

Diagrams as instruments for conceiving and negotiating space and cities

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Contents

Foreword.....	3
Introduction.....	4
Grounding in Research: Practice, Theory, and Fieldwork	
Media and Audiences	
Definitions .	
Thematic association cutting across trajectories of research	
1. Corporeality	
2. Science versus Language	
3. Instrument and Mirror	
4. Diagrams as Abstract Machines	
Projects and Publications	15
A. Situate and Relate	15
'Diagram Utopias: Rota and Network as Instrument and Mirror of Utopia and Agronica' [2013]	
'London Underground Diagram, UK (Harry Beck, 1931)' [2014]	
'Proximity: The Unfolding of a Koolhaasian Hypothesis in Book Space and Architectural Space' [2015]	
'Book-Worlds and Ordering Systems as Sites of Invention' [2017]	
B. Compose and Choreograph.....	18
'Intensive: Extensive' [2008]	
'Diagram Ecologies - Diagrams as Science and Game Board' [2012]	
'Evaluator, Choreographer, Ideologue, Catalyst - The Disparate Reception Histories of Alexander Klein's Graphical Method' [2017]	
'Poché. The Innominate Evolution of a Koolhaasian Technique' [2015]	

C.	Embody and Translate	21
	Library Building for the University of Magdeburg [1998-2003]	
	'Thinking between Diagram and Image: The Ergonomics of Abstraction and Imitation' [2011]	
	'Upside down or sideways up - Corporeality, Architecture and Urbanism in Translations between Ground and Image Plane' [2014]	
D.	Urbanism and Irregular Urbanism	24
	<i>Dynamische Instrumente für die Peripherie: Schlieren / ZH</i> [2004]	
	<i>Mapping Jabal Al Natheef</i> [2014]	
	'Social Fabric and Spatial Permutation – Ban Krua, Bangkok' [2014]	
	'Maps as Abstraction and Imaginative Space - Representing Informal Urbanism' [2014]	
	'Urban villages and informal settlements as protagonists of urban futures' [2016]	
	Research Impact	29
	Summary and Outlook	30
	References	31
	Portfolio	35
	A. Situate and Relate	38
	B. Compose and Choreograph	86
	C. Embody and Translate	170
	D. Urbanism and Irregular Urbanism	224

Foreword

This narrative is retrospective and reflective as well as projective. The thesis of a PhD by publication does not inherently align with a principal proposition. The building, books, chapters and articles collected in this PhD have been shaped by interaction with varied professional, academic and cultural environments and milieus. Professional contexts that have triggered research questions and enriched research methodologies range from architectural practice to scholarly research and collaborative field research undertaken internationally; cultural milieus include Germany, Switzerland, the UK, and, recently, countries of the Global South. The work was not produced with a singular destination in sight; rather, it proceeds along a set of distinct, but interdependent vectors, through changes in direction, displaced vantage points, and transposition between corporeal, architectural and urban scales.

This narrative juxtaposes, confronts and discusses the work collected in the portfolio, but does not seek to unify through imposing a singular thesis. The portfolio comprises of a building project, introductory essays to three edited books, three book chapters and nine journal articles, designed and built, written and published over a period of eighteen years from 1998 to 2016. The narrative reconstructs successive questions about diagrams that led to the building project, books, and articles, and the contexts which prompted the questions and frame the work. Rather than aligned to a linear narration, the work is presented along four parallel but interrelated paths of enquiry (Sections A, B, C, D) in which one output led to another, sometimes directly, at other times over detours and longer intervals. The work is introduced through four themes that cut across those paths.

While framing and consolidating a retrospective view, the narrative of this PhD also exposes previously unrecognized resonances. New meaning arises from juxtaposition, grouping, contextualising and ordering of outputs and trajectories. In this sense, the retrospective view becomes prospective and projective.

Introduction

Grounding in Research: Practice, Theory, and Fieldwork

The earliest work included in this portfolio, the library building for the University of Magdeburg (1998-2003),¹ was conceived in architectural practice. In fact, the library design process and proposal draw on my diploma thesis proposal for a cultural forum at the Alter Markt in Potsdam (1993).² I had worked with a series of 'diagrammatic models' made by laminating layers of different materials to form a continuous plane that then could be folded to enclose space and define spatial sequences. Material properties invited specific operations, material resistance discouraged or prohibited others; thus the models acted as diagrammatic editors of ideas. I developed the proposal in dialogue with diagrammatic models. (The term 'diagrammatic model' is used to describe a model that interacts with a series of design operations, and acts as explanation of the design process.) Unlike my diploma thesis, the project for the University Library Magdeburg was obliged to integrate a multiplicity of economic, structural, programmatic and environmental aspects in order to be built. Thus, a series of diagrammatic models acted in dialogue not only with the architects, but also supported—and sometimes initiated—conversations and negotiations with structural, environmental, and services engineers, as well as users and specific groups, such as disabled users. The design processes of both projects were underpinned by an understanding of diagrams and their functions as instruments of design, invention and speculation, of iterative explanation and negotiation.

Over the eighteen years in which the research on diagrams in this portfolio was produced, my vantage point has shifted from architectural and urban design practice to scholarly and field research. The subjects of my research have expanded to include utopian thought,³ the structure of books,⁴ understanding of space and cities,⁵ as well as irregular urbanisation. Along with this shift, my interest in diagrams as instruments of design and negotiation has widened to encompass the reading of diagrams as mirrors of thought.⁶ This amplification stems from theoretical enquiry into the relationships between diagrams and utopian thought;⁷ subsequently it informed another enquiry, conducted through field research, on the relationship of drawings and diagrams to irregular settlements produced through self-construction, with minimal or no recourse to drawn diagrams and instead informed by continuous feedback from the acts of construction and inhabitation.

My research has developed within three distinct domains and professional frameworks: First, architectural and urban design practice, in which research formed an integral part of design processes that predominantly were initiated by competition briefs. Second, scholarly research into architectural and urban theory, self-initiated; outcomes are disseminated predominantly through refereed journal articles. Third, field research on irregular urbanisation, carried out through field research collaborations with international academics, community organisations, and with communities inhabiting irregular settlements. Outcomes from the last domain are grouped in section D (Urbanism and Irregular Urbanism) of the portfolio. However, outcomes from architectural practice and from desk research are not assigned to separate sections. The built project raised research questions; epistemologically it initiated a path of enquiry pursued over a series of essays that are collected in section C (Embody and Translate). Across practice and theory, breaks and ruptures over time, contrasting methodologies and cultural contexts, the research carried out within these three domains is linked in a variety of ways. The linkages might be compared to a system of communicating vessels, in which ideas explored in one project initiate or impact upon another project, and newly emergent ideas re-contextualise previous outcomes and reformulate previous questions.

The chronological shift from practice to theory and to field research does not play out over a series of discrete intervals; rather, research interests and projects in one domain have roots that grow from another domain. A case in point is the project for Anting New Town (not included in portfolio), which I was project leader for at Auer & Weber & Architekten, and which introduced me to a particular mode of rapid urbanisation that provoked interest in alternative scenarios of urbanisation and city-making. Similarly, my interest in diagrams as instruments of architectural practice already implied a complementary interest in diagrams as mirrors of thought, pursued independently by individuals or collectively through negotiated design processes.

