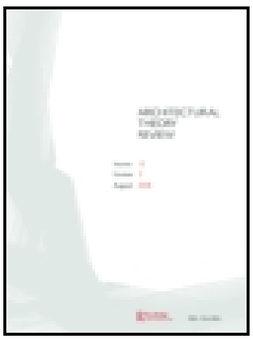

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Entangled Dependencies: The Architect, the Model, and the Professional Modelmaker in Britain, 1969–90

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ABSTRACT

Through a case study of the professionally made architectural model in Britain between the late 1960s and the early1990s, this article draws from archaeologist Ian Hodder's concept of entanglement and argues that the relationship between the architect, the architectural model, and the modelmaker exists as an entangled web of shifting distributions of power governed by asymmetric tensions and mutual dependencies. In tracing the changing relationship dynamics that led to a dramatic broadening of the model's visual styles to incorporate both realism and creative abstraction during this period, this article describes the professionally made architectural model as the locus of an intricate web of interconnected dependencies in which the model, the modelmaker, and the architect reap both the positive and negative consequences of their increasingly fraught entrapment. Demonstrating how a study of their entanglement reveals the complexities that exist within the human-object interactions that surround them, this article highlights the mutual dependencies that bind the model, the maker, and the architect together.

KEYWORDS

Architectural model; modelmaking; professional modelmaker; entanglement; human-object relations

Introduction

As physical objects widely used by both architects and property developers in the development and communication of architectural designs, architectural models are employed to "encourage the model's users to dream about an architectural idea that they may not be able to envision on their own."[1] Created as predictors of potential future realities, architectural models occupy a powerful position in the physical expression of architectural concepts before the intended design is fully realised.

For more than a century in Britain, the principal mediator between architectural designs and their visualisation in three-dimensional physical form has been the professional architectural modelmaker. Working in both commercial modelmaking companies and in-house modelshops within larger architectural practices, professional architectural modelmakers have long been fêted for their ability to empathise with architects' creative intentions; their models providing a "vector through which complex ideologies [are] reduced, simplified and directed on a scale with which humans can

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relate."[2] In *Architectural Supermodels*, Tom Porter and John Neale describe the affiliation between the architect and the modelmaker as a "special relationship of trust."[3] It is the responsibility that resides with both the maker and the model to faithfully communicate an architect's intentions in three-dimensional form, and as a result, the relationship between all three is underscored by often unacknowledged tensions. Michael Ostwald has questioned whether the relationship between the architect and the modelmaker is in fact exploitative and parasitic,[4] with the presentation model—the mainstay of the professional modelmaker—identified as a particular locus of tension and controversy, straddling "both the mystic realm of vision and the more humdrum world of gaining commissions and constructing buildings."[5]

While the critical and reflective study of architectural models has been steadily growing in volume and intensity over the past two decades, the nature of their relationships with the humans that make, use, observe, and otherwise encounter them has yet to be fully explored, with the role of the professional modelmaker in particular having been largely overlooked.[6] Thomas Fisher, in comparing the work of modelmaking to literary translation, has observed that modelmakers, "like their literary colleagues, have not always been treated with the greatest respect or given the proper credit."[7]

Ruled by asymmetric tensions and shifting distributions of power, a complex entanglement of mutual dependencies exists in which the architect, the architectural model, and the professional modelmaker are enmeshed. This article examines the nature of this relationship through a study of the professionally made architectural model in Britain between the late 1960s and the early 1990s, tracing the shifting relationship dynamics that led to a significant broadening of the model's visual styles to incorporate both realism and creative abstraction during a period in which the professionally made architectural model both contributed and responded to widespread changes in architectural practice and culture. Instigated by the increased dominance of an additional and disruptive element, the property developer, this article charts how the subsequent tensions that arose in that time affected change, with the model, the modelmaker, and the architect ultimately benefiting from the complex connections that comprise their entangled existence, and reveals how mutual dependence rather than trust defines their special and enduring relationship.

Entangled Human-Object Relationships

Ian Hodder's concept of entanglement considers the nature of our mutually-dependent relationships with the objects that surround, enable, and instruct us throughout our daily lives.[8] Developed within the context of archaeological theory, Hodder's work builds upon the growing adoption of what are broadly termed as "new materialist" approaches which recognise that far from being passive cultural outputs, objects exist as active agents in society alongside us, sharing a capacity to make a difference in the world.[9] These approaches, in drawing from the principles of a relational ontology, view the world as being comprised of bundles of interconnecting relations between human and non-human entities alike, removing any hierarchical distinction between the material and social worlds. Proposing that the world at large can be seen in relational terms, and that material objects are dependent on, and enter into, relations with other

entities,[10] the underlying principle extended by the adoption of a relational ontology is that an understanding of any entity of interest can only be achieved through an examination of its relative positioning within a broader field of other entities, activities and processes,[11] establishing an emphasis on understanding the relationships between entities rather than the entities themselves. Hodder's concept of entanglement draws from the relational insights of both actor-network theory (ANT) and assemblage theory in considering the networked connections that make up our world,[12] utilising both concepts' redefining of agency and the process by which change occurs as an emergent phenomenon that arises from the interaction of human and non-human entities, positioning agency as a decentralised concept that, rather than being inherent within people or objects, exists as a result of their combined interaction.[13]

