Design and Research: Shared Territories

Design Research Institute
Xi'an Jiaotong-Liverpool University
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Design Research Institute, Xi'an Jiaotong-Liverpool University

Thomas Fischer

XJTLU's Design Research Institute (DRI) is a new transdisciplinary initiative aimed at fostering design research as a speculative and rigorous project-based form of enquiry that offers the sciences, the arts, the humanities, engineering and society at large valuable insights into processes that lead to desirable futures. Within China and internationally, the DRI sets out to establish itself as a centre of design research excellence, with emphases on advanced practices in developing contexts and on the dynamics of creative processes. It is one of a small number of high priority, thematically focused, research institutes at XJTLU, in recognition of design as a transdisciplinary area of strategic importance. The DRI welcomes people, ideas and initiatives related to design research from XJTLU faculty and students, as well as from academia and industry at large.

The Shared Territories exhibition is the Design Research Institute's inaugural event. Its contributions were solicited internationally by invitation, and by an open call across the XJTLU campus. The result is a broad variety of design research areas, methods and media, of local, regional and international projects, from academic and industrial contributors. We envision this variety to stimulate design research interest and discourse across our campus and beyond in the intellectual territories shared between all who rigorously engage in open-ended, creative enquiry.

Shared Territories: The Exhibition

Anuradha Chatterjee

The exhibition *Shared Territories* is informed by the premise that the making of objects and disciplinary connections across different exhibits, ideas, and objects in an exhibition setting constitutes scholarship, and that it is not informed by the imperative of exposition alone, but also by one of discovery. The precedence for this is the 'Exhibition as Product and Generator of Scholarship' symposium organized by Susanne Lehmann-Brauns, Christian Sichau, and Helmuth Trischler of Max Planck Institute for the History of Science, which was held on November 27–28, 2008, at the Deutsches Museum in Munich. Martha Fleming, one of the contributors to the symposium, writes that the aim was find out "what exhibitions can do for scholarship that publications cannot (2008, 33)." Fleming questions the hegemony and fetishisation of traditional scholarship, and its form as a book. She suggests that if "it is the methodologies that are the scholarly product of research," then "the scholarship inheres in the practice, not just in the product, [and] then books and exhibitions are both equally forms of scholarship (35)." It is precisely this premise that the *Shared Territories* exhibition explores.

Shared Territories has yet another aim: to find distinctive, interdisciplinary connections, within and across the University; and discover our local and global collaborators, audience, partners, sponsors, and subscribers. The emerging nature of the Design Research Institute at XJTLU allows for this to happen, where instead of re-presenting accepted views and definitions of design research (now a well-established field internationally), and locating and connecting the known (and compatible) fields of inquiry, the exhibition opens up the space to discover what is not yet known, and to in fact define that which is not yet known. The exhibition features peer reviewed, mixed media contributions by scholars, academics and designers from Australia, Taiwan, Hong Kong, Finland, United States, United Kingdom, and of course China, from interdisciplinary fields of architecture, urban design, landscape architecture, fine art, industrial design, biological sciences, and language. It seeks out traces left by design processes, metaphors of design processes, reflections on design processes, and by inviting design research explorations along and across two main themes: Inquiring Inquiry *and* Research as Design.

Martha Fleming, 'Thinking through Objects.' In *The Exhibition as Product and Generator of Scholarship*, ed. Susanne Lehmann-Brauns, Christian Sichau, Helmuth Trischler, 33–47. Munich: Max Planck Institute for the History of Science, 2010.

Shared Territories: Curatorial Themes

Marian Macken, Thomas Fischer, Anuradha Chatterjee

Inquiring Inquiry: Design research is interested in the relationships between the ongoing making and the evolving knowing. It is not constituted merely by the sum of its outcomes, but also by the processes and relationships between their various elements. As these relationships shift and change, the design process relies on the capacity to adapt its structure when necessary. We take the design process as a processual, fluid, uncovering of tacit understanding in incessant flux, and not as something fixed, crystalline or frozen (Snodgrass and Coyne, 2006). The exhibition explores these changing relationships and invites contributions, which actively investigate one or more particular ways of inquiring and of producing the processes, imaginings, (re)presenting and testing which make up designing, and lead us to new insight (Heath, 2010).