Media and Audiences

The transition from architectural and building design practice to text and drawing based academic research practices engendered a parallel shift in audiences and participants from visitors and users of buildings to readers of texts and viewers of images.

The project for the University Library Magdeburg (1998-2003) is founded on an operational, kinetic diagram that generated the geometry and spatial character of the building, and served as an instrument of explanation and negotiation during the processes of design and realisation. Sited in urban space, the built project is experienced in place by users and visitors. From the streets and square as well as from the interior atrium the generative diagram can be read visually by tracing the edge of the continuous plane as it folds to form floors and walls. Mediated through the spaces that it served to create, the diagram remains intelligible. Such specific relationships between diagram and project, visual and corporeal perception, and intellectual reception differ from the factors at play in dissemination of ideas through printed publication.

Along with this shift in dissemination and reception contexts, my perspective and operational position relocated from an architectural practice of continual oscillation between making, testing, using diagrams and evaluating the outcomes of such experimental and experiential play, to a research practice operating within the frameworks of academia. From my current position I engage with two distinct scenarios of academic research and corresponding methodologies. Alongside scholarly research into the 20th century history and theory of diagrams (articles and books in section A to C of this thesis) I pursue field research on irregular urbanisation, in collaboration with international academic and community partners (section D).

The relocation of my vantage point and operational context has prompted an altered set of relationships between diagrams, my work, audiences and participants. Whereas built projects stimulated discussion in public contexts as well as professional fora, the journal articles on historical and theoretical subjects address academic audiences; as refereed essays, they adhere to academic frameworks and conventions. The articles and reports on field research into irregular urbanisation too appeared in academic journals, but bilingual publications were sought out, in order to involve specialists beyond the English speaking world. Research reports, formatted as visually-led booklets, were returned to the communities inhabiting irregular settlements who collaborated with the research.

Definitions

The title of the thesis, *Diagrams as instruments for conceiving and negotiating space and cities*, describes an enduring interest that links my practices of design, research and field

research. It contextualises my work within a long historical chronology of practices that engage diagrams and intersect with an array of disciplines, conventions and cultures. The historical scope, disciplinary reach and open-endedness of diagrammatic practices preclude any singular and finite definition. Rather, the narrative of this thesis proceeds by retracing a series of trajectories of investigation that mark out lines and cut pathways, establishing multifocal perspectives on my work within a larger field, seeking to identify thematic associations and understand relationships. As a consequence, the portfolio and the narrative are obliged to draw on several, at times competing, definitions of what a diagram is.

A diagram is commonly defined as “as ‘a sketch, outline, or plan demonstrating the form or workings of something,’”⁸ or, more generally, as a “graphic design that explains rather than represents.”⁹ Besides their functions, diagrams might also be defined through the process in which they are made: the Greek root of the term, *diagramma* or “that which is marked out by lines,” resonates with notions of drawing, trace, and map. I use these definitions to set up points of departure, in order to explore how diagrams have and might be made and used, and how specific understandings and practices might consolidate, augment or reformulate broader definitions. “Marking out by lines” suggests that diagrams can be understood as traces of corporeal movement, of explanatory gestures, or as choreographic notation of anticipated movement. The terms *notation*, *trace*, *gesture* and *choreography* derive from specific historical and disciplinary practices. As visual tools for generating, conceptualising, explaining, instructing and recording, these terms and practices intersect with diagrams. I am interested in specific areas of overlay.

The essays ‘Thinking between Diagram and Image: The Ergonomics of Abstraction and Imitation’ and ‘Upside down or sideways up - Corporeality, Architecture and Urbanism in Translations between Ground and Image Plane’ incorporate such discipline-specific practices in their definition of diagrams, but consider diagrams to be marks on two-dimensional surfaces that are perceived visually. Other projects and essays explore alternative definitions and perspectives. The project for the University Library Magdeburg understands diagrams as haptic and kinetic instruments, whereas the essay ‘London Underground Diagram’ examines the notion of diagrams as transparent frames, which is implied by the Greek root of the first syllable, *dia*, meaning “through, across.”

Thematic association cutting across trajectories of research

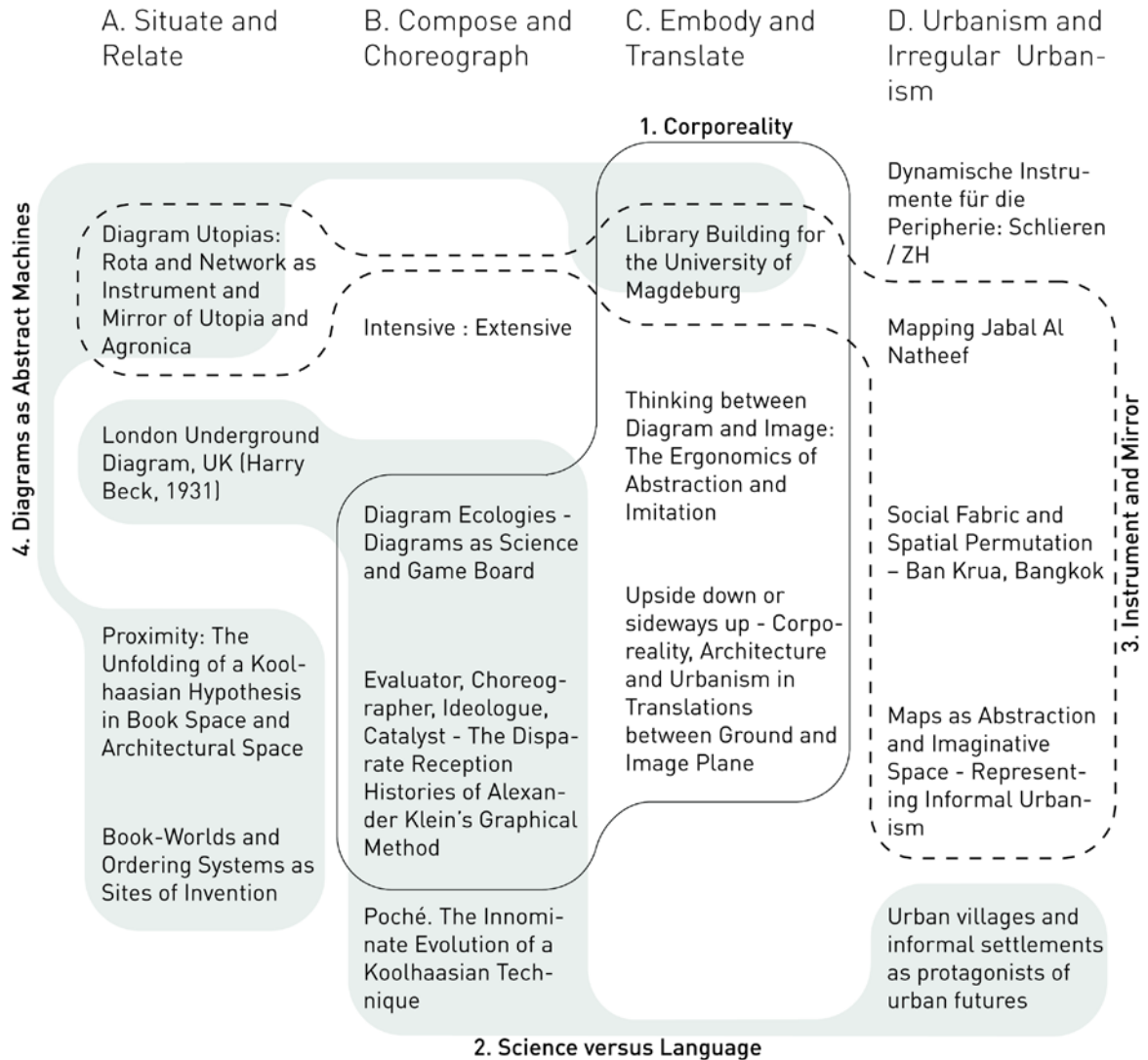


Figure 1. Diagram mapping cross-cutting thematic association onto trajectories of research