The growing use of relational perspectives to study human-object interactions stems from an acceptance that concepts of mind and matter, human and object, are all intricately connected; archaeological theorist Bjornar Olsen having observed that the modern world is the result of a complex process of humans delegating agency to objects while reciprocally being influenced by them throughout our daily lives.[14] With ANT in particular increasingly dominant within design history, material culture studies, archaeology, and the broader social sciences and humanities, Kjetil Fallan has argued for its greater use in architectural theory due to its emphasis on the "relational and reciprocal dynamics of ideas and matter";[15] Albena Yaneva notably used ANT in her study of the contribution of architectural models to the design process at OMA; and both Douglas Mitcham and Jane Insley used ANT in relation to the broader study of models and miniatures.[16]

In studying the deeper relationship dynamics within the connections that make up the socio-material networks of human-object interactions, Ian Hodder's relational concept of entanglement builds further on the insights of ANT and enables an examination of the flows of dependency and co-dependency within the relationships between people and objects, recognising the asymmetric tensions that exist. Just as agency is considered a decentralised concept within actor-networks and assemblages, so too is power, being an effect or performance that circulates within webs of relations, rather than being held by individual components. In describing our connections with objects as a form of sticky entrapment that is fraught and constraining, Hodder's approach enables an examination of these flows of power by highlighting that more than merely relating to one another, humans and objects are instead locked into spirals of entanglement and dependency, with humans relying on objects and objects relying on humans. As we have to make the objects we want, in our own dependence on them, we become entrapped in their dependence on us.[17] This double-bind is central to the concept of entanglement, a symbiotic relationship dominated by shifting tensions and mutual dependencies, and it is here that Hodder suggests that the unstable power dynamics that emerge from the asymmetrical tension between component entities and the dependencies that lock them into an ever-increasing reliance upon one other can be observed.

Studying the entangled nature of the relationships that surround and sustain the architectural model therefore allows for a consideration of the tensions and mutual dependencies that connect the model to architects, modelmakers, clients, and the

public, enabling a tracing of the flows of influence and power that bring about change. Crucially, this charting of the shifting relationships that comprise the entanglement reveals the complex nature of the professionally made architectural model's relationship with the architect, and in recognising both agency and power as distributed and emergent phenomena, describes the model as the locus of an intricate web of interconnected dependencies in which the model, the modelmaker, and the architect reap both the positive and negative consequences of their increasingly fraught entrapment.

Increasing Tensions and the Conflicting Demands of Commercial Development

Throughout much of the twentieth century, the distribution of power within the relationships connecting the professionally made architectural model, the modelmaker, and the architect in Britain remained remarkably stable. The utility of the model, primarily as a communication tool, had been increasingly recognised as integral to architectural practice in Britain during the nineteenth century, and by the outbreak of the First World War the burgeoning industry of commercial architectural modelmaking firms such as Thorp, Twining Models, and Partridge's Models had established themselves as the dominant makers of presentation models in the country. The models being commissioned were often extravagant and highly expensive; professional modelmakers creating increasingly more detailed and precise representations of architects' designs. Expectations were clear all-round, with a shared aim that architectural models were to be as realistic as possible, clearly outlining to planning committees and the public what a proposed building would look like. Models such as John Thorp's 1930 model of Edwin Lutyens' scheme for a new Charing Cross Bridge demonstrated the levels of detail and realism that professional modelmakers were able to achieve (fig. 1); a trend that continued in the post-war era as architects and city planners made extensive use of models to communicate their plans for the rebuilding of Britain's war-torn towns and cities.

After the Second World War, a boom in architectural modelmaking occurred in Britain, driven by the combination of an intensive demand for models generated by the post-war modernisation programmes, an expansion of the modelmaking profession due to an influx of highly trained ex-RAF modelmakers,[18] and the widespread availability of Perspex dramatically improving the quality and realism of architectural models. As a result, by the 1950s the structural relationships that surrounded the professionally made architectural model were firmly established. Architects, predominantly working in the public sector,[19] commissioned highly realistic architectural models from the increasing number of commercial modelmakers operating at the time, with only the largest local government architects' departments such as the London County Council employing in-house modelmakers; few private firms being of sufficient size to warrant employing dedicated architectural modelmakers themselves. Within this arrangement, the architect was the dominant force in the relationships surrounding the model and the modelmaker, but both being seen as the providers of a reliable service subservient to the architect's needs. Dedicated professional architectural modelmakers focussed their time on the pursuit of technical and material innovations such as the adoption of plastics, which improved the

Figure 1. Model of Edwin Lutyens' scheme for a new Charing Cross Bridge, made by John Thorp, 1930. Source: Thorp Archive, AUB, Poole.

quality and realism of the models that architects were commissioning; a *status quo* that maintained a comfortable balance of an unequal but stable distribution of power.

