OPERATIVE TRANSLATIONS: DIAGRAMS BETWEEN THE ANALOG AND THE DIGITAL IN EARLY DESIGN EDUCATION

ANTJE STEINMULLER
California College of the Arts

CONTEXT

> "The diagram is a graphic presentation of the course of a phenomenon. It consists of lines, structure, form; it works with reduction, abstraction and representation. As a medium the diagram performs a double role: it is a mode of notation, resuming, analytic and reflective; but it also is a model of thought, generating, synthetic and productive. Diagrams are a self-evident part of our everyday life with its continuously growing complexity of information-flows."[5]

The role of the diagram in architecture is changing and multi-faceted. Spatial information technologies expand the data available for design, digital technologies enable both complex form-making strategies, and the fabrication of mass-customized parts. Diagrammatic systems have become vital tools for the navigation of this information, and for knowledge-building as well as production in the design process. Diagrams are broadly understood as "reductive machines for the compression of information"[6], visually summarizing large amounts of data. The changing role of the diagram in the design process in relation to digital media and fabrication has produced a critical debate in the 16 years since Toyo Ito coined the term "diagram architecture" in reference to the work of Kajuyo Sejima. Robert Somol has argued that diagrams have become the matter of architecture[7], as opposed to its representation. He elaborates that "the architects of the neo-avant-garde are drawn to the diagram because - unlike drawing or text, partis pris or bubble notation - it appears in the first instance to operate precisely between form and word"[8]. Diagrams, in this sense, become both "constitutive and projective, [...] performative rather than representational"[9]. Today's architectural diagram is also defined by a new form of repetition, facilitated by digital technology and parametric tools, changing from a representation of the singular idea to a mechanism for the production and control of multiplicity. In this, they are characterized by an exploration of difference, performance and potentials. The built outcome of the design process becomes only one manifestation of the wealth of virtual possibilities spread open by the diagram.[10]

In this environment, diagrammatic processes are becoming critical subjects in design education: In the context of the explosive expansion of information, diagrams have become crucial devices for accessing and navigating data to make it operational for design. In geometrically driven form-finding processes, diagrams are fundamental tools for understanding the potentials of formal decisions and organizational strategies. In fabrication, diagrams take on a critical role in the dialog between material components and the manipulation of modular aggregates. Generative design software applications like Grasshopper have become the facilitators of these diagrammatic processes, and their use is prevalent and manifold in many upper level design studios. Parametric modeling enables the negotiation of complexity, and enables the control of spatial and other performance. At the basis of this lie carefully calibrated transformations of systems through variables and relationships within rule sets - a specific way of thinking and working that can be employed independent of the use of software applications.

This paper argues that diagrammatic processes using basic parametric and algorithmic thinking can be taught independently of generative design software while building fundamental design skills through analog, material-driven exercises in early design courses. Beginning design studios have been considered an "ideal place, a breeding ground of sorts, for introducing such complex ideologies and developing programs needed for a new generation of designers that will be able to seek solutions from information processing or reasoning, rather than intuition."[11] In lieu of beginning architectural education with generative design software, introductory design courses can confront thinking with systems, variables, rule sets, and an understanding of their relationship to performance through acts of translation in a diagrammatic process – maintaining, at the same time, the importance of working directly with material through analog processes as a foundation skill prior to engaging with complex technologies. This paper looks at the way in which diagrams unfold information in this process, arguing that translation between different media, and interrelated processes of abstraction, take on a catalytic role in understanding and navigating emerging potentials. Exercises from two different beginning design courses are used as case studies, revealing diagrams in operation. The use of diagrammatic processes in the case studies serves as a way of developing methods of working and thinking that navigate formal complexity, potential and performance, and prepare students for later studios that involve the use of generative design tools. Simultaneously, the nature of the exercises grounds formal exploration in the realities of material capabilities and spatial potential.

CASE STUDIES

The two case studies presented here are exercises in introductory studio courses within a three-year Master of Architecture program, and have an emphasis on learning through working 1:1 with material performance and constraints. Both case studies employ drawing as a diagrammatic process: as an analytical and exploratory vehicle through transposing a set of systems from one mode of working into another. Case study 1 begins with a series of folded physical constructs, refining and translating the operations via a diagrammatic process optimizing material and/or technique. Case study 2 departs from a 2D source image, using diagrams in the process of translating 2D information into 3D material constructs. The diagram here, as in Sanford Kwinter's description of Reiser Umemoto's practice, serves "retroactively as a 'reading device' or as a combustion engine that extracts information and energy from the environment"[12]: In the diagrammatic process, the information contained within each material construct is transmitted selectively, making tangible some (but not other) parameters through articulation and control.

Case Study 1- Methodology

This 3-week intensive exercise introduced basic design processes as non-linear workflow, yet a rigorous and critical process. Students begin with simple spatial operations carried out using card-stock (Fig. 1a). *Fold* is a common operational verb for all students as a primary way to add strength and three-dimensionality to a flat sheet. A second verb is chosen as a secondary operation (e.g. *rotate*, *split*, *undulate*, *refract* etc.). In the subsequent diagrammatic process, students produce a matrix of drawings (Fig. 1b-d) using AutoCAD and Adobe Illustrator. The matrix aims to identify systemic qualities, variable parameters, their possible articulations (embedded potential), and effects. Lastly, embedded organizational strategies are explored through small aggregations. In a third step, a transformed and refined version of the operations and organizational strategies are translated back into a physical construct. A few performance criteria (spaces of different size, connectivity/linking/bridging) are added for this final translation, guiding material choice, control and craft.