1. Corporeality

According to Charles Sanders Peirce “a diagram is a kind of icon particularly useful, because it suppresses a quantity of details, and so allows the mind more easily to think of the important features;”¹⁰ further, “all necessary reasoning without exception is diagrammatic.”¹¹ Most commonly, diagrams are thought of as visual representations. Visual manifestation and cognition associate diagrams with the eye and mind, but not inevitably with the human body in the entirety of its senses and feelings. A pivotal moment in my study of diagrams arose from presenting the diagrammatic model of the *University Library Magdeburg* to the representative of an association representing disabled library users; the

person was blind. The diagrammatic model had been fabricated by folding a long strip of card multiple times, changing direction; this physical model was the primary tool enabling me to conceive, represent and communicate the design proposal. From the central atrium of the realised building, visitors can situate and orient themselves in the continuous space of the library by tracing the edge of the folded band and locate a thematic area before choosing a stairway that will lead them to this destination. Prior to construction of the building, some participants in the planning process found it difficult to envision the building from the floor plans, because they were accustomed to buildings being composed of a stack of discrete floor plates rather than formed by a single, continuous band. The blind person, however, through touching and handling the model, understood the geometry of the building with ease and was able to naturally relate spaces to each other due to his proficiency in comprehending spatial information through non-visual, haptic means of cognition.

This experience triggered my interest in diagrammatic practices that engage the human body and its varied capacities for sentient cognition in their entirety. Gestures that accompany verbal reasoning, retrace and re-enact processes in space, or otherwise annotate spoken words to help explain an idea or proposal might be described as enacted diagrams. Gestures can produce traces in space or, more commonly, on surfaces. Lines traced on paper project the radii of the human hand. Frank and Lillian Gilbreth recorded the trajectory of a point light attached to a human hand performing manual operations on long-exposure photographic plates. Those automated recordings share the reductive and explanatory traits of diagrams. The Gilbreths sought to optimise an economy of motion. Christine Frederick extended their analysis to representations of the trajectories of the human body in motion across a room, for example preparing food in a kitchen; Alexander Klein further extended the scope to the scale of an apartment. Klein's diagrams were described by the architect Ernst Löwitsch as "'choreography,' a spatial notation of dance, composed by the architect and experienced by the inhabitant."¹² [See: 'Evaluator, Choreographer, Ideologue, Catalyst - The Disparate Reception Histories of Alexander Klein's Graphical Method.'¹³] E.J. Marey termed his automated recordings 'the language of the phenomena themselves.' [See: 'Diagram Ecologies - Diagrams as Science and Game Board.'¹⁴] The boundaries are fluent between recordings that can be analysed as if they were diagrams, explanatory acts that amalgamate gestures with drawn diagrams (such as Le Corbusier's lecture sketches), and chorographical notation that instructs performers' movement well as explains it to readers. Such practices and enactments of gestural

annotation profoundly associate themselves with diagrams; they constitute diagrammatic practices that reconnect the intangible abstraction of diagrams to palpable corporeality. 'Thinking between Diagram and Image: The Ergonomics of Abstraction and Imitation'¹⁵ studies the corporeal and visual practices of Jackson Pollock for clues that may help to better understand the impact of corporeal practices on drawing, specifically drawing practices of architects. Those practices oscillate between the intimate space of the drawing board and the upright plane of display and critique. Gestures of the human hand are recorded on a drawing board, which acts as a corollary to the horizontal plane of the building site. Placed for review on a vertical wall, vis-à-vis the viewer, the drawings become windows into another world. Diagrammatic traces become illusionary images. 'Upside down or sideways up - Corporeality, Architecture and Urbanism in Translations between Ground and Image Plane' continues this line of inquiry, taking as its starting point the reliefs that Le Corbusier and Costantino Nivola cast in the sand on the beach in 1951 on Long Island, subsequently to be installed vertically, contemporaneous with Pollock's action paintings and nearby. The significant roles of cardinal orientation in their work links Le Corbusier and Jackson Pollock to a wider circle of artists associated with the New York School, such as the composer Earle Brown and the choreographer-dancer Trisha Brown.

2. Science versus Language

How might diagrams constitute architectural languages? This problem plays out over the course of the 20th century. At the beginning of the century, Beaux Arts concepts such as *poché* (the footprint of heavy masonry structure that also encloses space within the wall itself), *mosaic* (the floor surface of rooms described through patterns), *parti* (the underlying scheme of a design) all are expressed through diagrams. They form elements of an architectural language that is governed by conventions which bind diagrams to design methods as well as to construction techniques. 'Poché. The Innominate Evolution of a Koolhaasian Technique'¹⁶ reveals how Rem Koolhaas, at the end of the 20th century, appropriated *poché* from the language of Beaux Arts Architecture to recontextualize and re-envision its conception in OMA's projects for the new town of Melun-Senart (1987) and the Très Grande Bibliothèque (1989). However, Koolhaas avoided use of the term *poché* until 1999. During his studies at Yale he had been exposed to the urban syntax and historicist architectural vocabulary that Colin Rowe affiliated with *poché*, which he reacted against.¹⁷

The notion of architecture as a language rooted in history had received a pivotal impetus from Rudolf Wittkower's 1949 syntactic analysis of Palladian Villas as a series of permutations. It triggered Colin Rowe's comparative analysis of classical versus modernist building plans, and John Hejduk's use of nine-square grids as pedagogical devices, teaching architecture as a language to be learnt. The essay 'Diagram Ecologies - Diagrams as Science and Game Board' examines this *syntactic* use of diagrams, and contrasts it against *scientific* usages, exemplified by the work of Alexander Klein, whose *graphical method* established a process of scientific analysis and evaluation that endeavoured to identify optimal solutions to clearly defined problems. The reception history of Klein's graphical method is marked by ruptures and breaks, dismissal as well as adaptations, reinterpretations and productive extensions. I have examined this history in greater detail in the journal article 'Evaluator, Choreographer, Ideologue, Catalyst - The Disparate Reception Histories of Alexander Klein's Graphical Method'. In one of the most productive readings, Franz Löwitsch reinterpreted Klein's pathways diagrams as choreographic notation, expressive of character as well as serving to optimise, that is, as language as well as science.

Spoken and written language is continuously redefined by its speakers and writers. An analogous architectural process can be observed in the irregular settlements on the hills overlooking Valparaiso, Chile. Two major typological elements—or lexemes, basic units of language—can be identified, *gallery*, originally an access balcony and *cité*, a shared alleyway. Both have undergone multiple stages of transformation. Many galleries originated as exterior balconies that provided access to a shared toilet, but have since been appropriated by a single apartment. Other galleries were added as one building was built on top of another. The essay 'Urban villages and informal settlements as protagonists of urban futures'¹⁸ applies diagrammatic analysis to data gathered during field research. The analysis makes visible and explains the stages and layers of transformation and permutation of the basic units of language, the typologies that accrued over time. None of the stages is "scientifically" optimised for a single pattern of use; rather all of the stages are interim and remain open to ad hoc adaptation and functional optimisation.