By the early 1960s, however, the stability of this relationship had begun to be severely disrupted by the growing dominance of a new entrant into the entanglement: the commercial property developer. The major post-war modelmaking firms such as Thorp and McCutchon Studio began to find their order books filling up with commissions from land-owning speculative developers rather than from architects themselves, and a rapid shift of income from public funds to privately raised financing followed. The abandonment of building controls in 1954 had set the stage for a property boom in London with commercial developers such as Harry Hyams building large numbers of speculative office developments.[20] Notably, the RIBA had banned registered architects from taking part in speculative practice in the 1920s,[21] and so those who did engage with developers were considered to be working outside the system. For architects not employed in the public sector, though, private development provided a potentially lucrative source of income. As the public financing of large scale developments gradually reduced through the 1960s, private developers became an increasingly central source of funding for the architectural profession, with architects such as Richard Seifert and his partner George Marsh leading the way with designs for countless office buildings including Magnet House, Tolworth Tower, and Centre Point—the model for which demonstrates the high levels of realism that professional modelmakers had by this time reached (fig. 2). Throughout the decade professional modelmakers became

Figure 2. Model of Centre Point, made by Nick Quine, 1963. Source: David MacKay/AMI.

increasingly tied to the demands of the property developer in place of the architect as this was simply where business was to be found, with professionally made presentation models quickly becoming viewed as sales tools rather than as communication tools, and architects' attitudes towards them began to sour.

By 1969, tensions within the entanglement of the model, the architect, the model-maker, and now the developer, had begun to show, with architects expressing

frustration at the hold property developers had over the commercial modelmaking firms. The *Telegraph*'s architectural critic John Chisholm summarised this deterioration in the model's standing within architectural circles with a polemic article in *The Architect and Building News*, wherein professionally made presentation models were squarely blamed for the poor quality of post-war architecture, noting that:

> Planning committees the length and breadth of the land were sold on the contents of hundreds of Perspex boxes enclosing the dust-free atmospheres of miniature "true-to-scale" worlds of shopping centre, office development or point block housing project .... Perhaps one of the saddest experiences of present-day life is to see a prestige model on display as pristine and bright as the day it was proudly unveiled before the board of directors, while about it the all-too-familiar reality of the dream stands—stained and tatty.[22]

As far as Chisholm and many other architects were concerned,[23] the architectural model had been hijacked by the property developer and was being dishonestly used in presenting unrealistic expectations that could never be delivered. Ironically, it was the very pursuit of realism that had made them ultimately unrealistic, with a too precise and optimistic view of the future. This concern over realistic architectural models has remained to this day—models at risk of presenting "what architecture promises, yet can never itself attain."[24] By being so confident about how a future building would look, surrounded by clean streets and green trees, realistic architectural models left no room for ambiguity or interpretation. Chisholm's criticisms aired deep concerns that the architectural model was moving further away from architecture's control; but for the commercial modelmakers, they were merely continuing to meet the demands of their now principal clients, developers. For architects, high levels of realism became seen as in some way disguising the creative work of architects themselves, and instead was deemed to be aimed at cultivating associations with childhood miniatures in order to sell property. As architects attempted to distance themselves from the commercial realities of property development, "the less palatable realism in models became."[25]

With increasingly competing demands from both developers and architects, the model and the modelmaker began to be pulled in different directions; the stability of their entangled relationship with the architect rapidly deteriorating and becoming increasingly fraught with tension. As architects' spiralling disapproval of the realistic professionally made model accelerated through the 1970s, the relationship appeared at breaking point, a situation made immeasurably more complicated as a result of architecture's fundamental rethinking of what the architectural model was for. In what was to prove a rather ugly and messy attempt by architecture to free itself from the entanglement in the decade that followed, the mutual dependencies between the architect and the professionally made model were only brought further into focus; neither could exist without the other, yet the model was not offering what many architects now wanted.

Entrapment and the Search for Alternatives

The deterioration of the entangled relationship between modelmakers, the professionally made model, and architects was further compounded by major structural changes taking place in the architectural profession during the 1970s. Employment rapidly

shifted towards the private sector as the role of the public sector as a patron of British architecture was severely diminished as a result of government cutbacks in the face of the economic challenges of the decade.[26] Architects suddenly found themselves at the mercy of commercial forces, and by 1981, the RIBA had responded by changing the code of practice to once again allow for speculative practice, and to allow architects to advertise their services and to create publicly listed companies on the stock exchange.[27] Thrust into a world of free enterprise and capitalism, resentment of the commercial uses of professionally made architectural models by developers deepened during a period in which architecture re-evaluated its relationship with the model entirely.