Case Study 1 - Student Work

The student work in Fig. 1 started with parallel cuts into a card stock sheet, alternating between opposing edges. The primary verb, *folding*, was converted to *bending* as the primary operation. *Rotating* became a secondary operation. This weakening of the card stock sheet allowed the student to pull apart the sheet in a zigzag, bending individual strips in alternating directions, offsetting and rotating them, and interlocking them for stability (Fig. 1a). Select conditions of the construct were then broken out and scanned, revealing light/shadow interactions through conditions of overlap (Fig. 1b). A drawing set further selected specific local conditions of rotation and bending of the strips, beginning to understand larger-scale effects on the orientation of the whole through emerging axes (Fig. 1c). The third set of drawings proposed organizational strategies through the introduction of straight lines that anchor bent lines through connection points, and control curvature (Fig. 1d). While the initial construct had a wide range of variables (degree and frequency of curvature, overlap, rotation, height, etc.) and lacked control of the conditions produced, the diagrammatic process filtered out the specific relationship between bending/rotating and a datum (straight lines and anchor points). Material experiments based on this diagram explored various types of connection points for stability and the control of curvature according to programmatic performance criteria given in the assignment (Fig. 2a,b).

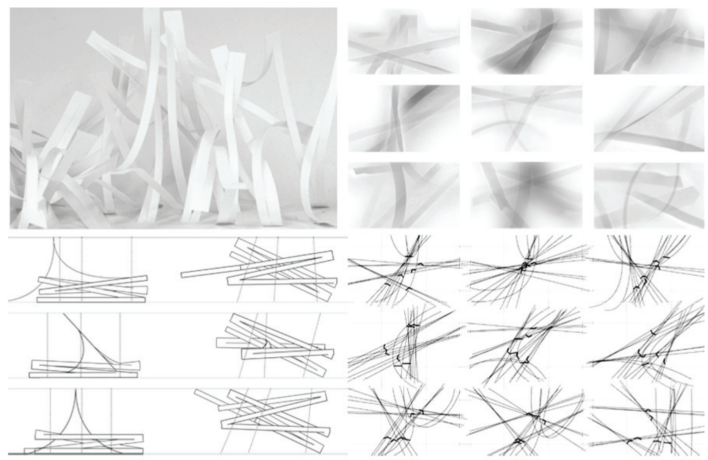

Figure 1a-d: 1a. Card stock construct, 1b,c,d. diagram matrix using scans, orthographic studies, and projections for aggregation

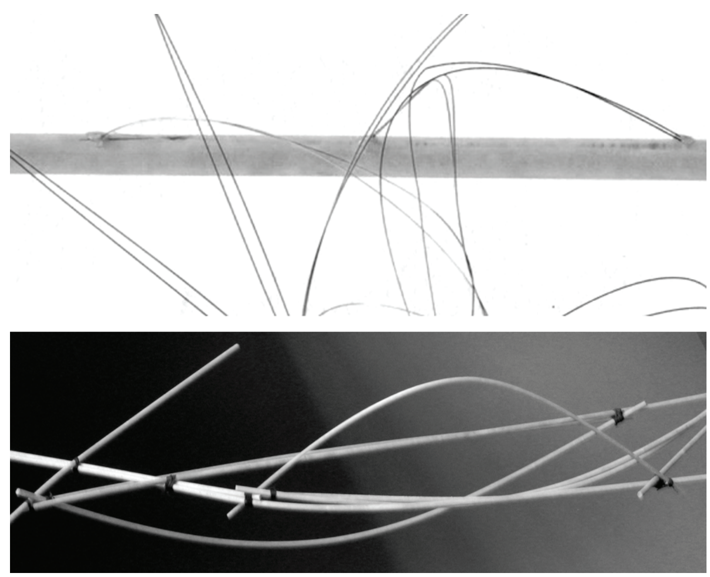

Figure 2a,b. Material constructs by two different students following a similar base diagram

In a second example, a student began working with small square modules folded in the same orientation along both diagonals. The folds produced bending and contraction on the edges of the card stock, lifting up the center of the square in the third dimension. These pieces were then arrayed by overlapping them along the fold lines (Fig. 3a). The intensity of the fold produced different degrees of height in the modules and degrees of curvature of the aggregate; the degree of overlap produced different material density and overall permeability (Fig. 3b).

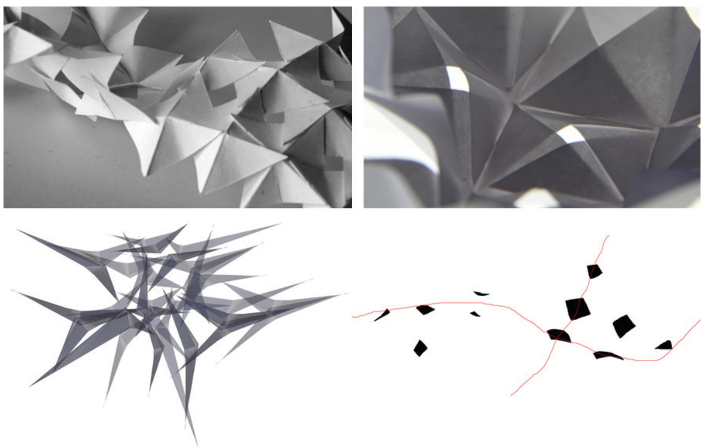

Figure 3a-d. Sample of a. material construct, b. scan, c. diagram of aggregation, d. diagram of void/curvature

The subsequent drawing process began with a set of visual instructions for production of the module (Fig. 4a). It also studied the interaction of light with material density produced by the overlap through serial scans and drawings (Fig. 3b,c), and the relationship of curvature to permeability by focusing only on the openings (Fig. 3d). Calling out the opening as a figure in the diagrams opened up a trajectory for the translation back into a material construct: the original square module was now cut (instead of folded) along the intersecting diagonals. The resulting construct was produced with a continuous curved surface in which the folds long the regularly placed diagonal cuts produced moments of stability and strength.