Legibility of representations and, correspondingly, literacy of readers, are fundamental conditions of language, architecture and diagrams. The chapter 'London Underground Diagram'¹⁹ examines how its author, Harry Beck (an engineer), sought an economy of visual

attention, and instant legibility, applying a topological transformation to a geographically accurate rail map. Succeeding generations of graphic designers refined and further optimised his diagram in a process that proceeded through trial and error as well as through scientific insights into the cognitive mechanisms underpinning legibility. Due to the incorporation over ever more underground, and even overground lines, legibility of the diagram nevertheless has been diminished.

3. Instrument and Mirror

The dual role of diagrams as instrument and mirror of thought is the subject of enquiry of the essay 'Diagram Utopias.'²⁰ The journal article makes explicit an interest that is at play in the method developed during the design of the *University Library Magdeburg*. That method was one of design; it employed a diagram as an instrument to generate space and spatial logic. 'Diagram Utopias' contrasts Thomas More's fictional narrative *Utopia* against Andrea Branzi's urban project *Agronica* in terms of their underlying diagrams, rota versus network. The article emphasises the role of diagrams as analytical mirrors over any role they might possibly have played as instruments of design. It was written in 2013, as I became increasingly interested in irregular urbanism. The construction of irregular settlements draws on continuous feedback from the acts of construction and inhabitation rather than being instructed by drawings. This challenges the role of diagrams as instruments, but also opens up new scope for diagrams as analytical mirrors. The analytical frameworks explored in 'Diagram Utopias' proved relevant and applicable to my field research and analysis.

Subsequently, the article 'Maps as Abstraction and Imaginative Space,'²¹ focused on three diagrammatic conventions that act as analytical mirrors: figure ground maps, Nolli maps and Rossi maps. Each convention records a pair of conditions, such as solid/void, public/private space, spatial striation and subdivision; each follows a set of rules that are independent of subjective interpretation. The maps produced through this process of abstraction stimulate subjective spatial imagination in the minds of their viewers and readers and support imaginary wanderings through the city. The article how diagrams act as abstractions as well as substrate for imagination.

'Social Fabric and Spatial Permutation – Ban Krua, Bangkok'²² and *Mapping Jabal Al Natheef*²³ each report on an episode of field research. Irregular settlements such as Ban Krua and Jabal Al Natheef previously had been recorded photographically, and rarely

deemed worth mapping with the same level of respect and care that is accorded vernacular villages and historical monuments. Over the last few years, this has begun to change; the transformative potential of irregular urbanism increasingly is exposed through diagrammatic representation.

4. Diagrams as Abstract Machines

The diagram for the *University Library Magdeburg* began as a generative instrument, a set of operational rules (cutting, folding and perforating). As the project developed, it turned into an instrument for conceptualising, explaining the idea of a spatial continuum, and ultimately an instrument that helped to negotiate and coordinate ideas during the planning process. During all phases, the diagram took on agency in the sense that it encouraged certain operations and resisted others. The designers were in dialogue with each other and with the diagram.

This notion of diagrammatic agency resonates with the materialist philosophy of Gilles Deleuze. In his 1968 book *Difference and Repetition* Deleuze denies any intrinsic connection between diagrams and visual representation, stating: “The abstract machine is pure Matter-Function - a diagram independent of the forms and substances, expressions and contents it will distribute.”²⁴ Deleuze considered diagrams to be involved in problem-solving activities rather than as visual language used in communication between people. Accordingly, such problem-solving through diagrams need not involve humans or robots; it may occur in material and energetic systems, such as soap bubbles or crystals. Explicating Deleuze, the philosopher Manuel DeLanda has described a “far-from-equilibrium, diagrammatic zone in which form emerges spontaneously.”²⁵

Although I refer to Deleuze’s materialist philosophy in *Intensive: Extensive*, my principal interest is not in material and energetic systems, but rather in the capacity of diagrams to produce systems that unfold with a degree of autonomy as well as in interaction with human authorship. Systems of classification, such as typology, taxonomy, alphabet or list imply diagrams have an agency to organise and structure. In ‘Diagram Utopias’ I have examined diagrams that colluded with their authors in generating utopian projects and utopian worlds. Those diagrams need not be expressed visually—with the exception of a single woodcut, More’s *Utopia* contains no visual material—but we can see the diagram through the work in ways that its author might not have. Subsequently, I became interested in how diagrammatic

ordering systems have been exploited to generate projects and cosmographies. The article 'Proximity: The Unfolding of a Koolhaasian Hypothesis in Book Space and Architectural Space' examines how the complex organisation of *S,M,L,XL*, Rem Koolhaas and Bruce Mau's book, or perhaps more appropriately, book-world, draws on diagrams and ordering systems. The arrogation of ordering systems to organise a book and articulate a world-view extends to the books of former collaborators in Rem Koolhaas's office, *foa's ark* (by Farshid Moussavi and Alejandro Zaera-Polo) and *49 Cities* (by Amale Andraos and Dan Wood). The relationships that each of the three books sets up between ordering systems and implied diagrams are the subject of the chapter 'Book-Worlds and Ordering Systems as Sites of Invention.'²⁶ Each of the books is shaped by interaction between the will of the designers and the autonomy of the diagram. Most poignantly, this interaction plays out in *S,M,L,XL* through appropriation and subversion of a complex system that juxtaposes multiple, competing ordering systems.

Projects and Publications

The work is organised in four sections that group work according to a specific path of enquiry. Each section is headed by a pair of terms that is oppositional as well as complementary: Situate and relate; compose and choreograph; embody and translate; and finally, urbanism and irregular urbanism. The first two pairs describe fundamental cognitive and propositional actions in architectural design; the third pair examines the corporeality of diagrams in art and architecture practices; the final pair shifts focus from theory to my practice as a field researcher on irregular urbanism.

A. Situate and Relate

The four essays in this section discuss how diagrams have been used, or might be used to situate ideas and things in time and in space, and to relate ideas and things to each other. Specific diagram types, such as rota, network, grids, trees or semi-lattices are situated in their historical context and in relation to a cosmography, or imagined world order which they imply. Their dual role as instruments, but also as mirrors of thought is examined across a series of historical intervals. The most recent two essays consider diagrams beyond graphic representation, as a medium in which organization and order of texts and books are revealed.

'Diagram Utopias: Rota and Network as Instrument and Mirror of Utopia and Agronica' [2013]

Rota schemata are cosmographies, that is, schemata of an imagined world order. They relate ideas and concepts to each other and situate these within a cosmographic system. Medieval rota schemata attempt to reconcile observations made in the world with a preconceived world order. Thomas More's text *Utopia* describes an imagined world order, with the exception of a single woodcut depicting the island Utopia, it is not annotated with any visual or diagrammatic representation. Yet, as Anthony Vidler argues, all Utopias necessarily are diagrammatic, and Thomas More's Utopia is most clearly revealed in the diagram, as if it initially was conceived as such.²⁷ Utopia sets out conceptual, spatial, and temporal relationships. The text implies a cyclical notion of time and a centripetal island-world that is closed in itself. Therefore, its underlying diagram is a rota schema. By contrast,

Andrea Branzi's utopian project *Agronica* implies a pervasive, centrifugal grid; its underlying diagram is a network. In his book *Weak and Diffuse Modernity* Branzi defines a worldview that, like *Utopia*, encompasses a conceptual, spatial, and temporal system, in which his architectural and urban projects are situated.

