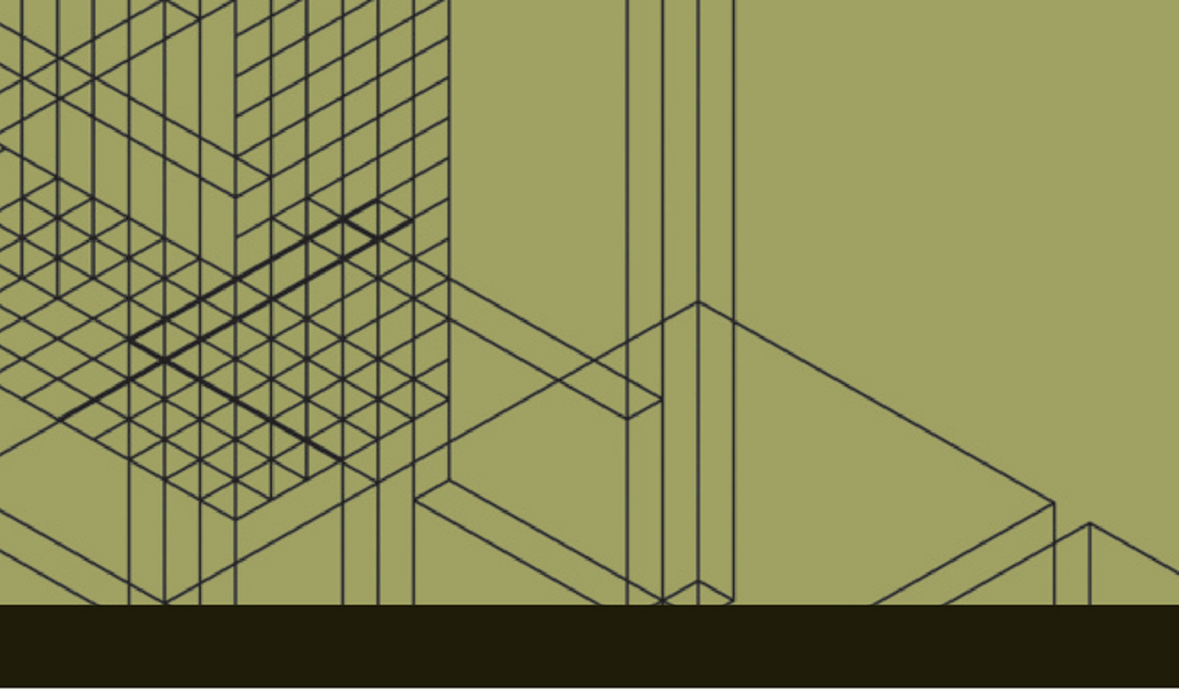
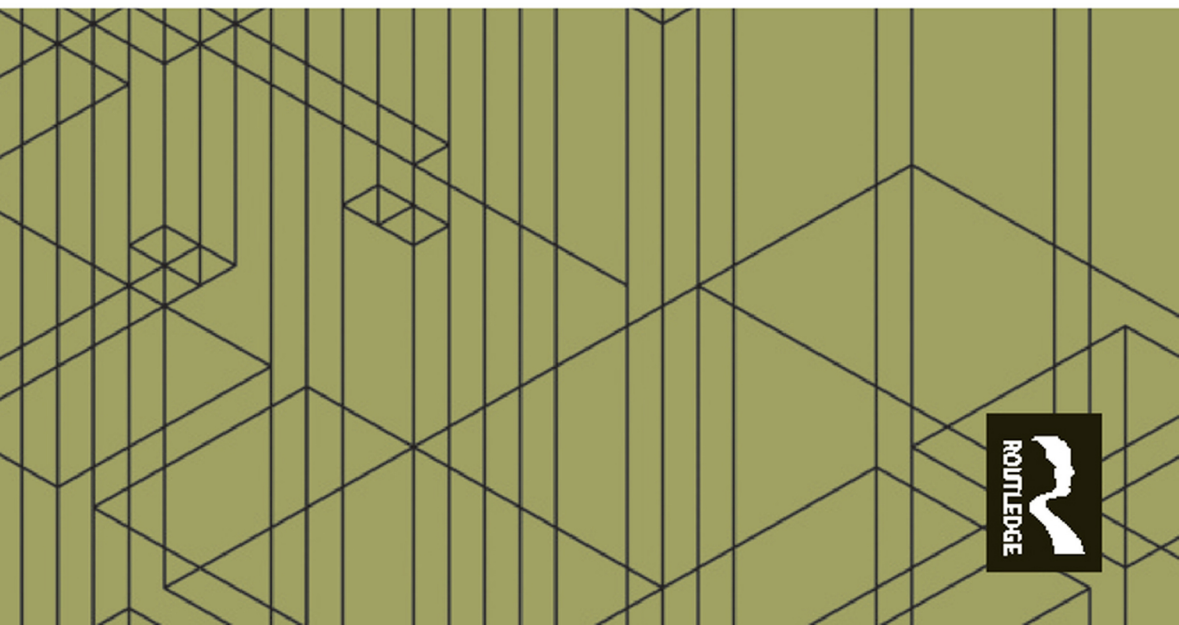