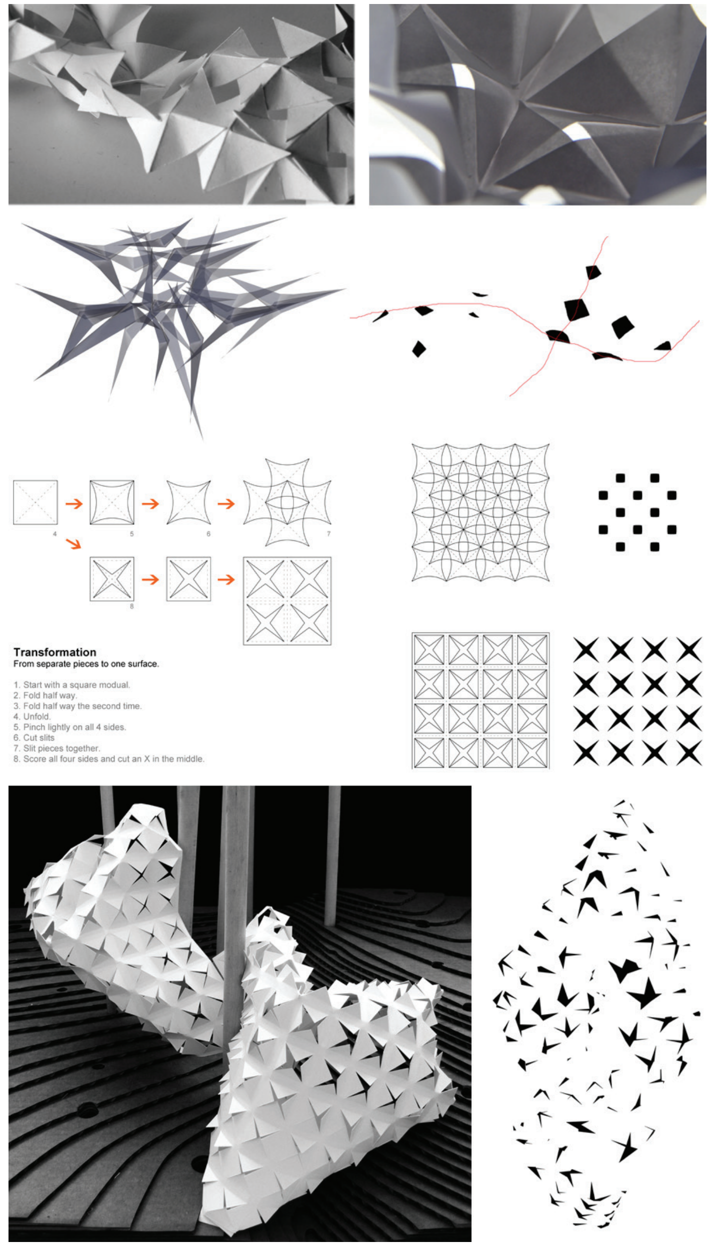

Figure 4a-c: a. diagrammatic instructions with transformation, b. final material construct, c. transformed void diagram

Case Study 2 - Methodology

This 4-week exercise takes as its subject the depth implied in a two-dimensional source image (abstract excerpts from paintings or illustrations). Students are asked to read a specific image through the lens of three methods of making/thinking: linear, planar and volumetric. As in the previous case study, a diagrammatic process serves as a 'reading device' to extract systems and relationships present in the image with the goal of translating these systems into three-dimensional physical constructs. Each of the methods of making/thinking forms the basis for one specific construct, leading students to iteratively analyze and transform the 2D source image via diagrams. Size and format for all constructs and drawings is given as a constraint. The exercise also serves as an introduction to working with a range of materials and contains plug-in tutorials for various tools and techniques in the school's shop facilities.

case study 2 - student work

In one example of the linear method, the diagram (Fig. 5b) identified a system of lines running along the length of the illustration (Fig. 5a). A second system of 'break lines' bent or displaced these base lines. Line weights and types within the drawing begin to indicate foreground and background, introducing a logic for three-dimensional

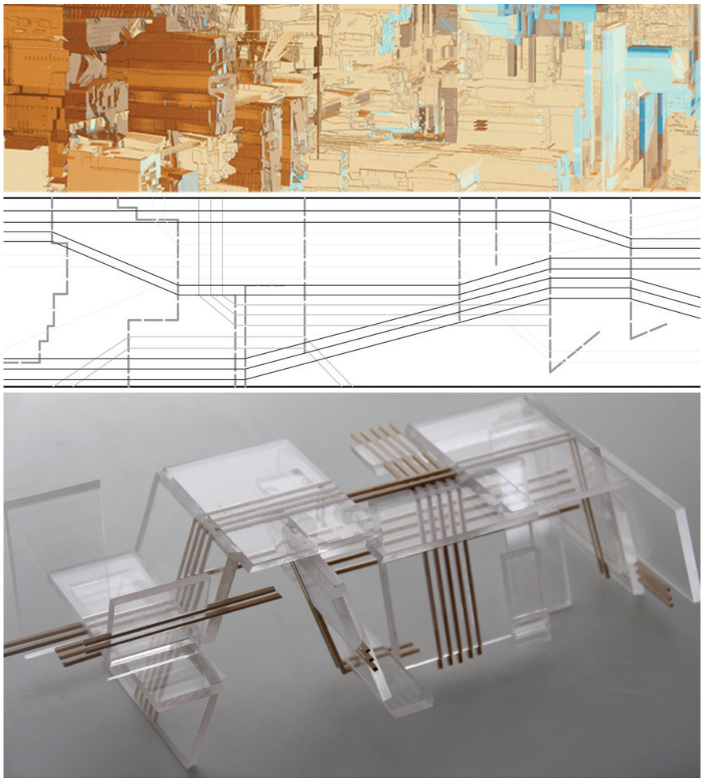

Figure 5a-c: a. source image (excerpt of a *Cities II* illustration by Atelier Olschinsky), b. linear diagram and c. material construct