The dichotomy between rota and network resurfaces in the shift from Walter Gropius's rota schema to Hannes Mayer's network diagram of the Bauhaus curriculum. Gropius's rota schema embodied a centripetal trajectory, drawing the student from a peripheral ring of preliminary courses to a central position, *Bau, Bauplatz, Bau und Ingenieur Wissen*, i.e. building, building place and building knowledge. Mayer's network embodied a centrifugal trajectory of the student, who progressively establishes links to the world.

The essay 'Diagram Utopias' stands at the beginning of a series of articles exploring diagrams as devices that relate and situate ideas, processes and places in time and space, and that analogize architectural and urban time and space with the time and space of texts and diagrams.

'London Underground Diagram, UK (Harry Beck, 1931)' [2014]

When Harry Beck, who worked as an electrical engineer for London Underground, devised the first iteration of the London Tube diagram, he visualized a mental image of London that is predicated on relationships and network connectivity rather than geographical veracity, a relational rather than scaled model of the city. The definition of diagram that underpins the London Tube diagram is that of a putatively transparent frame through which the underground transport system can be viewed and understood in the most effective way. The Modernist architect Le Corbusier describes the engineer as "inspired by the law of Economy and governed by mathematical calculation, (...) in accord with universal law." In Beck's case, the economy is one of visual attention, the universal laws are those of instant legibility, and the mathematical calculation is that of a topological transformation. My book chapter explores this idea of cognitive economy. Further, I relate the London Underground diagram to the Situationist conception of the city, specifically to Paris, and to Kevin Lynch's relational urban model of paths, edges, districts, nodes, and landmarks.

Unlike Thomas More's text, the London Underground diagram is not a cosmography. However, it has, over many iterations unfolding over the course of almost a century profoundly shaped Londoners and visitors mental image of London. It constitutes an

imagined urban order in which places, or even personal and collective experiences, can be situated. In this respect the paper extends the discourse of the earlier paper on Utopia, Agronica and the two Bauhaus diagrams.

'Proximity: The Unfolding of a Koolhaasian Hypothesis in Book Space and Architectural Space' [2015]

Rem Koolhaas and Bruce Mau's magnum opus *S,M,L,XL* extends far beyond the remit of a conventional monograph about an architectural office or book on theory; it constitutes a book-world woven from strategic usages of juxtaposition and subversive appropriation of multiple, competing ordering systems. Key elements of Koolhaas's method are *convenientia*, which he borrows from Michel Foucault to force the adjacency of dissimilar things that "come sufficiently close to each other to achieve juxtaposition," producing new similarities and new meaning.

As a consequence of this method of world-making, Koolhaas destabilises the commonly used architectural definition of context. His overlay of multiple, competing systems of classification and literary genres refutes Colin Rowe's notion of contextualism. Instead, he returns the notion of 'context' to linguistics, where it originated. As I wrote, Pierre Chabard has suggested that "Koolhaas does not understand the Latin *contextere* 'weaving together' contained in the word at all as a mandate for mimesis, reproduction, patrimonial sacralization of the locus but as a joyous occasion for architectural dialectics." Koolhaas's method of 'weaving together' is indebted to Roland Barthes's and Julia Kristeva's concept of intertextuality, which considers all texts to be "built as a mosaic of quotations ... as the absorption and transformation of another text." Arguably, the organisation of *S,M,L,XL* is most clearly revealed in a diagram, as if it initially was conceived as such. I analyse the structure of the book, using a diagram that demonstrates its complex organisation. This analysis is informed by the preceding work on Thomas More's book *Utopia*.

'Book-Worlds and Ordering Systems as Sites of Invention' [2017]

Alongside practice and theory, the making and structuring of books equips architects with an alternative site of invention and knowledge production. The book-worlds studied here - *S,M,L,XL*, by Rem Koolhaas and Bruce Mau, *foa's ark*, by Alejandro Zaera-Polo and Farshid Moussavi, and *49 Cities*, by Amale Andraos and Dan Wood (Figure 1) - depart from the model

of the practice monograph by constructing book-contexts within which they re-situate architectural, or utopian urban projects. Their constitutive devices, namely lists (*S,M,L,XL*), taxonomy (*foa's ark*), and typology (*49 Cities*), are used as instruments of cosmography, that is, as devices that organize representations of the world and articulate world-views. At the same time, they constitute instruments of cosmopoiesis, that is, inventions of new worlds that are created within the books. Each of the three books uses classification to construct new contexts, which place architectural or urban utopian projects in new relationships, through juxtaposition (*S,M,L,XL*), through a taxonomical tree that diagrams evolution (*foa's ark*), or a typological matrix that correlates data (*49 Cities*). The three books appropriate systems of classification to produce new meaning and associate their subject matter with new interpretations and implications.

B. Compose and Choreograph

This section assembles a series of essays on diagrams as instruments of composition and choreography. The first text in this series, *Intensive: Extensive*,²⁸ examines opposing conceptions of space, namely intensive and extensive space; those terms are borrowed from Gilles Deleuze. All of the diagram authors whose work this section discusses are architects of the 20th century: Le Corbusier, Alexander Klein, Colin Rowe, Bernhard Hoesli, John Hejduk, Christopher Alexander, Frei Otto, Günter Behnisch, Albert Pope and Rem Koolhaas.

'Intensive: Extensive' [2008]

Intensive: Extensive addresses the subjects of composition and choreography through an examination of connectivity, drawing on contrasting conceptions proposed by Alexander Klein, Frei Otto, Christopher Alexander and Albert Pope. Gilles Deleuze and Manuel DeLanda define connectivity as an intensive quantity. DeLanda differentiates between extensive space that is "bounded by natural and artificial extensive boundaries" and intensive space, characterized by "zones of intensity." Extensive quantities such as volume, area and length are additive; but intensive quantities such as density, light, pressure, temperature and connectivity are indivisible. While architectural systems of composition and proportions are based on extensive quantities, Deleuze linked intensive quantities such as connectivity to concepts appropriated from far-from-equilibrium thermodynamics.

Alexander Klein diagrammed connectivity in floor plans of apartments as a consequence of walls and doors, that is, as a consequence of enclosure, of extensive volume. By contrast, Frei Otto's systems of direct roads, minimum road systems, networks of minimal detours and the generative system do not assume any enclosure a priori, but rather emerge from a series of points as origins and destinations of movement or flow of forces. The two- and three-dimensional diagrams proposed by both Klein and Frei Otto register phenomena, but also invite reading as perceptual phenomena, and explanation through perceptual forces, such as balance, growth, movement, tension and dynamics that, according to the Gestalt theorist Rudolf Arnheim, enable us to formulate perceptual constructs.

A possible analogy between intensive quantities and perceptual tension, between far-from-equilibrium thermodynamics and Gestalt psychology, is explored in the work of Christopher Alexander and Albert Pope, with reference to Colin Rowe and John Hejduk. The oscillation between contrasting perceptual readings of grids is exemplified by the centripetal versus centrifugal readings Rosalind Krauss ascribes to Piet Mondrian's grid paintings.