DRAWING PARALLELS

KNOWLEDGE PRODUCTION IN AXONOMETRIC, ISOMETRIC AND OBLIQUE DRAWINGS

Ray Lucas



Drawing Parallels

Drawing Parallels expands your understanding of the working process of architects by looking at their work from an alternative perspective. The book focuses on parallel projections such as axonometric, isometric, and oblique drawings. Ray Lucas argues that by retracing the marks made by architects, we can begin to engage more directly with their practice as it is by redrawing the work that hidden aspects are revealed. The practice of drawing offers significantly different insights, not easily accessible through discourse analysis, critical theory, or observation.

Using James Stirling, JJP Oud, Peter Eisenman, John Hejduk, and Cedric Price as case studies, Lucas highlights each architect's creative practices which he analyses with reference to Bergson's concepts of temporality and creativity, discussing the manner in which creative problems are explored and solved. The book also draws on a range of anthropological ideas including skilled practice and enchantment in order to explore why axonometric drawings are important to architecture and questions the degree to which the drawing convention influences the forms produced by architects.

With 60 black-and-white images to illustrate design development, this book would be an essential read for academics and students of architecture with a particular interest in further understanding the inner workings of the architectural creative process.

Ray Lucas is senior lecturer in architecture at the University of Manchester, where he served as head of department from 2014 to 2018.

Lucas has a PhD in social anthropology from the University of Aberdeen on *A Theory of Notation as a Thinking Tool*. From 2014 to 2018, Lucas was an associate researcher and external advisor for the ERC Advanced Grant Knowing From the Inside which worked among the disciplines of anthropology, fine art, design, architecture, and others in order to interrogate how we know our world.

Lucas is author of *Research Methods for Architecture* (Laurence King, 2016), *Anthropology for Architects: Social Relations and the Built Environment* (Bloomsbury 2019), and is coeditor of *Architecture, Festival and the City* (Routledge 2018). Lucas's current research includes 'graphic anthropologies' of marketplaces in South Korea and urban festivals in Japan, as well as an interest in sensory design, film and architecture, anthropology and geometry, and further research into drawing.

Drawing Parallels

Knowledge Production in Axonometric, Isometric and Oblique Drawings

Ray Lucas

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Informal discussions with colleagues have also informed my thinking on the topics presented here, perhaps in a way that those responsible are unaware of. Particular thanks must go to Liz Hallam, who has always been encouraging of my work and provided invaluable advice on publishing. In this, the patience of my editor, Aoife McGrath, at Routledge has been greatly appreciated, and I would also like to thank Val Rose who originally commissioned this book at Ashgate.

Chapter 8 is an expanded reworking of material presented originally as: Lucas, R. 2017. "Why a Drawing Is Not an Image (and Why That Might Not Be a Problem)" in Hodson, E. (Ed.), *Imaginations Interiors Surfaces*. Aberdeen: Knowing from the Inside. This book also contains material from a paper presented at the Royal Anthropological Institute conference in June 2018: "Why All Drawings Are Failures," *RAI 2018: Art, Materiality & Representation*, panel *Notions of Failure in Art and Anthropology* convened by Alana Jelenick and with Jen Clarke as discussant.

Chapter 9 is a reworking of material from my PhD thesis presented originally as: Lucas, R. 2006. "Bergson, Duration and Drawing" in *Towards a Theory of Notation as a Thinking Tool*. Aberdeen: University of Aberdeen, pp. 150–186.

I continue to be in debt to my parents, Sandra and Andrew Lucas, whose unwavering support of my early research career is in evidence in the pages of this book, with my growing fascination with axonometric drawing beginning early in my academic life at the University of Strathclyde, further articulated once I began my PhD thesis, which forms an early version of some of the arguments presented here. Thanks are also due to my informal coauthors Omar and Odessa (two rather large Maine Coon kittens) have provided company and distraction in equal measure whilst writing the draft chapters.