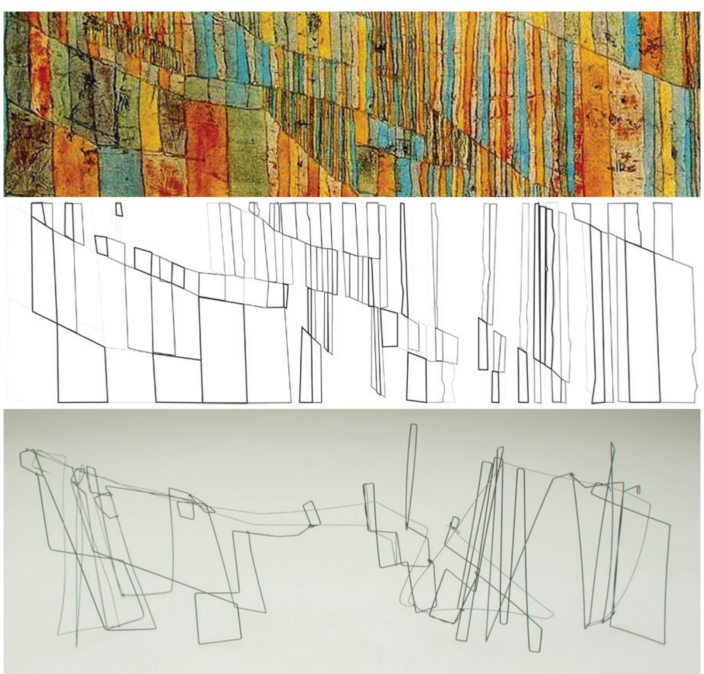

Figure 6. Translations of an excerpt of *Highway and Byways* (Paul Klee): linear

translation. In the material construct (Fig. 5c), the base lines were translated into basswood sticks. The ‘break lines’ were translated into a secondary material system (acrylic sheets with grooves for basswood sticks) that allowed the basswood sticks to change orientation in space. This material system was developed into a planar system, but the lack of transparency of the acrylic joints foregrounds their reading as lines in the overall construct. Reflections in the surface of the acrylic amplify the reading of the basswood lines.

The different methods of making/thinking used as lenses for the diagrammatic process in this exercise impose a reading of specific aspects and systems within the same source image. They also engender specific choices in the drawing language. Line weight, line type or tonal surface in the diagrams become devices to render implications of depth through rule sets employed in the reading of the source image, and are later translated into a three-dimensional logic for the material constructs. In the constructs based on Klee’s Highway and Byways (Fig. 6-9), the diagrammatic reading extracts systems based on line continuity (Fig. 8) and color occurrence (Fig.7). Line density, color, light and dark areas become triggers for interpretations of depth (Fig. 6, 9).

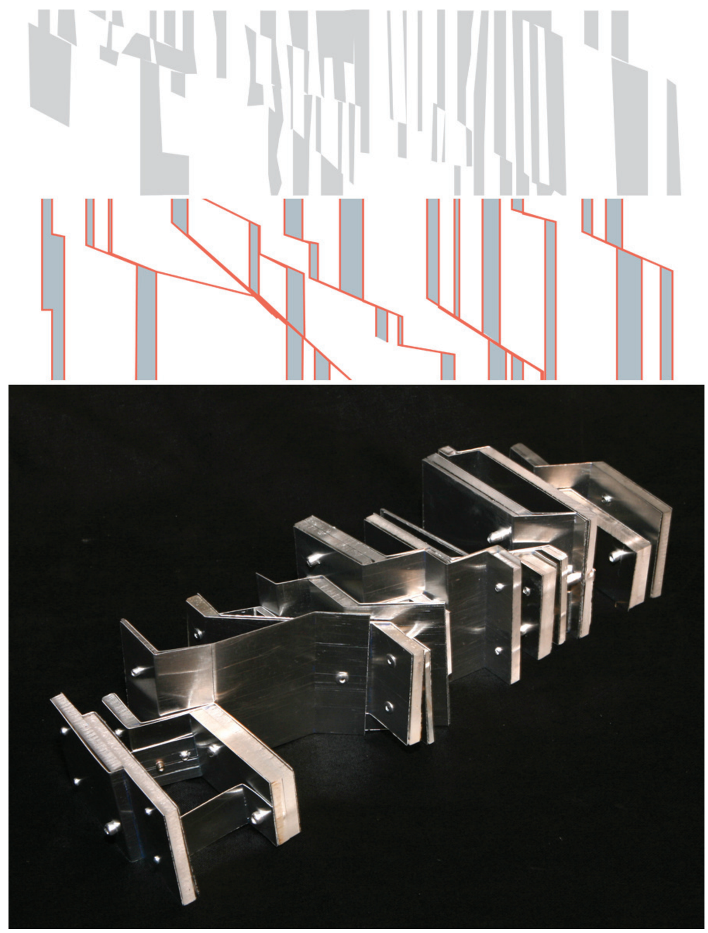

Figure 7. translations of an excerpt of *Highway and Byways* (Paul Klee): planar

ABSTRACTION AND TRANSLATION AS CATALYSTS

The following analysis examines the contribution of *abstraction* (extracting information) and *translation* (between 2D and 3D, between digital and material) to the production of knowledge through diagramming.