Research as Design: We understand research as involving doing in accordance to understanding, as well as understanding in accordance to doing (Glanville, 2003): A circular/recursive design process of reflective practice (Schön, 1984), of continuous modification and unification, the inclusion of more and more in a coherent whole; occasional re-start, extension, and revolution; the increase in range and of simplification (Glanville, 1999). We thus take design as the key to research, because research has to be designed. Considering design carefully (making theory from or researching it) can reveal how better to act, do research – to design research (ibid.). The artefacts of research are embodiments of reflection; the act of research places this work under constant interrogation. This exhibition explores the nature of the iterative conversations the researcher-as-designer has with the process's propositions, of the constant evaluation of what has happened, and what has been suggested or revealed (Downton, 2003).

Downton, Peter. (2003) *Design Research*. Melbourne: RMIT Publishing.
Glanville, Ranulph. (1999) 'Researching design and designing research." *Design Issues*, 15(2):80-91.
Glanville, Ranulph. (2003) 'An irregular dodekahedron and a lemon yellow Citroen.' In Leon van Schaik (ed.) *The Practice of Practice: Research in the Medium of Design*. Melbourne: RMIT Publishing: 258–265.
Heath, Tom. (2010). *Learning Architecture/Teaching Architecture: A Guide for the Perplexed*. Toowong, Qld: Denarius Design Books.
Schön, Donald A. (1984) 'The architectural studio as an exemplar of education for reflection-in-action,' *Journal of Architectural Education*, Vol. 38, No. 1: 2–9.
Snodgrass, Adrian and Richard Coyne. (2006) *Interpretation in Architecture: Design as a Way of Thinking*. London: Routledge.

Roger Ball has been crafting iconic sports products since 1983 for Burton Snowboards, Fisher Price, Cooper Canada, Itech Sports, Brine Lacrosse, Bell Helmets and Nike. During his 25-year teaching career, he has led design studios in North America, Asia and Europe. Roger is the Eric Yim Endowed Professor of Asian Ergonomics at The Hong Kong Polytechnic University where he is the Program Leader for the post graduate education. He holds an MFA from the Domus Academy in Milan and a PhD in Ergonomics from TUDeflt University in the Netherlands. His award winning 3D anthropometric study, SizeChina, has created the first digital database of Chinese head and face shapes. His Asian Ergonomic Lab drives the development of 'China-fit' products for local and global brands. His research clients include Luxottica, Microsoft, 3M, Cartier, Neurosky and cirque du soleil. His new book DesignDirect: how to start your own micro brand inspires designers to create their own personal brands.
See: www.designdirect.com.hk

Aditya Kedia is strategic designer and has background in fashion, retail experience and interaction design. He has been active in helping startups and organizations to develop a human-centred approach for problem-solving using design methods in the form of user research, product concepts, displays or project management. Some of the clients included retail chains, startups, technology companies and clothing manufacturers. He has always been fascinated by the complexity of the human form and possibilities of technology. In his current role as a researcher at the Asian Ergonomics Lab, he is working towards integrating various emerging 3D scanning and printing technologies into a seamless process termed Scan and Print. The process aims at creating ergonomic wearable products and disruptive business models.

Size China: An Exploratory Study in Asian Anthropometry and Ergonomics

Roger Ball and Aditya Kedia

At Asian Ergonomics Lab, Hong Kong Polytechnic University, we are continuously encountering and solving problems related to Asian ergonomics and anthropometrics, and the translation and application of this for understandable and meaningful outcomes. Our work is largely focused at creating products that fit perfectly to ethnic Chinese population. Our efforts over the past decade have resulted in a digital database of Chinese head scans and subsequently, anthropometric tools for product design.

It all began when principal investigator of the project Professor Roger Ball found that the helmets he designed could not fit Japanese customers. Instead, they ended up giving them pain and discomfort. When he inquired further, he found that Asian heads are of slightly different shape than Caucasian ones. However, it was unknown exactly what and how much was the difference. In addition, unlike Caucasian heads, there was no anthropometrical database of Asian heads for reference.