A lack of building opportunities during the 1970s saw many architects turn to theoretical and conceptual work. Nigel Coates has noted how the decade forced architects to find "other ways of making architecture … the question was, can you be an architect without building?"[28] Architectural models understandably found themselves under further scrutiny as a result, and the first theoretical considerations of their nature began to emerge in the United States. The publications *Idea as Model* and *Great Models* focussed on the conceptual role of models and their ability to transcend ideas of representation.[29] The shift in the relationship between the architect and the model expressed in both publications was summarised by Peter Eisenman in *Idea as Model*: "We do not seek to assemble models of buildings as propaganda for persuading clients, but rather as studies of an idea of architecture,"[30] while Michael Graves in *Great Models* was adamant that "we make models of ideas not real buildings."[31] This distinction further increased the already tense relationship architects had with the professionally made architectural model. With a revised understanding that models ought to be expressions of architectural concepts rather than concrete representations of proposed buildings, realistic models were seen not only as projecting false ideas about how a building would look, but of what architecture itself was considered to be. Karen Moon has observed that "the response of architects' reaction to realism is usually in direct proportion to their conception of themselves as artists,"[32] a situation that undoubtedly increased during the 1970s.

John Chisholm's criticisms of the model, now accompanied by a solid theoretical rationale, had become entrenched within much of architectural discourse by the end of the decade. Piers Gough wrote that professionally made models were "by and large a vehicle for fraudulent seduction."[33] The *Independent*'s architectural writer Janet Abrams described professional modelmakers as "the special effects consultants to the architectural profession," embellishing reality with their "tricks of the trade," and that those who were attracted to such realistic, professionally made models were "swarms of grown-ups gawping over cased replicas with the look of enchantment generally observed in five-year-olds playing with a doll's house or train set."[34] By the 1980s, it was clear that for many architects, the relationship with the professionally made model was in a very poor state. The vitriol directed at the model can, however, be seen as evidence of their inability to actually sever their relationship with it. As architects tried to free themselves from the entanglement, the realisation of the mutual dependencies that existed resulted in the outpouring of frustration that Gough, Chisholm, and others expressed. Architects still needed, and indeed wanted, architectural models, but with the balance of power within the entanglement having shifted away from architects and

towards the developers, and with commercial modelmakers lacking any motivation to placate their demands—given that their order books were full of commissions to make highly realistic models for their developer clients—the relationship continued to descend into an unhealthy spiral of suspicion and distrust.

For many in the architectural profession, the model's standing, like that of the professional modelmaker, had seemingly reached a point of no return, but the architect's relationship with the professionally made architectural model was contrasted by a much longer, and, by the end of the 1970s, far more positive relationship with sketch and study models, predominantly made by architects themselves. Balsa wood models had become popular during the 1960s, with young architects such as Norman Foster favouring the material. Simpler and significantly more abstract in nature than the largely plastics-based professionally made architectural models of the time, these more personal architect-made models were much more closely aligned to architecture's revised view of the model as an expression of ideas. During the shift from public to private practice during the 1960s and 1970s, larger architectural firms began to employ their own in-house architectural modelmakers, and with the ability to exert much more direct control over the styles of models being produced, high quality professionally made abstract architectural models began to appear in earnest.

Denys Lasdun hired Robert Kirkman as his first in-house modelmaker in 1964, and with Kirkman viewing architectural modelmaking as an art form rather than a technical pursuit of realism, his more abstract approach ideally suited Lasdun's brutalist designs (fig. 3). After a further seven-year period as an in-house modelmaker at Southwark Council, Kirkman established his own company, Robert Kirkman and Associates, in the early1970s, finding an increasing number of architects approaching him for models specifically because he was offering something very different to the highly realistic models made by the established commercial modelmakers.[35] Deliberately keeping his business on a more intimate scale, Kirkman was never able to meet the growing demand for such models, however, and throughout the decade, established firms like Thorp and McCutchon Studio continued to dominate the industry with highly realistic presentation models.

