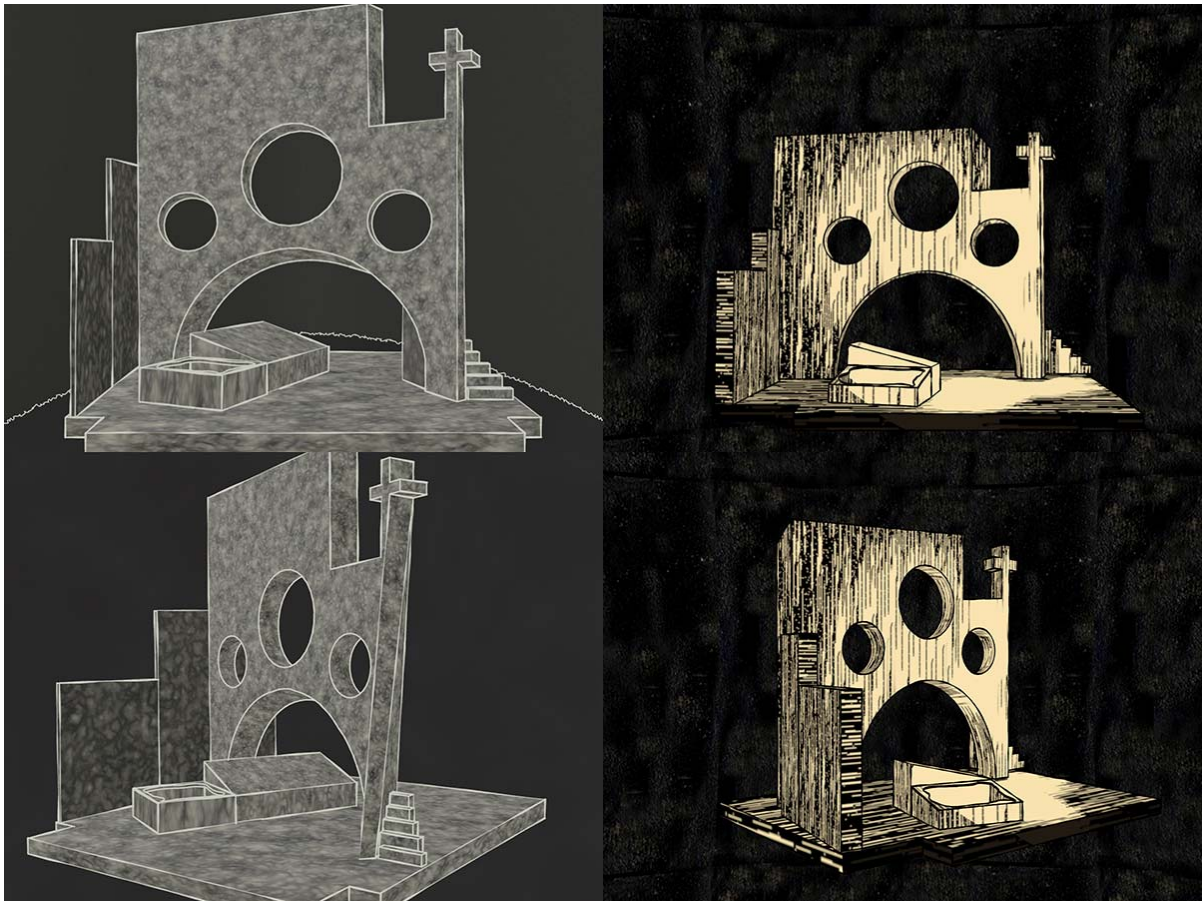
Figure 4 – Designs for Hamlet, Vlastislav Hoffman 1926. (Fergusson 2016)

Hofman's work on this project is documented in an unusually complete set of design artefacts from initial 'concept' designs through storyboard and scenic model to final production photographs. What is perhaps unhelpful to the visual researcher is that Hofman adopted radically different stylistic approaches at various points in the process and this greatly complicates any attempt to capture a sense of Hofman's conceptual development through comparison. Actual differences in the spaces implied by the various design artefacts are obscured by our tendency to interpret stylistic difference (through the application of conceptual constancy). In this case, a process of visual reconstruction enables the researcher to both interpolate the staging implied by the designs and reject stylistic difference by applying a uniform visual style.