Hence began the Size China project, a precise digital 3D database of Chinese head and face shapes, based on sophisticated analysis of raw data gathered from the 3D scans of more than 3,000 individuals at six different mainland China locations. It has resulted in a body of work that comprises of various digital and physical artefacts, tools, product development processes and publications. The physical artefacts are embodiment of the diversity of the human form, highlighting the significance of subtle differences that exist from one human being to another and at the same inviting us to explore the relationship between the product and the human form. They also serve as a ready reference for anthropometrically correct Chinese heads. Beyond their anthropological value, they are desirable for manufacturers and designers to create right product fit and subsequently reduce the development cost and time. Our work is particularly of value for design and development of products such as eyewear, face mask, helmet and earphones.

Media: Poster, physical models, video animation

Eleanor-Jayne Browne, born in England in 1969, is a university Course Director, Chief Branding Officer and Creative Director. She received her MA in Design for Textile Futures from London's prestigious Central St Martins. Eleanor is the founder of two practice-based Research Labs: The D/sign Lounge and Thread Count Lab, where she embraces interdisciplinary inquiry. As an artist and designer, Eleanor's research and commercial activities centre on bio-inspiration, materiality and both the analogue And the digital. In 2010, her 'Conversations With Nature Design Trilogy' was ranked as one of the top ten research projects by the NSC Taiwan Innovative Concept Design Program. Eleanor's unique, award-winning, designs embrace and juxtapose the past with the present; while forging a new and groundbreaking relationship between nostalgia and cutting-edge technology. Her unique aesthetic is ever-evolving in response to different ways of seeing and perceiving the world, and has been described as 'physical space informed by nature's poetry.'

Perfect**Im**perfect, Casting Space

Eleanor-Jayne Browne

The natural world.

Nature is data.

Nature as mentor.

Through the manipulation and understanding of materials, 'space' may be simultaneously structural, ornamental, and ephemeral. Therefore in response to this proposition 'PerfectImperfect, Casting Space' is part of an on-going conversation between materiality, bio-inspiration, and our external natural environments.

Drawing upon the (in)tangible elements around us, this series of experiments delves into nature's narrative layers to articulate and capture fleeting 'spaces' (and moments) which exist temporarily, such as rainfall or condensation, and in the spirit of true inquiry—that aesthetic qualities are not manifested solely through content or perfection of technique; but through the capricious nature of the process itself—are unfinished and perfectly imperfect.

Media: Fine bone porcelain, resin, brass, plaster of Paris, powdered gold, zinc and wax

Qi Lunian, Licensed Urban Planner. Qi Lunian graduated from Guilin University of Technology with a Master of Urban Planning and Design. He has over twenty years of working experience in the field of city planning and urban design. He served as Chief Planner at Jurong International of Singapore prior to join CSIAD. Mr. Qi is also a visiting professor in Soochow University and the Southeast University. He now is the Director of Planning at SCIAD.

Hu Xuming, Director of Planning, SCIAD; Registered Architect. Hu Xuming graduated from the Southeast University with a Master of Urban Planning. He has extensive working experience in the fields of both urban planning and architecture. Some of his design projects have won national design awards.

Yang Ze, Urban Planner & Landscape Architect, SCIAD. Yang Zi graduated from Soochow University in 2013, with a Bachelor's degree in City Planning. He has more than two years of working experience as an urban planner and landscape architecture designer.

Xiong Rong, Urban Planner, SCIAD. Xiong Rong graduated from the Southeast University in 2012 with a Bachelor's degree in City Planning. He has more than three years of working experience as an urban planner.

Baoshan Han, Chief Architect of SCIAD. Baoshan Han received his B.Arch. and M.Arch. from Tsinghua University in Beijing, China and the University of Cincinnati. He taught architectural design and theory courses in both China and the U.S. and has worked on many architectural and urban design projects in many cities such as Beijing, Suzhou, Atlanta, and the Caribbean.

A Master Plan to Boost Cultural Tourism for a Taihu Fishermen's Village: Chongshan, Jiangsu Province, China

CSIAD: Qi Lunian, Hu Xuming, Yang Ze, Xiong Rong, Baoshan Han

Chinese urban dwellers now represent 51.27% of China's entire population of nearly 1.35 billion. The shift marks a turning point for China, which for centuries has been a mainly agrarian nation, but which has witnessed a huge population shift to cities over the past three decades as people seek to benefit from the nation's economic growth.