In a similar vein, David Armstrong was hired by Philip Dowson in 1961 to establish Arup Associates' in-house modelshop with a specific brief to create "beautiful things out of lovely woods,"[36] eschewing realism and demanding high-quality abstract models made from hardwoods rather than balsa. Armstrong developed a palette of rich timbers that included yellow and red cedar, pine, and sequoia—the modelshop's resulting models rapidly gaining an envied reputation. With high profile projects such as the Sydney Opera House and the Aldeburgh Concert Hall (fig. 4), the Arup approach to modelmaking was further spread through the engineering firm's collaborations with architects such as Norman Foster, Richard Rogers, and Renzo Piano, many of whom began to enquire as to whether they could obtain models from the Arup modelshop on a commercial basis for their own projects.[37]

What both Kirkman and the Arup modelshop offered was an alternative visual language for professionally made architectural models that simply were not available elsewhere, and it was one that directly appealed to many architects' evolving understanding of what an architectural model should be. The abstraction that timber

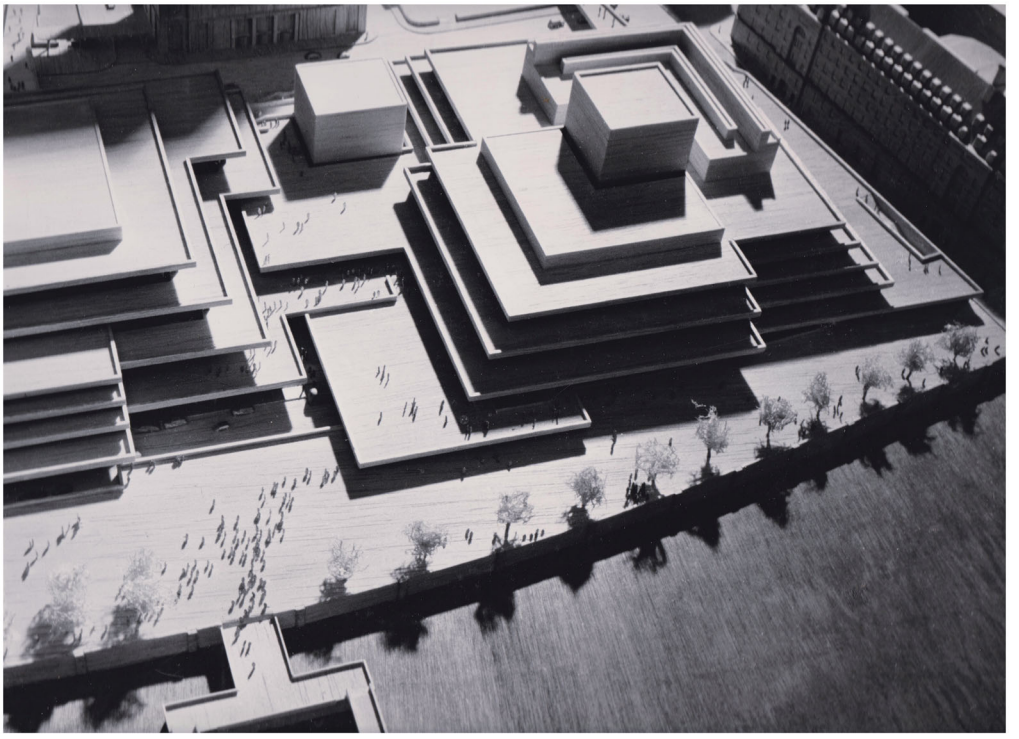

Figure 3. Model of Denys Lasdun's design for the National Theatre, made by Robert Kirkman, 1965. Source: Robert Kirkman.

engendered turned them into more ambiguous suggestions of what was to come; models becoming expressions of ideas, impressions rather than promises. With Kirkman's business remaining deliberately small, and Arup only providing models in-house, the opportunities presented by their more creative, less realistic approaches to modelmaking remained frustratingly out of reach for most architects throughout the 1970s. During the early 1980s, however, the make-up of the modelmaking profession underwent a significant change as newly-educated modelmakers trained in the "Arup School" of architectural modelmaking began to set up their own commercial modelshops; the balance of power within the entanglement shifting away from the developer and towards the influence of a new generation of modelmakers who brought stability to the architect's relationship with the professionally made model and resolved much of the tension that had been building over the past twenty years.

A Rebalancing of Power

During much of the twentieth century, the mutual dependencies within the entanglement of the model, the maker, the architect, and the developer had been dominated by a balance of power that emanated from the client; whether this favoured the architect or the developer. In many respects this was the cause of much of the tension that arose during the late 1960s and 1970s; the establishment of a relationship dynamic that placed the professional architectural modelmaker as the provider of a service that was

Figure 4. Model of Aldeburgh Concert Hall, made by the Arup Modelshop, 1966. Source: Roger Hillier.

viewed as occupying a secondary position within that entanglement. The architect's principal relationship was with the model, and until the late 1960s this proved to be especially productive. As the developer became an increasingly important client for architectural modelmakers, however, architects found their influence over professional modelmakers waning, and as their intentions for the model evolved, frustrations emerged as they realised that the model had become locked into its ongoing state of offering highly realistic impressions of happily animated future worlds that could never come to pass. Rallying at their loss of influence over the model, criticisms of professionally made architectural models by architects were met with puzzlement from modelmakers themselves,[38] and with the shift to developer-led commissions, few were motivated to address architects' changing demands. This stubbornness of the modelmaker in retrospect demonstrates a certain commercial short-sightedness. By the start of the 1980s, though, the two large modelmakers of the time, Thorp and Pipers, had an

almost total dominance of the market. Despite the attractiveness of the more abstract models produced by the Arup modelshop, architects had few alternative modelmakers to which they could turn.