This project revealed a process in which the designer was clearly interrogating the use of both Expressionist and 'Purist' (Hofman's term) aesthetics with a view to resolving a tension in his design concept (Fergusson 2017). The reconstructed process shows an initial design with clear statement of Cubo/Expressionist intent, first tamed (in the storyboard) and then removed (in the model box) before being re-instated (in the production photographs) in a way which represents a pragmatic compromise between the designer's intent and the technical requirements of stage realistaion.

Archiving Process

If we are to accept Baker's position that the process must be considered as a discrete outcome of reconstructive research then it is clear that this process must be captured as it happens. This position however assumes that the 'process' is clearly articulated at the point of capture. That is, that the impact and significance of the researcher's work is clear *before* the completion of

the process. This is of course not the case. The 'revelations' of reconstructive research are often unexpected and sometimes only truly significant in retrospect. I think here that our paradox might rest on a semantic confusion. While a reconstructive researcher must approach their task with a clear sense of methodology, the 'process' by which understanding is generated may only become clear once it is completed because it is not a single body of material but a trajectory. The various activities undertaken by the reconstructive researcher (their 'practice') may all contribute to the final visualisation but they need not all contribute to the 'process' as discrete outcome. Or at least, the extent of their contribution to that process is not fully known until the researcher is able to reflect on their work.

There are two clear implications here. First, the mode of recording 'practice' must necessarily differ from the mode of presenting 'process' and second, that the mode of presentation must contain a strong sense of 'authorship'.

To date, attempts to present process have focussed on the concept of 'paradata' and have been principally directed at concerns over transparency and accessibility because in the words of the London Charter, it is essential that 'computer-based visualisation processes and outcomes can be properly understood and evaluated by users' (Dennard 2009). The focus though has tended to be on the place of the computer visualisation as part of an on-going body of knowledge, rather than on the process as discrete outcome. This position tacitly privileges the final model as principal outcome and rejects the possibility that model making can exist as a form of practice as research.

Of course this need not be the case, indeed once one accepts the importance of process as outcome, it is clearly a rather poor compromise. The process is a trajectory, the model outcome an artefact, they cannot possibly be equally served by a single mode of presentation. To put it another way, the process is the argument, the model the conclusion. They must be authored in different ways.

A more organic solution to the problem might be to locate the exploration of paradata separately in a presentation of the process, not in the presentation of the model. This offers a number of advantages. It enables the researcher to locate paradata in the context in which choices were made rather than simply demonstrating their impact on the final model. This gives the researcher the possibility of presenting much more sophisticated models of process in which they might show the significantly more complex interplay of choices and dependencies which generally characterises reconstructive research. Perhaps most significantly though it generates more possibilities for the presentation of rejected hypotheses rather than focussing only on those elements that are ultimately retained.

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[1] The deployment of 'real' structures (with historically accurate 'database entries') within fictionalised urban landscapes in the *Assassin's Creed* games engenders a sense of trust in the accuracy of the histories

depicted. Indeed this is one of the strategies used by the games designers to reinforce the game's principal narrative (which deals with genetic memory) and is only confirmed by the inevitable sense of (admittedly uncanny) familiarity experienced by the player on encountering the virtual building's real world counterpart.

[2] For a brief exploration of subjectivity and the historian see 'On Writing Theatre History and My Mother's Button Box' in (Baugh 2014).

[3] While Cibber's description of the 1674 Drury Lane includes a clear assertion that the forestage was 'semi oval in figure' (Cibber 1740), the interpolated groundplan shows that if Wren had used a circle for the basis of his plan (as he did in may other structures) the resultant stage has a thrust which takes the form of a quarter circle – which might (with licence) be broadly describes as 'semi-oval'.