Like many rural villages in China, our subject, a small fisherman's village by Taihu Lake, is affected by the Chinese urbanisation wave: many young people left the village for large cities; farmland was left for elderly to take care of; many once prosperous handcraft workshops are losing their market share to other Asian countries due to lack of skilled workers; a popular fisherman's market was closed by the government due to pollution to the lake.

Our original program was limited to the adoptive re-use of a few old buildings: converting an old workshop complex into a tourist service centre; re-surfacing some unfinished retail structures for several wooden Buddha Workshops; redevelop a waterfront area for a fisherman's market and restaurants. After exchanging ideas with our client, the Suzhou Wuzhong District Guangfu Town Committee, we learnt that we can help the villagers to achieve more if we plan both spatial layout and tourism business together. The clients were very supportive and we expanded our service to the overall tourism business development plan for the village.

What can we do to help the villagers to better use their traditional cultural heritage, such as the lake product market, wooden Buddha sculpture shop, etc.? How to avoid developing tourism programs at the expense of the local residents? How to boost tourist business when the resource is very limited? Our goal is not only to boost the number of people that will come to visit Chongshan Village, but also to provide more job openings for villagers, and to make this once beautiful little town an attractive place for young people to stay and to engage in the process of making it better.

Media: Multi-media presentation, audio

Harry den Hartog is an urban designer and critic, and founder of studio 'Urban Language'. After working for more than ten years as a designer for several Dutch urban planning and architecture firms he founded his own studio in 2004 in Rotterdam, which provides advice regarding urban design issues. Since the late 1990s, he has regularly visited Asia, especially China. Since 2008, Harry is based in Shanghai. He is frequently asked to participate in or organise debates and exhibits by various organisations in Europe and Asia. He regularly writes essays and authored two books, one of them: *Shanghai New Towns: Searching for Community and Identity in a Sprawling Metropolis* (Rotterdam: 010 Publishers, 2010). In mid–2012 he became faculty member at Tongji University in Shanghai where he teaches urban design and housing. Harry is also guest lecturer and part-time turor at XJTLU in Suzhou, since 2013.

See: http://www.urbanlanguage.org

Urban Design Research in a Context of Haphazard Growth and the Unknown

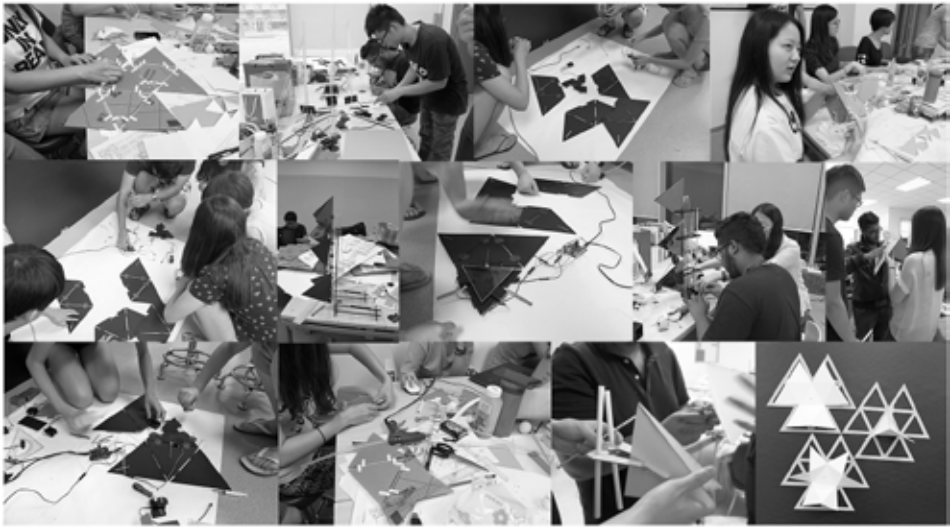
Harry den Hartog

During the past eight years, I did a lot of research on new towns in China and abroad. The planning of new towns is always a case of wild disputes within and outside the professional field. It is a long process of development from plan to construction, with multiple obstacles and moments of correction on its path. This makes the topic multi-layered and extremely complex to research.