Translation

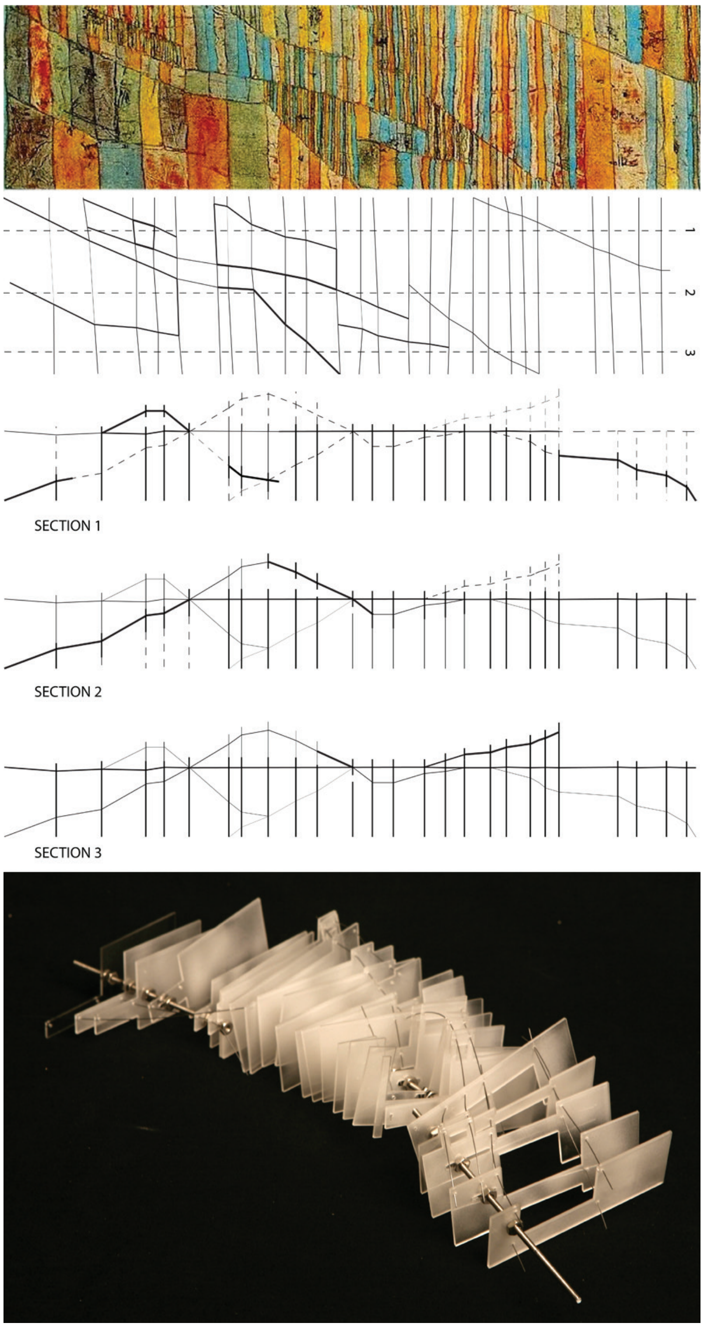

Figure 8a-c: a. plan diagram of continuous lines; b. translations of line density into heights in section diagrams; c. planar construct for *Highway and Byways* (Paul Klee)

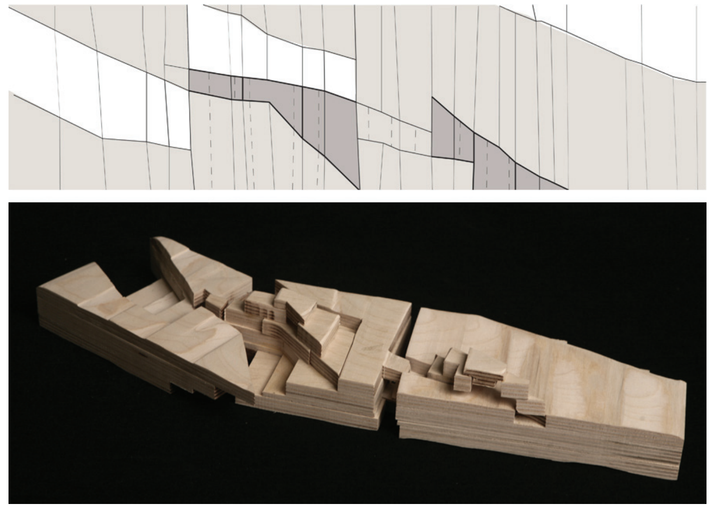

Figure 9. translations of an excerpt of *Highway and Byways* (Paul Klee): volumetric

In the diagrammatic process used in these case studies, the act of *translating* a set of operations into a new medium (material or software) and a new method of visualization (orthographic or other projections, drawing vs. physical making etc.) take on a catalytic role in the development of the projects. The term *translation*, in these case studies, describes the transfer of information between material constructs and two-dimensional drawings using basic digital tools (AutoCAD, Adobe Illustrator). In both exercises, these translations operate both analytically (describing select aspects/systems of what is there) and projectively (further articulating systems and capitalizing on potentials).

Both exercises asked students to combine an understanding of material capabilities with organizational strategies developed through the diagrammatic process. The approach to material is informed by Deleuze's analysis of matter and form "which attempts to replace essentialist views of the genesis of form (which imply a conception of matter as an inert receptacle for forms that come from the outside) with one in which matter is already pregnant with morphogenetic capabilities, therefore capable of generating form on its own"[13]. As one reading of material capabilities, the work in Fig. 5c capitalized on a range of material-specific potential in the acrylic: the material was primarily chosen for its transparency (to foreground the basswood lines), and for moments in which this transparency 'breaks' through reflection or joints. In specific light conditions, the reflective qualities amplify the reading of the basswood lines, while the joints manifest thicker types of 'lines' within the construct. The acrylic system as a whole exists in response to the lack of bending capability in the basswood sticks.