The early 1980s saw a dramatic change to the balance of power as a result of a new generation of architectural modelmakers graduating from the modelmaking Higher National Diploma (HND) at the Medway College of Design in Rochester. Having been trained by Arup modelmaker George Rome Innes, these professional modelmakers began to offer a much broader palette of styles, embracing the creative potential of models to meet the conflicting demands of both the developer and the architect.[39] During Innes' tenure at Medway, the Arup School approach to architectural modelmaking became embedded into the curriculum, with modelmaking transitioning from a purely technical pursuit into a more creative process. Notable architectural modelmakers like Nick Grace, Tim Price, Robert Danton-Rees, and future head of modelmaking at Foster + Partners, Neil Vandersteen, all graduated from Medway during the early 1980s, their careers percolating the Arup approach throughout the industry.

Leading this expansion was Richard Armiger, who having graduated from Medway in 1978 spent time working at Arup before setting up the in-house modelshop for Hugh Casson, and then establishing his own company, Network Modelmakers, in 1982. While working for Arup, Armiger had observed a string of "young architects, all Knighted and Lords now,"[40] entering competitions where they had teamed up with Arup as the structural engineer. Those same architects constantly returned to the modelshop asking for models, but unless Arup was involved, they could not make them. As Armiger was a freelance modelmaker, business started being passed his way. Through these introductions, Armiger began to receive commissions from architects such as David Chipperfield, Nicholas Grimshaw, Jan Kaplicky, and Jeremy Dixon. Crucially, Armiger had noticed that due to their diverse range of architectural approaches, no single visual language would suit them all, and so Armiger created Network Modelmakers with the intention of replicating the Arup experience but for a variety of different architects, each with a unique style of models. The differing approaches required by Armiger's clients meant he was constantly adapting his own methods to suit their needs. Experimenting constantly, Armiger's models perfectly matched the desire for models that represented looser concepts and ideas rather than finished buildings. Although the Arup modelshop, and Innes through his teaching, had favoured timber over plastics, Innes' legacy in educating this new generation of modelmakers was in opening up the stylistic palette regardless of the material used, with the combination of precision and accuracy that plastics offered and the abstraction that the use of timber had enforced leading to far more creative models being produced (fig. 5).

The arrival of the Arup School architectural modelmakers such as Armiger coincided with a ferocious property boom in Britain as a result of the Big Bang financial deregulation—the total volume of office space in London alone doubled between 1985 and 1993[41]—creating an enormous demand for the services of both architects and architectural modelmakers. Government policy at the time was to encourage the use of architectural competitions, and throughout the 1980s, competitions became an increasingly important means for young architects to establish themselves. Crucially, the making of competition models required a great deal of collaboration between an architect

Figure 5. Model of Eva Jiricna's entry to the Venice Gateway Competition, made by Richard Armiger, 1991. Photography by Andrew Putler. Source: Andrew Putler.

and a modelmaker in order to interpret and communicate their vision. Designs for architectural competitions are largely conceptual, and so ill-defined at such an early stage that realistic models are rarely an option. The creative and abstract models produced by Armiger and other Medway graduates were ideally suited for this purpose, and a much more collaborative process began to emerge that started to repair the failures of trust that had characterised the previous decade. Photographers such as Andrew Putler began to specialise in photographing these more creative models for publicity and marketing; and the combination of Armiger's models and Putler's photography scored a number of journal and magazine covers.[42]

As the 1980s progressed, the profession of architectural modelmaking continued to expand, with new firms such as 3DD, Tetra Modelmakers, Unit 22, and Armiger's firm Network Modelmakers breaking the dominance of Thorp and Pipers and broadening the choice of models available to suit both the developer and the architect. Figures 6 and 7 illustrate the diversity of styles that were by then on offer, with two schools of thought comfortably co-existing within the profession; the traditional approach of producing marketing and sales models that drew from the long tradition of pushing the boundaries of technical precision and realism, and the Arup School that embraced a creative drive for experimentation and individuality. The consequences of such internal changes to the modelmaking profession served to rebalance the power dynamics within the entanglement towards the modelmaker, who gained much more influence in their relationships with the model and the architect. While a general dislike of realistic

Figure 6. Marketing model made by Pipers, circa 1990. Source: Pipers Modelmakers.