'Diagram Ecologies - Diagrams as Science and Game Board' [2012]

The book section 'Diagram Ecologies' continued the exploration, begun four years earlier, of how space may be diagrammed and how diagrams may be employed to compose and choreograph in space. Many of the diagrammatic methodologies discussed in *Intensive: Extensive*, namely those proposed by Alexander Klein, Frei Otto and Christopher Alexander are predicated towards identifying the optimal solution to a given problems, whereas others, namely those of Colin Rowe, John Hejduk and Albert Pope emphasize the capacity of diagrams to operate as a visual language, supported by their interest in Gestalt theory, in the modus operandi of visual perception. The former conception of diagrams might be termed scientific or perhaps even positivist, while the diagrams proposed by the latter group of authors might be likened to game boards.

The "scientific" approach originated in functionalism and management theory. Its principal diagrammatic devices are the flow diagram and the bubble diagram. Both diagrams are used to optimise. Flow diagrams seek to minimise the length of paths and trajectories of movement, in order to perform industrial as well as domestic tasks with the least expenditure of energy (Alexander Klein). Bubble diagrams seek to compose parts in the most optimal relationship to each other (Le Corbusier). Flow and bubble diagrams are

closely related, optimising compositions will reduce length of pathways. Architecture is taught as a series of problems to solve. Diagrams are transparent devices through which the problem is framed.

The opposing position, which I link to the conception of diagrams as game boards, was expressed by Colin Rowe, Bernhard Hoesli and John Hejduk. They saw architecture as a language to be learned. They recognized that diagrams are not transparent, and emphasized the cognitive aspect of seeing and reading diagrams. They criticised the ahistorical preconception implied by problem solving without recurrence to precedent. Their diagrams are concerned with composition (though for example Hoesli continued to use flow diagrams alongside the new diagrammatic formats). Rudolf Arnheim's diagrams of Palladian Villas are a foundational reference.

The flow diagrams of Alexander Klein remain of interest beyond the demise of orthodox functionalism. Franz Löwitsch, a contemporary of Klein, had recognised in them an alternate reading as choreography.

'Evaluator, Choreographer, Ideologue, Catalyst - The Disparate Reception Histories of Alexander Klein's Graphical Method' [2017]

The graphical method, propounded by the Russian / German / Israeli architect Alexander Klein during the late 1920s, evaluates the qualities of architectural plans through a process of diagrammatic analysis following purportedly objective criteria. Over the course of the 20th century Klein's proposition has been adapted, reframed, diverted and inverted. Ernst Löwitsch reinterpreted Klein's analytical notation as choreography of domestic life; following a rupture incised by Klein's forced emigration from Nazi Germany, Frank Gloor rediscovered the graphical method, transformed and adapted it to conceive of a scientific method classifying degrees of flexibility. Early dissemination to the English-speaking world by Catherine Bauer under the refashioned title "Functional House for Frictionless Living" ultimately led to Robin Evan's enduring indictment of Klein's diagrams as emblem of reductive Functionalism. Throughout its disparate reception histories, the graphical method has oscillated between methodology of scientific evaluation; choreography of everyday life; emblematic indictment of Functionalist ideology; and catalyst to new working methodologies. The article uses the reception history of Klein's work to trace the first of the two vectors of enquiry identified in 'Diagram Ecologies' and link a series of authors and diagrammatic practices that have not received the attention they deserve.

'Poché. The Innominate Evolution of a Koolhaasian Technique' [2015]

The Beaux-Arts conception of poché denotes a particular configuration of heavy, load bearing walls that enclose primary spaces as well as pockets of auxiliary rooms contained within them. The Beaux-Arts discourse emphasized construction, composition and spatial hierarchy; thus movement through space and choreography are implied, but do not play an explicit role. The discourse is framed as a dichotomy between Colin Rowe's embrace of Beaux Arts concepts such as poché as a contextualist as well as tectonic device negotiating between ideal type and empirical site, and Rem Koolhaas's dismissal of contextualism and traditional tectonics. Over a series of several steps and projects, Koolhaas came full circle (in a way). The radical inversion of architectural poché, in terms of space as well as tectonics, from a device of urban contextualisation to one of internal lobotomy, from antithesis of the free plan to enabler of the free section, conjoins ideas which previously were conceptual antagonisms.

C. Embody and Translate

The section begins with the library building for the University of Magdeburg, Germany, that became pivotal for several directions that my thinking about architecture and diagrams was to take. The diagrammatic model that drove the library design worked with cardinal transposition, with folding and turning upside down and sideways up a continuous strip that generated all floor plates of the building. The two essays that followed my work on the building examined and speculated on corporeal manipulation of diagrams, on cardinal transposition and translation of gestures into diagrams, and on translation of traces of movement on horizontal ground to representations on the upright plane of viewing.

Library Building for the University of Magdeburg [1998-2003]

The constraints and contradictions of a site formed by remaining traces of an irregular polygonal block structure, largely obliterated in the Second World War, overlaid during the era of the German Democratic Republic with repetitive, prefabricated object-buildings, are resolved through a diagrammatic as well as playful strategy: a continuous concrete plane rises through a series of folds to form all horizontal floor plates and vertical walls, creating continuous space animated by changes in height and lighting situations. Long, unbroken

edges of floor slabs establish diagonal connections through the interior space and lead onwards to vistas of the campus and the city beyond. The continuous space of the library is not subdivided by walls, but rather structured through a series of discreet spatial identities characterised by light, achieved through varied devices that filter, reflect and modulate zenithal as well as transverse sun- and daylight.

A diagrammatic model was instrumental for developing the idea of a spatial continuum and then resolving the building geometry. Varied folding patterns were tested through the diagrammatic model. As the model was turned upside down and sideways up, manipulation of cardinal orientation invited new interpretations and design development as the folded strip transformed from floor to wall to ceiling to wall.

The diagrammatic model proved to be more than an expedient that supported swift and effective testing of alternatives, and more than a cognitive technique that aided designers and consultants in continuously re-interpreting and re-inventing the parti. Its embrace of corporeality within the design process is twofold: By treating a fundamental invariable of human experience of space, corporeal orientation, as a variable, the diagrammatic model provoked and supported consideration of corporeality in the design process beyond mere reiteration or refinement of architectural precedent. Further, tactile experience and manipulation of the generative diagram drew designers, specialists and other participants into the design process.²⁹ The presence of the diagrammatic model aided in linking tactile manipulation to cognitive speculation, corporeality to abstraction.

‘Thinking between Diagram and Image: The Ergonomics of Abstraction and Imitation’ [2011]

The spatial orientation of the drawing surface and the position of the human body are in dynamic relationship with the drawing both in authoring and in viewing. The digital workplace does, thought, reformulate this spatiality.

This essay broadened the definition of diagram to encompass trace as a record—or even explanation—of movement, manifest in the art practice of Jackson Pollock. Pollock recorded the movements of his body on the ground plane and of his arms through traces on a large canvas laid out horizontally. The uprighted canvas invites new readings, as illustration and picture rather than trace and map. The same shift occurs in architectural practice, from the horizontal drawing table to vertical display on a wall during review. Working on a computer,

the dichotomy between tracings on horizontal ground and frontal review is collapsed in time, keyboard, track pad and screen update electronically and instantly. Such isotropic space, simulated digitally, invites imaginative immersion, but rejects corporeal inhabitation. Concurrently, digital tools continue to refer to physical instruments as metaphors. This situation provokes renewed interest in the spatiality of physical working and exhibition practices by artists and architects, their use of cardinal orientation (of subject matter, working surface, or viewing plane) as immutable or strategically variable.