The making of new towns often follows a plan or even 'blueprint,' though real life and external influences during the years make strict planning useless and sometimes even dangerous. As everywhere else, the new towns around Shanghai show discrepancies between design, implementation and daily life.

My preliminary research questions were driven by curiosity. From my 'foreign' perspective, the first impressions when visiting new towns were a mixture of shock, surprise, astonishment, and finally also admiration. From a professional perspective, I was searching for causes, backgrounds and processes behind the unprecedented building boom, the rapid transformation of lifestyles and context, the international exchange of design ideas (architecture and urban planning), and the often lacking interdisciplinary approach.

This research and resulting publication covers multiple practices and experiences, ranging from large to small scale. It critically analyses the failures and successes. It reveals conflicts and gaps as results of misinterpretations, diverging ambitions and design failures, both in the research-object as in the research itself. During this research my Western 'foreign' perspective gradually changed and became blended with a more Chinese perspective. In the framework of 'inquiring inquiry,' this exhibit tries to explain the various moments of confusion and change of direction and approach.



Before joining the XJTLU architecture department in 2011 **Nancy Diniz** held several academic positions in UK, Italy and in Portugal in the areas of Architecture, Interior Architecture, Environmental Technology and Interactive Design. Her main research and teaching interests question traditional scale boundaries between the design disciplines of Product, Architecture and Computer Science. Lately she has been prototyping modular and scalable systems that go from people to envelopes of buildings, exploring notions of wearable and mobile materials with real-time environmental information exchange properties. In the past, her research has included developing digital tools using Augmented Reality and 3D Free-Hand Virtual Modelling to assist conceptual design processes. She has also a special interest in time-based mapping, analysis and visualisation of invisible, unquantifiable and temporal data. She is a post-doctoral researcher at 'Digital Living Spaces', ISTAR-ISCTE-IUL Lisbon.
See: www.augmented-architectures.com

Hai-Ning Liang is Associate Professor with the Department of Computer Science and Software Engineering, XJTLU. He received his PhD in computer science from the University of Western Ontario, Canada. After receiving his PhD, he moved to Australia and worked as a researcher with a national ICT research centre. He is an Adjunct Research Professor in the Department of Computer Science at the University of Western Ontario. He has published over 60 academic articles in the areas of human-computer interaction, information visualisation, learning technologies, and wireless sensor networks. Finally, he has been a committee member for several international conferences, and has received best paper awards at international conferences.

Students involved in the project, XJTLU: Fang Nan, Mengxue Gu, Tao Yang, Mengfei Yu, Rong Yao, Siying Liu, Chitraj Bissoonauth, Yuyang Mao, Zirui Zhang, Shuyu Zhao, Henan Xiong.