Similarly, the visualization methods, or the capabilities and constraints within the software used, imposed their own qualities or limitations onto the diagram, engendering abstraction and bringing for-

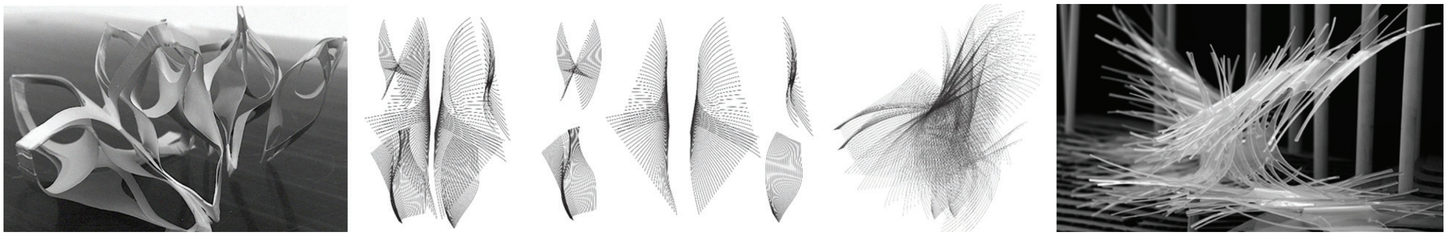

Figure 10a-c: a. card stock modules; b. line work translation; c. subsequent material choice

ward previously unseen aspects: The digital scans of the paper strips in Fig. 1b foreground relationships between straight and curved lines beyond the specifics of the card stock construct. The further flattening of these lines in the orthographic CAD diagrams further intensifies this reading (Fig. 1c). The relationships found in these visualizations then triggered an exploration of curvature in relation to stabilizing axes and connection points in a secondary set of diagrams (Fig. 1d). In Fig. 10, the representation of card stock curvature through parallel line work in a three-dimensional line drawing in Rhinoceros revealed a reading of material densities in the paper constructs through the ‘dissolving’ of the surface in the line drawing. This triggered both material choice and transformation of the base modules in subsequent constructs where material overlaps became part of both structural assembly and perceptual effect.

Abstraction

Acts of translation from 3D to 2D, or between media or drawing methods, bring with them a form of abstraction as any new medium or method will not be capable of holding all aspects of what is being translated. This first layer of abstraction already leads to an automatic reduction of what is being taken into consideration and produces foregrounding of specific aspects or relationships. Through this close connection of translation and abstraction, the diagrammatic process in the first case study defamiliarizes the card stock constructs and opens up new readings.

A second act of abstraction moves beyond elimination of information by default towards intentional emphasis of a chosen set of relationships or effects. The diagrammatic matrix in case study 1 engenders the pursuit of a range of specific aspects found within the card stock constructs, including articulation specific of parameters (as in the fold pairings in Fig.11), perceptual effect (degrees of permeability through the openings in Fig. 3d) and embedded organizational strategies for aggregation (rotation within linear array in Fig. 10b,c). In the exploration in Fig. 3, the diagramming of void conditions and permeability to light became the trigger for a change in the material system in which the folded voids become operational as stabilizers within a larger surface (Fig. 4b). In case study 2, diagrammatic abstraction from an already two-dimensional source image is used as a tool to identify embedded formal systems, and to form a basis for the development of three-dimensional rule sets for future translation into a material construct. Here, the line drawing can be considered a sectional diagram in which a process of abstraction eliminates color, texture and surface specificity of the source image in favor of revealing spatial and organizational relationships. The diagram here reveals its nature as a “reductive machine”: one that generates the space for decisions about three-dimensional relationships and the contribution of material and assembly.

THE ROLE OF SYSTEMS, PARAMETERS AND RULE SETS

Through translation and abstraction, diagrams focus the formal investigation and heighten the understanding of inherent potential. The diagrammatic process in the case study exercises also lays the foundation for systems-based thinking, and provides fundamentals for thinking with changeable parameters and rule sets in preparation for the use of generative design tools in later studios. The integration of formal explorations with basic performative criteria (simple programs, goals for light permeability, response to a specific external condition, optimization of material assembly etc.) also plays a critical role in both case studies, setting the ground for a critical dialog of form-making with a range of external concerns.

Systems

Fritjof Capra defines a system as “an integrated whole whose essential properties arise from the relationships between its parts.”[14] The diagrammatic process described in the case studies focuses on the identification of specific components and their relationship to each other, rather than on overall shape or figure. The source images in case study 2 are chosen with attention to repetitive, clearly identifiable components that operate in specific relation to one another. Students use diagrams iteratively as reading devices for components through a linear, planar and volumetric lens. The translation into material assemblies in this exercise touches on questions of hierarchy and interdependence of systems as they find expression in the physical constructs. As the linear reading in Fig. 5 shows, the student identified primary directional lines as a first system that is affected by a set of perpendicular elements - a secondary system - causing shifts and directional changes. Line densities and tone were used as an abstract rendering of the corresponding component relationships in the source image. The material translation both abstracted and amplified these relationships through specific rule sets.

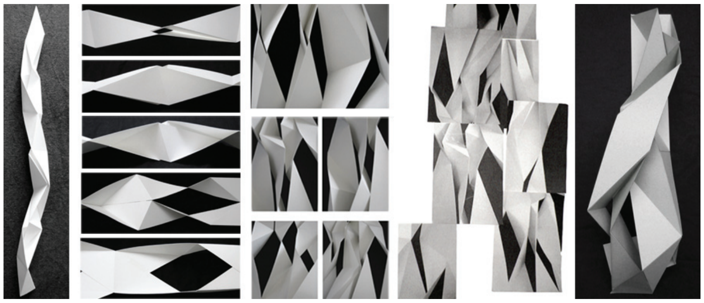

Figure 11. photographic matrix of fold components, fold relationships, aggregate system and final composite

In case study 1, the aggregation of component parts through the diagrammatic matrix introduces a discussion of systems: students clarify the operations used in their card stock studies, and discover embedded potentials for putting individual components in relationship to others in an emerging system. Changes to the individual components become associated with their impact on the composite whole. In Fig. 11, two entangled strips of folded card stock were analyzed through a photographic matrix for individual fold components and pairings, and then assembled through collage and assessed for their interactions. The resulting material construct produced a controlled system of repetitive folded conditions played out along a specific sequence of interior spatial relationships.