The essay juxtaposes shifts in the meaning of cardinal orientation for architects, as a reality of the digital workplace and as an opportunity inviting strategic exploitation, against a historical narrative of spatial orientation in the visual arts. Jan Vermeer's paintings describe the spatial relationships that painters, writers, readers and mapmakers establish to vertical and horizontal working surfaces. Walter Benjamin's distinction between "two sections through the world's substance," vertical and horizontal, extends this line of enquiry and suggests resonances between the spatial orientations of viewing planes and working surfaces; diagrammatic representation draws on spatial orientation.

**'Upside down or sideways up - Corporeality, Architecture and Urbanism
in Translations between Ground and Image Plane' [2014]**

'Upside down or sideways up' revisits the spatial practices of the artist Jackson Pollock who worked in his East Hampton studio on Long Island. It so happened that the architect Le Corbusier visited East Hampton several times around 1951. Le Corbusier stayed with his friend Costantino Nivola; together they made a series of sand castings, using a phased process of tracing lines and volumes on the beach, casting, and then uprighting the cast. The essay contends that Le Corbusier's usage of transposition between ground and image plane is not coincidental but strategic. It retraces the pervasive role of such transpositions, and of corporeality in Le Corbusier's oeuvre, from the 1920's Maison Domino to Ronchamp. The *cit -jardin verticale* plays a pivotal role.

Transposition is further explored in the work of artists of the New York School, to which Pollock belonged. The group includes the composer Earle Brown. Of particular interest is the choreographic, performance and installation work of the dancer Trisha Brown. The lineage extends to contemporary cinema in films such as *Inception*, and thus enters popular imagination.

The origin of diagrams in gestures, and their close relationship to the human body, permeates the work of the artists and architects discussed in this essay. In the work of Le Corbusier, gestures at the scale of the human body relate to diagrams at urban scale. In all works, diagrammatic cognition relies on corporeality.

D. Urbanism and Irregular Urbanism

The final section shifts focus from theory to my current practice of field research on irregular urbanism. This trajectory of research can be traced back to an urban research project which I led at the ETH Zürich in 2003 and 2004. We investigated the community of Schlieren and the Limmat Valley in which Schlieren is situated. Several of the methods tested and critiqued as part of the project's emphasis on methodology were subsequently developed and adapted to a range of international contexts and tested in mapping workshops in Ankara, Beijing, Dubai and during my first research visit to Amman. Outcomes from these four mapping workshops remain unpublished. A set of methods coalesced around the specifically diagrammatic aspects of the methodology and applied as a more fully formed set of methods in a second visit to Amman, engaging the community of Jabal Al Natheef.

The four essays that succeed the ETH publication constitute reports on a series of field research episodes, engaging specific conceptions of diagrammatic representation and mapping.

Dynamische Instrumente für die Peripherie: Schlieren / ZH [2004]

The research and design studio "Schlieren" undertaken at the ETH Zürich in the summer semester 2004 searched, through examining the specific situation of this community in the Limmat valley at the edge of Zürich, for dynamic instruments of analysis and design more widely applicable to peripheral sites elsewhere. Principal methods of documentation and discursive analysis were interviews with members of the community, community leaders and academic experts such as the urbanist Albert Pope and the sociologist Christian Schmidt, collection of statistical data, spatial surveys. Analysis and design were undertaken concurrently; design propositions served to test hypotheses and contributed to discursive analysis. Research on methodology accompanied analytical studies as well as design

projects. Known methods acted as catalysts to initiate design steps; new methods were discovered through design and subsequently systematized and categorized. The monograph reporting on the research project became a reference for subsequent research projects on irregular urbanisation. While certain techniques, such as the interviews, proved adaptable to new contexts, those methods that drew on the amalgamation of analysis and design proved inadequate in contexts in which fundamental assumptions needed to be questioned. Design hypotheses proved blunt instruments in irregular settlements constructed with continuous feedback from the acts of construction and inhabitation, without any guidance from architect's propositions. Following on from the research project on Schlieren, Holger Schurk, Stefan Kurath and I were invited to a limited competition seeking proposals for an urban project on a former industrial site in Schlieren.

Mapping Jabal Al Natheef [2014]

Jabal Al Natheef is sited on a hill overlooking the sprawling expanse of Amman and its historical centre, located in close proximity. However, the settlement, which originated in 1945 as a Palestinian refugee camp, is linked to the city by only two roads.

Our analysis of one of the oldest areas in Jabal Al Natheef, known as the "upper camp," comprised of seven parts: (1) documentation of urban fabric, through a figure ground plan and street elevations; (2) a series of interviews capturing the personal stories of inhabitants, what might be referred to as "storycatching," which were conducted in conjunction with a survey recording statistical information; (3) a survey of housing typologies recorded in plans and three-dimensional representation; (4) representation of the ground level as a continuous Rossi plan, following the conventions established by Aldo Rossi's 1972 plan of Zürich; (5) typological analysis, (6) an examination of shared spaces, their physical characteristics, and interpretations of their usage; and (7) a detailed study of a group of houses, the network of alleyways, courtyards and interconnected rooftop terraces, in conjunction with the social relationships that have produced and are sustained by these spatial arrangements.

The drawn components of this analytical methodology combine characteristics of drawings with those of diagrams. The philosopher Charles Sanders Peirce has stated that "a diagram is a kind of icon particularly useful, because it suppresses a quantity of details, and so allows the mind more easily to think of the important features."³⁰ Further, Peirce argued for

a deductive process of reasoning, for conclusions to be formulated in general terms if a series of diagrams share the same relationship between parts.³¹ The analytical drawings on Jabal Al Natheef begin with observation of particulars and proceed towards deduction of principles. This is most clearly evidenced in (5) typological analysis, which documents all floor plans in the study area, allocates to groups according to shared characteristics and finally produces a matrix, in which each group is arranged around an abstracted representation of the typology, such as corridor type, enfilade, matrix of interconnected chambers, central hall with alcoves, etc. The general terms, or typologies, formulated in this process allow the heterogeneous collection of houses self-constructed by immigrants and refugees from a wide variety of rural and urban areas to be contextualized according to geographical origin as well as within global typologies of self-construction.

'Social Fabric and Spatial Permutation – Ban Krua, Bangkok' [2014]

Ban Krua is a community of Cambodian Cham Muslim silk weavers settled since two centuries on the banks of the San Saeb canal in the centre of Bangkok. Their silk weaving workshops had supplied hand woven silk cloth in the 1950s and 60s; production has relocated to factories outside of Bangkok. Ban Krua is noted by political scientists for its successful grass-roots opposition against a 1988 government project to build a highway exit ramp that would have bisected the settlement.