Figure 7. Model of Terry Farrell's design for The Peak, Hong Kong, made by 3DD, 1992. Source: 3DD Modelmakers.

marketing models persisted in the architectural profession, the tensions of the 1970s quickly fell away as the more creative models of the Arup School provided a vital opportunity to re-establish the architectural model at the centre of many architects' creative practices. The importance of architectural competitions, and the collaborative development of impressive commission-gaining models, helped to stabilise the relationships within the entanglement, and the mutual dependencies locking the model, the maker, the architect, and the developer together returned to a more positive footing.

Conclusion

Through the adoption of Ian Hodder's concept of entanglement, this article has explored the complex evolution of the entangled relationships between the architect, the architectural model, and the professional modelmaker from the late 1960s to the early 1990s, revealing the "special relationship of trust" between them that Porter and Neale described to be a much more nuanced existence; and one that is maintained due to mutual dependency rather than choice. The shifting power dynamics described herein demonstrate the messy realities of human-object interactions and illustrate how the disruptive tensions created by the gradual dominance of the developer in the production of architectural models served as a catalyst for dramatic changes in professional architectural modelmaking that ultimately stabilised this entanglement through the flow of influence towards the modelmaker. Recognising both agency and power as distributed effects emerging from the interaction of humans and objects, this paper has identified the professionally made architectural model as the locus of an intricate web of interconnected dependencies in which the model, the modelmaker, and the architect are entrapped.

The greater influence of the modelmaker that emerged during the 1980s ultimately allowed for a broadening of the model's visual styles that placated the need for both highly realistic models for developers, and more abstract models for architects. Today the professionally made architectural model in Britain continues to benefit from a more evenly distributed power balance. For the model to remain attendant to the diverging needs of its twin clients, this shift in power was a vital necessity, with the commercial and financial influence of the property developer massively outweighing the creative influence of the architect within the assemblage by the end of the 1970s. Unable to extract themselves from what had become a mutually-dependent relationship, architects became reliant on the modelmaker to adapt the model to meet the conflicting needs of the profession and the developer, and it was only through an involuntary relinquishment of power that the architect was able to gain the types of models that they required. Locked into an ever-increasing dependence upon one another, the shifting patterns of influence between the architect, the architectural model, and the professional modelmaker continue to define their entangled existence in the twenty-first century. This examination of the messiness of their enmeshment has revealed the complexities that exist within this specific instance of human-object interactions.

Notes on contributor

David Lund is a Senior Lecturer in Modelmaking at the School of Art, Design, and Architecture at the Arts University Bournemouth. A modelmaking historian, his research specialisms include the history of architectural modelmaking, the nature of models as epistemological tools, and the role of makers within human-object relationships. Co-author of *Zaha Hadid Architects: Evolution* (2018), and curator of the exhibition *Dazzle and The Art of Defence* (2019), he has recently completed his PhD dissertation, a historical study of the professionally made architectural model in Britain.

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Disclosure statement

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Notes

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2. Jack Davy and Charlotte Dixon, "What Makes a Miniature?" in *Worlds in Miniature: Contemplating Miniaturisation in Global Material Culture*, ed. Jack Davy and Charlotte Dixon (Walnut Creek, CA: Left Coast Press, 2016), 3.
3. Tom Porter and John Neale, *Architectural Supermodels* (London: Architectural Press, 2000), 74.
4. Michael Ostwald, *Architectural Models* (Berlin: DOM, 2008), 30.
5. Karen Moon, *Modelling Messages* (New York: Monacelli Press, 2005), 132.
6. Much of the existing literature, written from an architectural perspective, has understandably focused on the use of models in the design process. Mark Morris has noted how "architects tend not to consider models." Mark Morris, *Models: Architecture and the Miniature* (Chichester: Wiley-Academy, 2006), 6. Teresa Fankhanel's forthcoming publication examining the work of American modelmaker Theodore Conrad will help further address this.
7. Thomas Fisher, *Communicating Ideas Gracefully* (New York: Steelcase Partnership, 1990), 23.
8. Ian Hodder, *Entangled: An Archaeology of the Relationship between Humans and Things* (Chichester: John Wiley, 2012).
9. For further definitions of New Materialism, see Chris Fowler and Oliver Harris, "Enduring Relations: Exploring a Paradox of New Materialism," *Journal of Material Culture* 20, no. 2 (2015): 127–48; Bjornar Olsen, *In Defense of Things* (Lanham, MD: AltaMira Press, 2010), 16.