The Anatomy of a Prototype

Nancy Diniz and Hai-Ning Liang

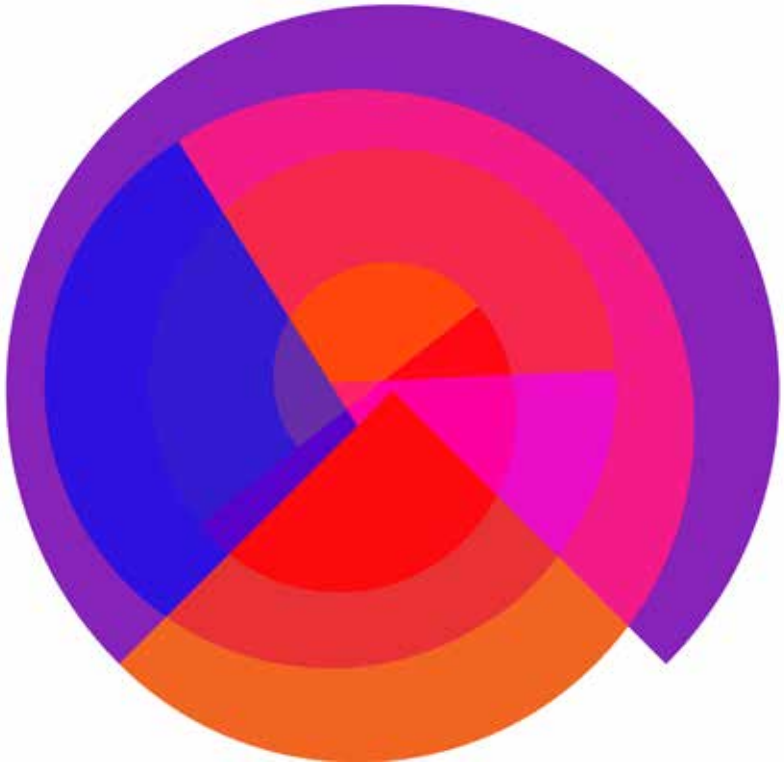
The role of prototypes is well established in the field of design. However, the many different types of prototypes are difficult to define and there is a lack of knowledge about the fundamental nature of prototypes. 'The anatomy of a prototype' reflects on efforts to provide a discourse for understanding fundamental characteristics of prototypes in design and specifically the role of prototyping in design education. It views prototypes, not only in their role in evaluation, but also in their generative role, in enabling students and designers to reflect on their design activities in exploring a design idea.

'The anatomy of a prototype' exhibits the same prototype in different manifestations from problem-solving through problem-finding to full documentation. The prototypes were developed by students in the Department of Architecture, Xi'an Jiaotong-Liverpool University, during a ten day competition brief. The exhibit furthers the research described by Faste and Faste (2012) that a combination of process and research culminates in an artifact as the embodiment of design research knowledge. For this reason, it is referred to as 'prototyping embedded design research': the knowledge generated is contained in the cognitive processes and artifacts of the design activity performed.

Embedded design research enables the enhanced performance of future design action through knowledge disseminated through broader means than that of traditional research. Like Biggs argues design objects are presented as arguments for interpretation by their intended audience, forming a critical triad of discourse between the designer, the artifact, and the social environment that the artifact influences (Biggs 2002). Embedding knowledge in the designers' activity not only enhances design research, it plays a vital role in the dissemination of knowledge across all forms of experience.

Biggs, M. (2002) 'The Role of the Artefact in Art and Design Research.' International Journal of Design Sciences and Technology. 10 (2), 19–24.

Faste T. and Faste, H. (2012) 'Demystifying design research: design is not research, research is design.' IDSA Education Symposium 2012, Boston USA.



Maria Fullaondo is an architect and received her PhD in Architecture from Universidad Politécnica de Madrid, Spain. Her work has always been a combination of two worlds: the professional and the academic. Her major fields of research are design, visual communication and the intersections between architecture, design and art. Lately, her main research line deals with innovating topics and teaching methodologies that are directly related to the processes of design, drawing and creation. Her academic career has mainly been carried out in Spain where she contributed to leading and teaching several undergraduate and postgraduate programmes. She has been invited to workshops, lectures and critiques at various universities and schools in Spain, Italy, South Korea, the United States and China. Last September (2013) she became Associate Professor at Xi'an Jiaotong-Liverpool University in China. During a career of nearly twenty years, she has designed, directed, built and developed several projects of all scales and uses, from master planning to interior design, from cultural equipment to housing. This knowledge is always present in her academic activity, where she teaches similar approaches and methods to those she experiments with in her practice.

Tribute to Max Bill: Nine More Variations on a Single Theme

Maria Fullaondo

One of my main goals as a teacher of architecture is to try to clarify and explain to students, as far as possible, the vast and complex world (methods and creative processes) linked to creative activity. The use of systematic, objective, verifiable and controllable procedures for the generation of a certain reality is one of the numerous possible approaches to the complex creative activity.

