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THE FABRIC OF  
ARCHITECTURE  
DIGITAL STRUCTURES,  
OPERATIONS,  
AND INSTITUTIONS



**SYNTHETICS: FROCK COATS AS DIAGRAMS**

Between 1833 and 1867, the medium of clothing became the subject of philosophical musing, architectural theory, and economic critique. Focusing on three texts: Thomas Carlyle's "Sartor Resartus," Gottfried Semper's "Stil," and Karl Marx's "Das Kapital," this paper will consider how and why the practice of tailoring in the nineteenth century lent itself to a metafictional account of a Philosophy of Clothing, the development of the "Bekleidungsprinzip," and an analysis of the value form ("Wertform"). In each of these synthetic texts, the figure of the frock coat became a means of diagramming a particular apparatus.

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T'AI SMITH is an Assistant Professor in the Department of Art History, Visual Art & Theory and a Wall Scholar in the Peter Wall Institute of Advanced Studies at the University of British Columbia, Vancouver. Recipient of the American Craft Council's Emerging Scholar Award (2015), her writings have appeared in "Art Journal", "Art Practical", "Grey Room", "Journal of Modern Craft", "Texte zur Kunst," and "Zeitschrift für Medien- und Kulturforschung." Her first book, "Bauhaus Weaving Theory: From Feminine Craft to Mode of Design," was published by University of Minnesota Press in 2014. She is currently developing a new book project on textiles as figures of thought within art, philosophy, and political economy under capitalism.

**METTE RAMSGAARD THOMSEN**, The Royal Danish Academy of Fine Arts, Copenhagen

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**THE TENT AND THE TAPESTRY: TEXTILES AS A MODEL AND MATERIAL FOR ARCHITECTURAL POETICS**

The talk discusses traditions for conceiving and understanding textiles in architecture. Contrasting the traditions of structural membranes with the poetic potentials of textiles as transformative material, Mette will present examples of works that cross these boundaries. Mette will showcase how textile structures can serve as models for material thinking in architecture with a special focus on computation and digital fabrication.

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**METTE RAMSGAARD THOMSEN** is an architect working with digital technologies. Her research centers on the relationship between crafts and technology framed through "Digital Crafting" as way of questioning how computation, code, and fabrication challenge architectural thinking and material practices. Her work is practice led, and through projects such as "The Rise", "Shadow Play", "Thicket", "Strange Metabolisms," and "Vivisection," she investigates the design and realisation of a behavioural space. Mette is professor at the Royal Danish Academy of Fine Arts, School of Architecture, where she heads CITA (Centre for Information Technology and Architecture).

## THE INFLUENCE OF COMPUTATIONAL REPRESENTATION ON ARCHITECTURE

Central to the discussion regarding the development and influence of computing on architecture is the distinction between two uses of computers in architectural practice: computers may, on the one hand, aid conventional architectural practice. On the other hand, unique computational concepts not previously used in architectural design may directly influence the architect's creative process. Conventional CAD modelling is an example of the first use of computing in architecture, whereas design computation reflects the second use. We can describe conventional CAD drawing or modelling as analogous to "word processing," and design computation as analogous to the use of a "spreadsheet" application. With word processing, the author [or architect] directly creates the delivered document. The interaction with a word processor, or with an architectural modelling application, uses "direct manipulation," and in an "age of automation" it is still anachronistically "manually intensive." With a spreadsheet application - or design computation - the author [or architect] does not only operate on the final delivered document or model. The architect also uses the application to create a system of relationships - or an algorithm - which, when executed, will create the desired result. This presentation will explore how the change in architectural representation from model to program has had a profound influence on architecture.

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ROBERT AISH is Visiting Professor of Design Computation at the Bartlett School of Architecture at UCL, London. He has been a major figure in the development of new computational technologies in architecture since the 1970s. He was previously Director of Research at Bentley, where he lead the development of GenerativeComponents and Director of software development at Autodesk where he lead the development DesignScript. He is also a cofounder of the Smartgeometry Group. He studied industrial design at the Royal College of Art in London and holds a PhD in human computer interaction from the University of Essex.

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**CURATING COMPUTATIONAL ARCHITECTURE AND DESIGN**

What does an architectural exhibition mean in the computational era? Between digital design and robotic fabrication, how might one reveal the relationships among architecture, engineering, biology, and the computer sciences? What is the best manner to display how the computer sciences meet up with the evolutionary dimension of the living? How might an exhibit synthesize models, interactive installations, pavilions, hybrid objects of design? Which paradigms can authorize the coexistence of objects stemming from the engineering of the living and crafted objects? A new multi-scaled artifact declines itself from model to prototype, from installation to "behavioral environments." Is it a new kind of "Wunderkammer" where we find on the same level scientific, natural, and hybrid objects? The exhibition of computational architecture puts together processual elements with proto-objects between prototype and architecture in order to experiment with objects on a 1:1 scale. An evolving form of materiality connected to a physical and cognitive environment informs the exhibition of these objects. The question at issue here is how to present architecture and design in a performative way, with a morphogenetic dimension.