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1 Introduction: Parallel projection, mimesis, and intersections

1.1 Parallel projection: a history of the form and a taxonomy of types

This book is the result of research into how we might understand inscriptive practices such as drawing as a form of knowledge production forming an alternative to the written text. This alternative status is understood to have two key facets: firstly, that drawing, diagramming, and notation are equivalent to extended discourse in writing; and secondly that they offer significantly different insights, not easily accessible through textual models of discourse analysis, critical theory, or observation. It is important to my broader project to position this study within the catch-all term of *inscriptive practice* to group forms of graphic representation together while maintaining the separate identities of practices such as sketching, notation, diagramming and draughting.

This idea has been under development for some time, grounded in my PhD research which established a theory of notation as a thinking tool, responding to the anthropologist Tim Ingold's discussion of knowledge production as a practiced activity, and the necessity to understand the processes of creativity rather than addressing only the end result or artefact. This broad turn towards practice can be seen in a wide range of disciplines, with an interest in the making of things, the nature of the

creative impulse, and the social conditions under which these activities are undertaken. As such, this book intends to be an account of some of the possibilities available to a draughtsperson making drawings in one of the conventions of parallel projection.

To this end, I have investigated inscriptive practices with reference to the conflation of creativity and temporality in the work of Henri Bergson. Bergson, and later Gilles Deleuze both characterise creative practices in terms of the quality of their temporality—the manner in which problems are explored and solved. Simply stated, the conventional understanding wrought through architectural histories and theories only gives a part of the story. By retracing the marks made by five selected architects, we can begin to engage more directly with their practice. Understanding the drawings as scores to be reenacted is one way of describing this process: It is only by performing the drawing that aspects of it are revealed. This recalls aspects of Nelson Goodman's thesis in *Languages of Art* (1976), where the discussion of inscriptive practices is afforded by comparison: a sketch can be described when contrasted with a notation, for example. In Goodman's language, the process engaged with here transforms the autographic mark of Hejduk's drawings to the allographic drawing—as a script which produces meaning through practice.

This book emerged from a research project, *An Anthropology of/with Architectural Drawings,* the aim being to understand the ways in which drawing practices inform their home disciplines. In this case, the focus is architecture and the use of parallel projection. By positioning the study as anthropological, certain forms of argumentation are opened, focusing on the nature of the creative practice as a fundamental human activity and exploring the relationship between creativity and practice. This relies upon my reading of each drawing, shown through copying and description, the intention is to show each drawing as a part of a larger social system of communication through common conventions. Over a short period, I redrew works held by the Drawing Collection at the Canadian Centre for Architecture, focusing on the axonometric as an under-theorised form of representation which lies between orthographic and perspective drawing conventions. The redrawing project was conducted in graphite on two A4 skechbooks with dot-grid paper. A variety of pragmatic concerns emerged, and the categorisation of different parallel projections became important:

Axonometric (planometric) refers to those drawings where the horizontal plane is true: none of the angles are distorted on this plane, but often rotated as this shows wall details most clearly. This rotation is often wilfully rejected, however, to enhance the geometry of occlusion (figure 1.1). The vertical plane is projected upward, so that walls are distorted and skewed, the angle between uprights and ground plane most deformed.

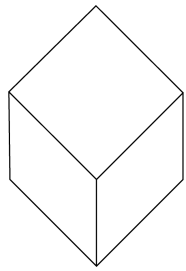

Figure 1.1 Example of a cube drawn in axonometric projection.

Isometric is a rather different procedure to axonometric, despite looking similar (figure 1.2). The horizontal plane is distorted, opening the elevations out. Right angles on an isometric drawing are drawn at 120° rather than 90°. Variations on this include trimetric, where the angles differ between north and south faces of a cube and the east and west faces. Another variation is dimetric, which is similar to isometric, but with different angles of distortion. These are used to prevent elements from overlapping.

Oblique drawings are somewhat rarer, and come in a variety of forms (figure 1.3). Variations are called *cabinet projection* or *cavalier projection*, where the distances of the deformed plane can vary. One plane is true, parallel to the picture plane. This might be an elevation of a plan, but the projection of the opposite plane is heavily skewed, often by 45° to the vertical and horizontal.

Worm's eye (reverse angle) drawings demonstrate a certain virtuosity in drawing, and are used to describe volumes and ceiling details (figure 1.4). Most often used with axonometric projection, these drawings are difficult to read as well as to draw, but give a great deal of information missing from other projections.