Parameters

As diagrams became the vehicle for translating information from one medium into another in both case study exercises, a generative 'DNA' was being extracted in the form of variable parameters. The example in Fig. 12 and others from case study 1 also illustrate the beginnings of parametric thinking: the diagrammatic matrices begin with calling out basic parameters. Subsequent drawings track possible variations and latent attributes the effect of which is tested in the aggregation studies. The diagrams, thus, build knowledge about the parameters involved in the operations, their formal and performative capabilities, and serve as a technique for the control and manipulation of the whole.

Rule Sets

Other elements of the exercises introduced the development of well-understood rule sets for the tectonic assembly of material components and the production of aggregate constructs. Understanding material capabilities in relationship to organizational systems becomes a critical part of this process. Specifically case study 2 focused on the development of rule sets in relation to introducing the third dimension into the diagrammatic reading of the source image: in Fig. 8, fields with specific line density in the Klee painting are translated into a gradient of heights (Fig.8b). The continuous lines in the painting (Fig. 8a), become material 'registers' in the form of acrylic plates (Fig. 8c). The rule set articulated in section is translated into of cuts and notches in the acrylic sheets, manifesting

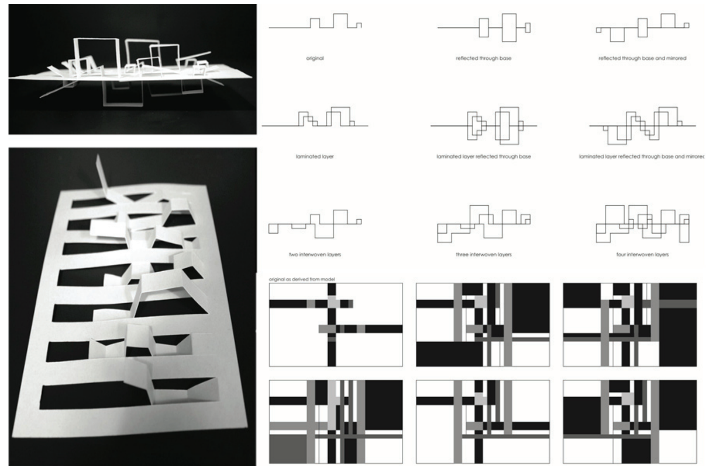

Figure 12a-c: a. folding operations in card stock constructs; b. line drawing varying basic fold parameters; c. aggregation of conditions in plan (grey values correspond with specific heights)

not only heights, but also the intersection with the diagonal lines from the painting. Attachments through wire and threaded rod follow these diagonal lines, and an additional rule set for their height. One of the goals of the exercise was that the tectonic assembly in the constructs is sufficiently clear for someone else to work with the rule set in order to produce other conditions with it. The rule set in the material construct, thus, can take on a life of its own beyond the Klee source image.

Form and Performance

While formal explorations form the beginning of both exercises, each of them engages notions of performance as part of the design process. Case study 1 discusses performance through the evaluation of spatial qualities (Fig.11) or perceptual effects (Fig.3,4) in the diagram matrix. Specific performative qualities of the card stock constructs, here, become the content of translations into 2D with the goal to understand the parameters that drive this performance for later manipulation. Case study 2 considers material performance in the sense of embedded material qualities (see Fig.5), their structural potential, bending capability (Fig. 2b), or strategies for attachment (role of aluminum 'links' in Fig.7). The basis for this understanding is laid through diagramming, unfolding a specific performance of components through drawing.

CONCLUSION

Through this analog introduction of systems with variable components and configurative rule sets, both exercises engender the beginnings of a parametric mindset in students and prepare them for working with generative design software and algorithmic processes later in their education. The diagram, in this process, becomes the tool with which systems are identified, laying open components and relationships. It is the diagram that unfolds parameters to be manipulated, and lays the ground for rule sets to be defined. As a result, diagrams have a catalytic role in the process, making information from one stage operative through interlinked processes of translation and abstraction, and generating directions and development. This builds the foundation for the use of diagrams are devices for iterative research into possibilities embedded in organizational and material systems.

Epilog: Working with Generative Design Tools in Later Studios

In an advanced studio on the introduction of ecological performance parameters into urban zoning in Chinese cities, Grasshopper was used as a tool for rapid and iterative evaluation of the impact of certain performance criteria on specific typologies on the site. Here, a diagrammatic process of 'decoding', 'transcoding' and 'recoding'[15] was used to transform specific local conditions (like the characteristic mixed densities within the urban block) of a neighborhood in Tianjin into new, ecologically high-performing urban typologies.