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MARIE-ANGE BRAYER is the Chief Curator and Head of the Design and Industrial Prospective Department MNAM-CCI, at the Centre Pompidou in Paris. The former Director of the FRAC Centre in Orléans, Brayer served as a curator of the French Pavilion of the Venice Biennale of Architecture in 2002. She also curated ArchiLab in 2013, the exposition she co-founded with Frederic Migayrou in 1999. As an art and architecture critic, she has published numerous articles in her field as she pursues her research interests regarding the history of the representation of architectural models.

### THE PROCESS OF DESIGNING AND ITS ENDS

The most intriguing, challenging, and discomfoting qualities of design processes are their relations to time, for they deal with future situations and objects, and thus with nondescript conditions. In my paper I will describe the process of designing as a multifaceted cultural technique to overcome the uncertainties involved in planning and designing. The questions to be discussed include: How is actual uncertainty reflected in standard-procedures in architecture? How do designers react to this uncertainty? What is the role of different types of knowledge in the process of projecting a certain future? What is the impact of defined cultural practices, and how are these transformed in the process of designing? How does the process of designing affect the role and productivity of media involved in this process? And what are the ends of designing?

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SUSANNE HAUSER is a Professor of Art History and Cultural Studies in Architecture at the University of the Arts, Berlin. She has held positions with the Technischen Universität Berlin, the Universität Kassel, the Technischen Universität Graz, the EHESS in Paris, and the Södertörns Hogschola in Stockholm, among other institutions. Having been a student of history, linguistics, literary studies, and art history in Bonn, Freiburg and Berlin, Hauser received her PhD from the Technischen Universität Berlin and completed her Habilitation at the Humboldt-Universität zu Berlin. Her research interests consider the theory and history of the city and the landscape, as well as the relationship between architecture and cultural production. Her publications include "Kulturtechnik Entwerfen. Praktiken, Konzepte und Medien in Architektur und Design Science" (with Daniel Gethmann, ed., Bielefeld 2009), and "Architekturwissen. Grundlagentexte aus den Kulturwissenschaften," Vol. II (with Christa Kamleithner and Roland Meyer, eds., Bielefeld 2011-2013).

**AUTOMATISMS OF THE AUTOMATIC: ARCHITECTURE THROUGH COMPUTATION**

Thinking about the condition of music, painting, and film in the 1960s and 1970s, the philosopher Stanley Cavell introduced the concept of "automatism" to characterize modernist artistic practices. Cavell's argument is that while pre-modernist artists could reply upon, and work within, established forms and genres, the modernist artist, in the absence of such stable forms, can not simply produce works, but must first produce a way of working - what Cavell calls an automatism. My paper argues that this notion - especially Cavell's observation that artistic production often involves "automatisms of the automatic," that is, automatisms that work through automated technical devices - is especially apt for contemporary architecture, for which computationally-based representation has become central. I examine the implications for architecture of Cavell's distinction between the merely automatic and what he means by automatism; the related issues of organization and chance; and the productively irresolvable tension between the abstractions of computation and the worldly conditions of building.

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SEAN KELLER is Associate Professor and Director of Architectural History and Theory at IIT Chicago. His work focuses on the relationship of architecture and technology after 1945. His writing has received a Warhol Foundation Grant and a Winterhouse Award. He has taught at Harvard and Yale universities and is a trustee of the Graham Foundation. He is a frequent contributor to "Artforum" and has written for numerous anthologies and journals, including "Grey Room", "Perspecta," and "Journal of Architectural Education." He has two books forthcoming: "Automatic Architecture" (University of Chicago Press) and - with Christine Mehring "Munich '72" (Yale University Press).



### POIESIS - THE FABRIC OF MAKING

Today we use bacteria to produce energy and we train slime molds how to calculate shortest paths. We utilize all sorts of organisms to implement technical functions and envision programmable matter that has the ability to freely change its physical properties dependent upon user input. But what is the common ground underlying the discussion of these different forms of artifacts and technics? The presentation will reintroduce the notion of "poiesis" to conciliate reason and perception with material and information. We consider this philosophical term as the still missing theory of all possible forms of production. The fact that a theory of "poiesis" has never been accomplished might be one reason that European culture hasn't intellectually mastered technics. So it is hardly surprising that we still lack criteria to govern decisions regarding what should be produced in the nearly endless field of scientific and technical production. Hence this talk is not primarily about knowing "how" but more about knowing "why," and will present specific examples that reveal some of the fundamental conditions of making.

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GEORG TROGEMANN is Founder and Head of lab3 at the Academy of Media Arts Cologne. After working as a carpenter he studied Computer Science and Mathematics at the University of Erlangen. Theoretical research in the field of supercomputing ensued. In 1990 he finished a dissertation on performance evaluation of massively parallel algorithms. Since 1994 he has served as a Professor for Experimental Informatics at the Academy of Media Arts Cologne. He is the author of the book "CodeArt" and editor of "Code und Material - Exkursionen ins Undingliche."