The journal article reports on field research undertaken in collaboration with academic partners at Chulalongkorn University Bangkok and a group of 11 graduate students. Our methodology, informed by the experiences and outcomes gained at Jabal Al Natheef, comprised of interviews, a Rossi map, typological studies of homes and of a silk-weaving workshop, as well as of Soi, narrow alleyways running perpendicular to the canal. One of the principal challenges was the definition of public space, which eluded diagrammatic conventions such as those of the Nolli and Rossi maps, because it is too dynamic and ambiguous to be mapped as solid and void. Instead, the field research report represents the Soi of Ban Krua through a network of interrelated diagrams, Rossi and Nolli maps to be read in conjunction with diagrams of circulation and connectivity that record the dynamic interplay between local connections and urban disconnect resulting from the gating and privatisation of Soi during times of the day or over longer intervals in time. This produces both elastic and plastic deformations of circulation patterns.

We were interested in the relationship between the social structure of a community which has demonstrated remarkable cohesion, and the public, shared, and private spaces that it produces and continuously remakes. The research outcomes contributed to discourse on urban space produced by interactions between urban development, social marginalisation and community resilience. In terms of this thesis, the field research stimulated the adaption and extension of a diagrammatic apparatus for field research.

'Maps as Abstraction and Imaginative Space - Representing Informal Urbanism' [2014]

This journal article differs from the preceding reports on field research inasmuch as it presents a comparative analysis of three episodes of field research, and establishes links to theory on diagrams. The article discussed the varied matrixes of densely spaced houses sustaining both dynamic and plastic patterns of connectivity that the communities of Divale Gaon (India), Ban Krua (Thailand) and Jabal Al Natheef (Jordan) inhabit. Diagrams that explicitly address these dynamic and plastic patterns of connectivity are juxtaposed against figure ground, Nolli and Rossi maps. The article retraces the genealogy and historical evolution of these maps, their reception histories, and the means by which they suppress detail to achieve varying degrees of diagrammatic abstraction. To varying degrees, all three mapping conventions—despite, as well as because of abstraction—invite imaginative inhabitation and conjure imagined spatial sequences for hypothetical wanderings through the city. Citing Anthony Vidler's and Henri Lefebvre's critiques against the "abstract space" of architects and planners, the article discusses methods for translating the "lived space" experienced by inhabitants into "conceived space," that is, experience into complex forms of abstraction that may help to understand and appreciate irregular urbanisation and, borrowing Rahul Mehrotra's terms, the interplay between the "kinetic and static cities."

'Urban villages and informal settlements as protagonists of urban futures' [2016]

This publication provides another synoptic overview of and commentary of field research episodes undertaken in Amman, Valparaiso and Bangkok. Stimulated by recognition of the level of elaboration and spatial complexity that the irregular settlements on the ravines above Valparaiso have achieved, the article aims to decipher the gestation histories of urban

forms and building typologies in the context of three different topographical situations, cultural milieus and contrasting scenarios of irregular urbanisation.

Topographical situations range from the steep hillsides of Jabal Al Natheef, Amman and Cerro de la Cruz, Valparaiso to the banks of a canal on which Ban Krua, Bangkok is situated. The evolution of circulation and connectivity patterns can be understood in relation to available means of transport and to the differing ways in which population growth and densification could be absorbed with available means and typologies of building. The buildings themselves register a complex range of aspects and events. This range encompasses the diversity of cultures and remembered spatial typologies that refugees and migrants imported to Jabal Al Natheef; the transformation of a traditional building typology, defined construction methods as well as inhabitation patterns, the Thai houses of Ban Krua, in response to environmental change resulting from the provision of floodgates; and the transformation of a pair of linked typologies addressing building and street, the communal gallery type buildings and cite type streets of Valparaiso, in response to social change.

As part of a series survey over time that retraces development processes dependent on a complex array of conditions in contrasting contexts, diagrams support processes of abstraction that provide frameworks for classification, juxtaposition and re-contextualisation. They contribute to a discourse on global irregular urbanisation that recognises its transformative potential, rather than discounting it as a series of passing local deviances from dominant models of planned urbanisation.

Research Impact

My research contributes to discourse on diagrams as analytical, generative, narrative and critical instruments and mirrors of thought through publications in refereed journals, such as *OASE*, *The Journal of Architecture*, *Architectural Research Quarterly*, the *Journal of Architectural Education*, and the *Journal of the Society of Architectural Historians*. Alongside contributions to theoretical discourse, reports on field research have been shared as printed booklets and electronically with the communities (Jabal Al Natheef, Ban Krua, Divale Gaon, Cerro de la Cruz) that have been subjects of and collaborators in the research. The reports are available to the communities as references in arguing their case in negotiations with municipalities, authorities and developers.

Field research findings have been disseminated in local exhibitions and roundtables, in Zürich (Community Centre Schlieren, 2004), continuing with exhibitions in Beijing (Central Academy of Fine Arts, 2007), Dubai (Tashkeel Art Center, 2011), Amman (Ras Al Ain Gallery, 2012 and German Jordanian University, 2013) and Navi Mumbai (Urban Heart Public Art Venue, 2014). Diagrams produced as research on irregular urbanism have been included in the group exhibition *Plague of Diagrams* at the London (ICA, 2015).

Those exhibitions and publications have led to invitations to speak at universities in the UK (Centre for Research in the Arts, Social Sciences and Humanities, Cambridge University, 2016), as well as internationally (Escuela Arquitectura, Pontificia Universidad Católica de Chile, Santiago, Chile, 2015) as well as Newton Fund Researcher Links workshops in Delhi (Cultural Heritage and Rapid Urbanization in India, 2015) and Mexico City (Producing and Contesting Urban Marginality, 2016). From these exhibitions and publications research and teaching collaborations have arisen, in Navi Mumbai (2014) and Casablanca (2016).

Translations of my work have appeared in bi-lingual journals such as *Landscape Architecture Frontiers* (Chinese / English), *OASE* (Dutch / English) and *Materia Arquitectura* (Spanish / English).

Summary and Outlook

The intertwined trajectories that have amalgamated into the body of research presented in this portfolio began with curiosity about the potential of diagrams as instruments of design and negotiation, and initially proceeded through diagrammatic experimentation in architectural practice. Two main lines of enquiry originate there. The first line leads on enquiry into the theoretical underpinnings of diagrammatic practices in architecture, urbanism and cognate design practices in the arts. The second path relates diagrams to negotiation; it is driven by field research on irregular urbanism. The correlation of the two principal lines and their interviewing with secondary threads of research exposes new research questions and enables new collaborative research.

The line of theoretical enquiry is carried forward by the article on Alexander Klein forthcoming in *JSAH*. Concurrently, recognition of my field research has opened up an opportunity to co-author, with two Mexican researchers, Enrique Perez and Lucía Martín, a book chapter on 'Marginalized Development and Ad-hoc Tactics for Growth,' to be included in an *Anthology of Marginalized Urbanism*. I have begun work on an *Atlas of Negotiated Typologies*, to be co-authored with Alexandru Malaescu and Iulia Frățiță, collaborators in several episodes of field research. The *Atlas* aims to provide a comparative overview over the varied strategies and tactics of irregular urbanism, presenting a series of diagrams that analyse and explain field research findings. Developing diagrammatic formats that can be shared across diverse episodes of field research and cultural contexts is envisioned to support a comprehensive and inclusive discourse on a global phenomenon. Diagrams will also inform the structure of the book. This latter aspect will be informed by prior research into 'Book-Worlds and Ordering Systems as Sites of Invention,' conjoining the vectors that drive my current research.

10,718 words

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Portfolio

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B. Compose and Choreograph	
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total D 13,267

Total Portfolio 67,321

PhD thesis 10,000

PhD thesis plus Portfolio 77,321

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