In the most practical, straightforward language, I examined the archival drawings and sketchbooks closely, and produced my own sketched versions of these, producing 100 pages of drawing in total. By re-enacting, each quality of the original works is revealed to hold significance. The projections, angles, relationships, and line quality are all shown to convey meaning and content. These might look in places to be hesitant or even unfinished works, but they contain great complexity and sophistication of

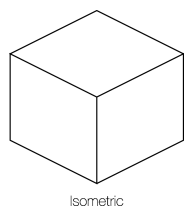

Figure 1.2 Example of a cube drawn in isometric projection.

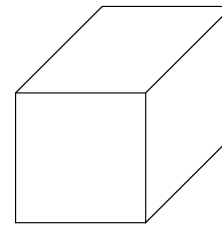

Figure 1.3 Example of a cube drawn in oblique projection.

thought. This is despite the apparent childlike quality of some of the lines in late Hejduk, the International Style line erasing the labour of Oud's hand, the sparse economy of Price's representation, or the showy complications of Eisenman and Stirling.

1.2 Some history of parallel projection

This book does not present a comprehensive history of parallel projection but is instead an investigation into some of the potential of these conventions by discussing some of the ways in which it was used by a selection of 20th-century architects. It is important to trace some of the history of the drawing convention and its use within architecture. This will, however, be limited in scope and bears the marks of some of the difficulties in pinning down a precise period when parallel projection is 'invented'.

There remain some issues with nomenclature, as Booker notes in his 1963 work *A History of Engineering Drawing*[1]. Here, we see discussions continuing until the mid-20th century over the use of *axonometric* or *planometric* drawings, the invention of new terms such as *axometric*, and the desire for one term to cover a range of projections including isometric, dimetric, and trimetric (1963:207).

As a genre of engineering drawing, it is clear that parallel projection solves certain problems of representation. Parallel projection shows a three-dimensional image whilst being measurable, making it an easier working drawing than a perspective, for example. Parallel projections in an oblique convention are used in the West from the Middle Ages in both

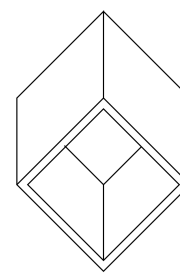

Figure 1.4 Example of a cube drawn in reverse-angle axonometric.

mathematical treatises and military engineering[2] (Lefevre, 2004:184), coming to particular prominence in the 16th century when it was eventually supplanted by perspective. Some variations of parallel projection have been used historically without a stable convention, not being codified until textbook writers in the 19th century turned their attention to making the rules explicit (Booker, 1963:211). Of these, Gaspard Monge's *Descriptive Geometry* of 1798[3] is often seen as a source for contemporary drawing practices, particularly as it had such wide circulation through relatively swift translation into other European languages. The development of these ideas after Monge's introduction to England is discussed by Lawrence[4] where the further development of isometric drawings by William Farish (1820) and Peter Nicholson's *Parallel Oblique System* (1822).

By far the most comprehensive account of the history of parallel projection is Massimo Scolari's *Oblique Drawing*[5]. According to Scolari, there is evidence in the West of parallel projection as far back as the fourth century BCE, and it has a more consistent history of use throughout China and Japan than the alternating use in Europe where it falls into and out of fashion several times. When describing the need for axonometric and parallel projection, the aim of practicality is reinforced by Scolari:

> Bartolomeo Romano described a spherical perspective in which the 'measured parts shall give the right distances, which the oval form would not do because of the foreshortening its parts produce.' Goivan Battista Belici (Belluzi), who was firmly convinced that 'the soldier must also be a theoretician,' used parallel representation because 'we need to see the thing whole, distinct, clear; one can find the truth precisely with compasses.' He favoured axonometry over perspective. Because in war 'one single view does not serve, since the whole has to be shown.' (2012:9)

Further exploration of the nomenclature of parallel projection is explored by Hilary Bryon[6] who differentiates between oblique and axonometric forms of parallel projection in terms of the *projectors* (2008:337). In perspective, the projectors converge at a vanishing point, distinct from parallel projection where they never meet. Oblique, as one would expect, uses projectors which are oblique to the plane of projection, where axonometric projectors are perpendicular to it.

A similar picture is given by mathematician Vlasta Moravcova[7], noting the predecessors of Monge's work in producing rules for parallel projection. One of the most important is the painter, Albrecht Dürer whose treatise of 1525 still contains some errors (Moravcova puts these down to Dürer's expectation of how certain forms such as ellipses ought to look), corrected by Monge's more accurate, later work. Cavalier projection emerges as a dominant form for military purposes between 1500 and 1600, also described as *transoblique perspective*[8] and grounded firmly in the solution of pragmatic

problems of representation. Alonso-Rodríguez and Calvo-López (2014:565) note that Le Corbusier and other early modernists were strongly influenced by Choisy's use of parallel projection[9] and setting the ground for the architectural drawings discussed here.