**INTEGRATED PLANNING AND DESIGN OF URBAN AGGLOMERATION:  
BERNHARD HAFNER'S SIMULATION OF ALTERNATIVE URBAN PROTOTYPES**

The beginning of cybernetic simulation programs for the development of urban agglomerations in the 1960s was directed by architects and systems scientists. Starting in 1967, the Architecture Machine Group developed "Urban5" as a planning program for urban participation based on man-machine-dialogues. The systems scientist Jay Wright Forrester conceived "Urban Dynamics" in 1969 as a computer simulation of the interdependence of urban population, housing, and industry in the urban fabric. In 1967 the architect Bernhard Hafner began to work on a program for the "Simulation of Alternative Urban Prototypes," which he developed from the assumption that the system design of urban forms had to be accompanied by the simulation of fields of urban dispersion. This in turn was aggregated by different attractors in urban development, such as employment, commercial services, industries, and population. The paper discusses Bernhard Hafner's program for the "Simulation of Alternative Urban Prototypes" as a digital tool for the integrated planning and design of urban agglomeration.

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**DANIEL GETHMANN** is Assistant Professor at the Institute of Architectural Theory, History of Art and Cultural Studies at Graz University of Technology. He is the Executive Editor of "GAM Graz Architecture Magazine." His research focuses on the fields of architectural research and cultural sciences, history and theory of cultural technologies, auditory culture, and media theory. Recent publications: "Die Enden des Kabels. Kleine Mediengeschichte der Übertragung" (kadmos 2014) (with Florian Sprenger); "Übertragung und Speicherung. Architektonische Beiträge zur Medientheorie der Wand," in Susanne Hauser, Julia Weber, eds., "Architektur in transdisziplinärer Perspektive. Von Philosophie bis Tanz. Aktuelle Zugänge und Positionen" (transcript 2015).

**DRAWN IN SAND: NUMBERS AND THINGS**

It has been almost fifty years since Michel Foucault ended "Les mots et les choses" (1966) with the erasure of the human, "like a face drawn in the sand at the edge of the sea." Since then, most of the attention and anxiety devoted to this image has focused on the face. I would like to focus briefly on the sand. While Foucault wrote, sand and silica became the material basis for the computers that were busy rearranging the "order of things." Textuality was one way (though not Foucault's) of describing the resulting displacement of humans -subjects, authors, beings, and others - into the cross-hatched fabrics or textiles of language. Replace words with numbers, coded in silica, and you get the basics of a computational practice into which architecture was written from the beginning. This paper will reflect historically on resulting techniques for drawing in sand with numbers, performed by an apparatus (dispositif) that was itself erected on and in valleys of sand, or silica.

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**REINHOLD MARTIN** is Professor of Architecture in the Graduate School of Architecture, Planning, and Preservation at Columbia University, where he directs the Temple Hoyne Buell Center for the Study of American Architecture. Martin is a member of Columbia's Committee on Global Thought and was a founding co-editor of the journal "Grey Room." His research concentrates on two related areas: the material, architectural, and urban history of knowledge infrastructures, and thinking the contemporary city under globalization. His books include "The Organizational Complex: Architecture, Media, and Corporate Space" (MIT Press, 2003) and "Utopia's Ghost: Architecture and Postmodernism, Again" (Minnesota, 2010). Currently, Martin is working on a history of the American research university as a media complex, and a set of theoretical essays on the contemporary city. The latter is excerpted as an e-book, "Mediators: Aesthetics, Politics, and the City" (Minnesota, 2014).

**ACTIVE MATTER: 3D-CODE IN WEAVING, FOLDING, AND BUILDING**

Recent materials research shows that matter is no longer the passive element for implementing and realizing design strategies. Matter itself develops architectural structures. Thus the focus turns from computational design to the design strategies of active matter. This material 3D-code can be described as folding algorithms and mechanics, where 1D weaving, 2D folding, and 3D building represent a new fabric of architecture. From Semper and Fröbel, to Fuller and Fratzl, there are historical, conceptual, and technical contexts for challenging architecture in a fundamental way.

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**WOLFGANG SCHÄFFNER** is a Professor for the History of Knowledge and Culture at the Institute of Cultural History and Theory at the Humboldt-Universität zu Berlin, where he is also Director of the Hermann von Helmholtz-Zentrum für Kulturtechnik and Director (together with Horst Bredekamp) of the "Image Knowledge Gestaltung" Cluster of Excellence. He has been the Permanent Guest Professor and Director of the Walter Gropius Program at the Faculty of Architecture, Design and Urbanism at the University of Buenos Aires since 2005, and has held fellowship positions with the Universidad de Buenos Aires, Harvard University, MAST Rio de Janeiro, and the Universidad Complutense de Madrid. His research interest include the history and theory of structures and geometric operations, architecture of knowledge, interdisciplinary design of knowledge, material epistemology, transatlantic knowledge transfer (Europe-Ibero-America). His most recent monograph is "Punkt 0.1. Zur Genese des analogen Codes in der Frühen Neuzeit" (forthcoming).