10. Penny Harvey and Hannah Knox, "Objects and Materials: An Introduction," in *Objects and Materials*, ed. Penny Harvey and Hannah Knox (London: Routledge, 2014), 8.
11. Christopher Watts, ed., *Relational Archaeologies: Humans, Animals, Things* (London: Routledge, 2013), 13.
12. Actor-network theory, developed by Bruno Latour, John Law, and John Hassard; and assemblage theory, devised by Gilles Deleuze and Felix Guattari, and notably developed by Manuel DeLanda, both independently express many of the same implications of adopting a relational ontology.
13. For more detailed discussions of the nature of distributed agency, see John Law and John Hassard, *Actor Network Theory and After* (Oxford: Blackwell, 1999); Bruno Latour, *Reassembling the Social* (Oxford: Oxford University Press, 2007).
14. Olsen, *In Defense of Things*, 16.
15. Kjetil Fallan, "Architecture in Action: Travelling with Actor Network Theory in the Land of Architectural Research," *Architectural Theory Review* 13, no. 1 (2008): 184–200.
16. Albena Yaneva, *The Making of a Building: A Pragmatist Approach to Architecture* (Bern: Peter Lang, 2009); Douglas Mitcham, "Exmoor's Minilithic Enigma," in *Worlds in Miniature*, ed. Davy and Dixon, 18–38; Jane Insley, "Institutionalised Invisibility: Histories of Models and their Makers" (PhD diss., University College London, 2019). The author's own PhD thesis also draws from the use of Assemblage Theory in studying the development of the professionally made architectural model in Britain.
17. Hodder, *Entangled*, 9–12.
18. V-Section at RAF Medmenham was the secret base for over 150 modelmakers trained to produce highly detailed planning models during the Second World War, many of whom applied their skills to commercial modelmaking work during the 1950s.
19. Of the 22,000 registered architects in Britain in 1960, fewer than 5,000 were working in private practice. Oliver Marriott, *The Property Boom* (London: Abingdon, 1989), 27.
20. Marriott, *The Property Boom*, 1.
21. Peter Hall, *Cities of Tomorrow* (Oxford: Blackwell, 2002), 76.
22. John Chisholm, "Rehearsal for Reality," *The Architect and Building News*, February 27, 1969, 21–27.
23. See similar comments in Abercrombie, "Creative Playthings," *Horizon*, July 1978; Romaldo Giurgola, "Modelling," in *Great Models*, ed. Suzanne Buttolph (Raleigh: North Carolina State University Press, 1978), 67–68; Graham Hartman, "Some Observations on the Influences of Architectural Models," in *Great Models*, ed. Buttolph, 31–33.
24. Christophe van Gerrewey, "What are Rocks to Men and Mountains? The Architectural Models of OMA/Rem Koolhaas," in "Models: The Idea, The Representation, and Theory," ed. Bas Princen and Krijn de Koning, *Oase* 84 (2011): 31–36.
25. Moon, *Modelling Messages*, 132.
26. Alastair Goobey, *Bricks and Mortals* (London: Century Business, 1992), 29; Graham Stewart, *Bang! A History of Britain in the 1980s* (London: Atlantic, 2013), 264.
27. Alan Powers, *Britain* (London: Reaktion, 2007), 197.
28. Nigel Coates interviewed by Maria Nielson, in Maria Nielson, "Form Follows Culture: Architectural Models in London 1970–1979" (MA diss., Royal College of Art, 2013), 58.
29. Kenneth Frampton and Silvia Kolbowski, eds., *Idea as Model* (New York: Rizzoli, 1981).
30. Peter Eisenmann, "Preface," in *Idea as Model*, ed. Frampton and Kolbowski, 3.
31. Michael Graves, "Thought Models," in *Great Models*, ed. Buttolph, 43.
32. Moon, *Modelling Messages*, 131.
33. Piers Gough, "Model Makers," *Architects Journal* 177 (April 27, 1983), 30.
34. Janet Abrams, "Models of their Kind," *Independent*, August 26, 1988, 18.
35. Robert Kirkman, pers. corr. with the author, April 29, 2019.
36. David Armstrong, interview by Louise Brady, September 23, 1999, audio recording, Ove Arup Interviews, C765/19/01-04, British Library, London.
37. Richard Armiger, pers. corr. with the author, October 12, 2018.

38. J.K. Adams wrote a suitably bemused response to the journal the following month: "Letter to the Editor," *Architect and Building News*, March 27, 1969, 41. Arup Modelmaker George Rome Innes also recalled a similar sentiment in an interview with the author in 2019.
39. George Rome Innes, pers. corr. with the author, April 18, 2019.
40. Armiger, pers. corr., 2018.
41. Powers, *Britain*, 223.
42. Andrew Putler, pers. corr. with the author, June 7, 2019. Davide Deriu has explored an earlier conjunction of models and photography during the 1930s in "The Architectural Model in the Age of its Mechanical Reproducibility," in *Proceedings of the Second International Conference of the European Architectural History Network*, ed. Hilde Heynen and Janina Gosseye (Brussels: EAHN, 2012), 166–70.