1.3 Copying, mimesis, and innovation

Recent work in fine art and anthropology has rehabilitated the idea of copying the work of acknowledged masters both as a way of learning about that work and about the act of drawing itself. There is a long tradition in architecture of drawing from buildings as a way of understanding them more closely. This moves beyond the production of sketched perspectives and towards redrawn plans, and other projections in order to analyse a work. This is proposed by writers such as Simon Unwin[10] who also maintains that you can know a building better by examining the drawings than by visiting it. Whilst I do not hold to this provocative view, his method of understanding architecture through drawing respects the means of the discipline and produces deep knowledge of precedent consistent with the practice of design.

Many similarities can be found in Sudnow's account of learning not only to play piano but learning to improvise jazz piano as a member of a band[11]. His work is written in the mode of an anthropologist in the field, but complicated by the deep implication and close participation in the work under examination. This discussion of practice from within is increasingly common in anthropology, where the conventional idea of discussing 'creativity' as a topic is inextricable from the practices themselves. Somehow such discussions have been one of the last bastions of scientific notions of maintaining distance in anthropology as opposed to the more direct engagement of participant observation and beyond into autoethnography and reflexivity.

The discussion of art and creative practices has, problematically, been restricted to the outcomes and product of creative practices: the art-object (such that categories of art are even valid in all cases). Influential works such as Gell's *Art and Agency* have compounded this with discussions of the social pressures which build up to the production of a work, but never the making itself.

Notable works on the anthropology of creative practices have of course moved significantly away from this position, including Küchler's *Malanggan*[12] which discusses the cycle of making as something entirely separate from the consumption of funerary sculptures by Western connoisseurs and collectors. Küchler's account of how motifs find their way from everyday life into decorative sculpture speaks to the acts of translation undertaken in creative practices.

More pertinent still are two writers who examine the act of copying within this context. The first of these is Fuyubi Nakamura, who writes on contemporary Japanese calligraphy practices[13] (2007). This paper

challenges the foundation of art and creative practice by the nebulous criterion of originality. The aura, so challenged in the aesthetic theory of Adorno and appreciated by Benjamin, appears to be alive and well in discussions of art, particularly from outside the actual practice of art. Nakamura instead locates art and creativity in skilled practice. This again recalls the notions of autographic and allographic works noted by Goodman, further challenging the notion that these are fixed states. Perhaps such states are rather more fluid and contingent than might at first appear.

The presence of the model in Japanese calligraphy is well established, but this is different from absolute copying. In a manner akin to the pianist approaching a score, the calligrapher, through practice and training, becomes more and more competent to the point of virtuosity with regard to the originating model: surpassing it whilst still referring to it. Western art history is similarly littered with referential works. The ruptures of modernism still cast back to their predecessors, Picasso working with compositions and themes from Manet's *Lunch on the Grass* as well as a number of others.

Nakamura problematises the idea of the copy, preferring to talk about reproduction with reference to Benjamin's essay on *The Work of Art in the Age of Its Mechanical Reproduction*[14]. In the reproductive practice, Nakamura contends, the aim is to understand more than what is on the paper:

KEIRIN: First stage, focusing on the mechanics of brush technique.
IRIN: Second stage, interpreting the spirit and intention of the work.
HAIRIN: Third stage, reproduction from memory without looking at the model.

adapted from Nakamura (2007:82)

Some forms of inscriptive practice have more in common with musical performance, where the trace is the result of a set of gestures. Ingold (2007:72–75) contends that in many cases, the trace can be regarded as incidental, and that the trace is what is important. This idea is explored in depth in other projects, notably *Gestural Artefacts* (see Lucas 2009).

The second key writer on copying is the painter and researcher Patricia Cain[15]. Cain discusses the idea of reenacting a drawing in her experiential account of copying a drawing, *Glass*, by Richard Talbot (2010:134–143, 155–247). The account is told through text, journals, and stages of the drawing, a precise and complex pencil drawing comprised of elliptical planes cut through a bulb-shaped object in perspectival projection. Cain, after making an initial copy, in the *Keirin* stage, then moves towards what Nakamura identifies as *Irin,* where a series of further diagrams are produced to interrogate the intent and decision-making process behind Talbot's originating work. Finally, the *hairin* stage is also engaged with, where Cain produces a series of large scale drawings which interpret the engagement with Talbot's drawing, but by allowing a conversation to emerge with her own practice.