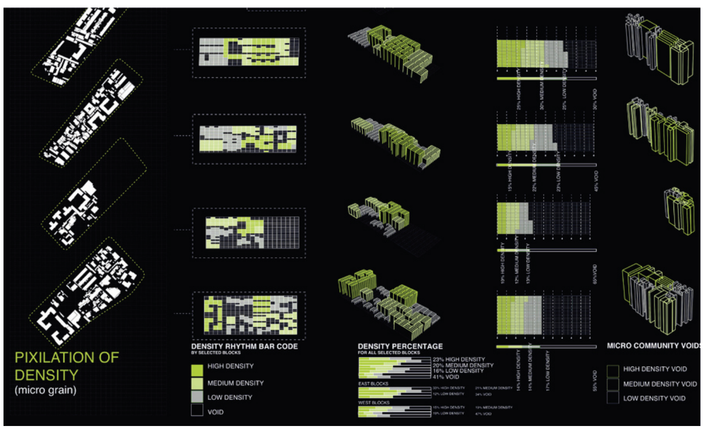

Figure 13. MADE for CHINA Studio: density analysis diagrams

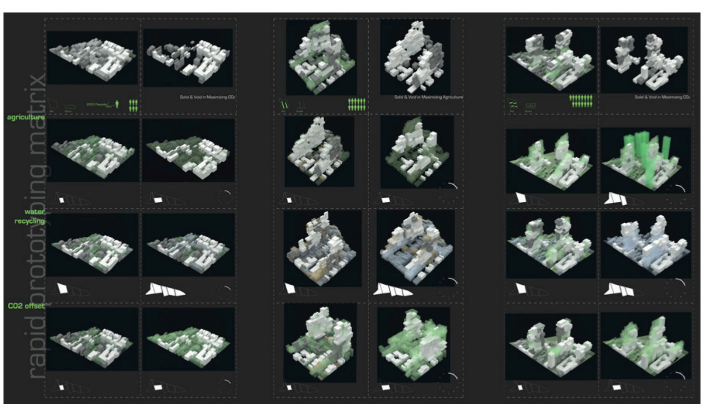

Figure 14. MADE for CHINA Studio: Grasshopper diagrams showing performance parameters

The student team in Fig. 13 analyzed the mix of different built densities within existing urban blocks, 'transcoding' them by using a spatial base module found in the context as a 'pixel'. Idiosyncratic local conditions are thus abstracted into a diagram of relationships between coexisting densities (second and third column in Fig. 13), and ultimately translated into a quantitative form (bar codes, fourth column in Fig. 13)). In the final step of 'recoding' (Fig. 14), the relationships between diverse solid and void conditions were embedded with specific performance parameters for the void spaces (agriculture, greywater gardens, CO2 offset). A Grasshopper script quickly produced a range of diagrammatic typological prototypes for different population densities.

CREDITS

All student work in Fig. 1-12 is the outcome of MArch Studio 0, and MArch Visual Digital Media 1, two beginning design courses at California College of the Arts. Student work in Fig. 13-14 stems from an Advanced Studio at California College of the Arts in collaboration with CCA URBANlab.

Figures 1, 2: Student work: Brendon Williams, Frances Reid; Instructors: Christopher Falliers, Keith Plymale, Antje Steinmuller
Figures 3, 4: Student work: Ling Hu; Instructors: Christopher Falliers, Keith Plymale, Antje Steinmuller
Figure 5: Student work: Anthony Quivers; Instructor: Antje Steinmuller
Figure 6: Student work: Alana Young; Instructor: Antje Steinmuller
Figure 7: Student work: Kenneth Lin; Instructor: Antje Steinmuller
Figure 8: Student work: Sarah Estephan; Instructor: Antje Steinmuller
Figure 9: Student work: Sarah Estephan; Instructor: Antje Steinmuller
Figure 10: Student work: Sha Li; Instructors: Christopher Falliers, Keith Plymale, Antje Steinmuller
Figure 11: Student work: Coren Rau; Instructors: Christopher Falliers, Keith Plymale, Antje Steinmuller
Figure 12: Student work: Stephanie Tabb; Instructors: Christopher Falliers, Keith Plymale, Antje Steinmuller
Figure 13,14: Student work: Souzan Kachbi, Salar Moazzensafaei, Pranay Mowji; Instructors: Mona El Khafif, Antje Steinmuller

ACKNOWLEDGMENT

This paper was supported by California College of the Arts, Faculty Development Grants.

ENDNOTES

1 Mark Garcia. "Epilogue", in *The diagrams of architecture,* ed. Mark Garcia (Chichester: Wiley, 2010), 310-312.

2 see Robert Somol. "Dummy Text, or The Diagrammatic Basis of Contemporary Architecture", introduction to *Peter Eisenman: Diagram Diaries* (London: Thames & Hudson, 1999).

3 Gilles Deleuze, "The Diagram" in *The Deleuze Reader,* trans Constantin Boundas and Jacqueline Code, (New York: Columbia University Press, 1993).

4 Ben van Berkel, Caroline Bos. "Diagrams - Interactive Instruments in Operation" in ANY 23 - Diagram Work, ed. Cynthia C. Davidson, guest eds. Ben van Berkel and Caroline Bos (New York: Anyone Corporation, 1998), 19-23.

5 Like Bijlsma, Wouter Deen, and Udo Garritzmann, Introduction to OASE 48 (1998).
6 Ben van Berkel and Caroline Bos, “Diagrams - Interactive Instruments in Operation, in ANY23 Diagram Work: Data Mechanics for a Topological Age (1998): 20.
7 Robert E. Somol, “Dummy Text, or the Diagrammatic Basis of Contemporary Architecture,” in Peter Eisenman: Diagram Diaries (New York: Universe Publishing, 1999): 7.
8 Somol, “Dummy Text”, 8.
9 Anthony Vidler, “Diagrams of Diagrams: Architectural Abstraction and Modern Representation”, Representations 72. (2000): 6.
10 see Somol, “Dummy Text”.
11 Jonathan Anderson, Ming Tang, Maria Vera, Shai Yeshayahu, “Parametric Thinking [Not Modeling] as a Generator (paper presented at the National Conference on the Beginning Design Student (NCBDS), Lincoln, Nebraska, April 1-2, 2011).
12 Sanford Kwinter, “The Judo of Cold Combustion”, in Atlas of Novel Tectonics, Reiser + Umemoto (New York: Princeton Architectural Press, 2006): 12-15.
13 Manuel De Landa, “Deleuze, Diagrams, and the Genesis of Form”, in ANY23 Diagram Work: Data Mechanics for a Topological Age (1998): 30.
14 Fritjof Capra, The Web of Life - A New Scientific Understanding of Living Systems (New York: Anchor Books, 1996).
15 Mona El Khafif and Antje Steinmuller, “MADE FOR CHINA: Transcoding local Patterns into Ecologically High-Performing Urban Prototypes” (paper presented at the ACSA Fall Conference, Houston, Texas, October 6-8, 2011).