Between 1931 and 1938, the multi-faceted artist, Max Bill created the work entitled 'Fifteen variations of a single theme'. This aimed to illustrate that a structural theme, based on a 'law of development' and not arbitrariness, admits an infinite multiplicity of possibilities:

> A single fundamental idea—leads to fifteen very different developments can be considered the proof that concrete art holds an infinite number of possibilities. Such constructions are developed only on the basis of their given conditions and without any arbitrary attempt to modify them for reasons of proportion. With this method once the basic theme has been chosen—whether it be simple or complex—an infinite number of very different developments can be evolved according to individual inclination and temperament. This method of thus developing and transforming a fundamental idea—a theme—into a variety of expressive forms derived from the theme itself is used by various artists in the realm of concrete art. (Max Bill, 1938)

Media: Digital prints on paper; booklet

Christiane M. Herr is an architect, researcher and teacher focusing on the areas of digitally supported design, conceptual design, structural design, design studio teaching and traditional Chinese approaches to creative thinking. Christiane is a German National and has 13 years of study and work experience in Australia, Hong Kong, China, and Taiwan. In her recent research, Christiane focuses primarily on innovative approaches to structural design education in architecture as well as cross-cultural values in architectural design.

Christiane's approach to education for creativity relies strongly on second-order cybernetics and radical constructivism. In her research work, Christiane focuses on the integration of designerly and scientific modes of inquiry through empirical, grounded, and action research approaches. Christiane is a member of conference organising and review committees for the American Society for Cybernetics (ASC) and the Association for Computer-Aided Design Research in Asia (CAADRIA) and executive board member in both societies. In addition, she is a member of peer review committees of various journals and conferences.

Designing Theory by Listening to Myself Listening to Others

Christiane M. Herr

In my architectural research, I aim to investigate design through research approaches that allow for design-based modes of developing insight, such as action research, ethnography, and grounded research. These research methods and their approaches to rigour all permit research to be carried out in an involved and qualitative manner and can be adapted to design-related as well as design-based research. My contribution to the exhibition examines the process of 'emergence' in grounded theory, as described by Glaser and Strauss in The Discovery of Grounded Theory (1967). Glaser and Strauss propose that certain structures, inherent in data, can be identified by researchers in a process of careful data analysis that leads to gradual 'emergence' of theory. In this 'emergence of theory', theoretical description is assumed to arise on its own in the mind of the researcher once data is analysed intensively. I argue that this process of 'emergence' is in fact a design process, in which a researcher assumes a designerly position in the creating of theory that is designed to fit analysed data. This claim extends and transcends existing work in the field of grounded theory research, which is typically positioned as an objective research method and would likely object to the notion that theory is 'designed.' The exhibit consists of a visual tracing of the design of theory. It follows the initial immediacy of producing hand-writing field notes while engaged in listening to others, and the subsequent repeated re-consideration and re-reading of these field notes in an analytical process of listening to oneself (in the process of observing others), that eventually leads to the creation of increasingly abstract and general theoretical patterns.

Virginia (Gini) Lee is a landscape architect and interior designer and commenced as the Elisabeth Murdoch Chair of Landscape Architecture in July 2011. Prior to this, she was the Professor of Landscape Architecture at Queensland University of Technology (2008–2011), moving to academia after many years in Landscape Architecture and Interior Design practice and consultancy based from her Melbourne studio. Her research and teaching investigates cultural and critical landscape architecture, design studio and spatial interior design, focusing on the curation and postproduction of complex landscapes. The Intention to Notice: the collection, the tour and ordinary landscapes (2006), investigated ways in which designed landscapes are incorporated into the cultural understandings of individuals and communities. Her recent landscape curation practice is an experiment with Deep Mapping methods to investigate the arid lands of remote and rural Australia.

Stone Country: A Material Almanac for Practical Gardening

Gini Lee

Stone Country shares design language through the medium of 'practical gardening' for deep mapping of stone (gardens and landscapes) concerning Australia and China. The Suzhou Classical Gardens express the tangible and intangible values of nature and human relationships, and stone elements are central to their design and experience. In the Flinders Ranges stone country, witnessing country from shared/negotiated perspectives between Aboriginal and non-Aboriginal travellers/custodians seeks to ascribe garden spaces based upon topography, travel lines, site materiality and temporal change over millions of years.

This cross landscape research invites mapping across territories where the locus for the research is the appearance of stone, wherever and however it emerges as a prompt for deep mapping. The material work for the gallery is a speculative conversation between and across stone landscapes, inspired by shifting cultural and spatial narratives currently at play. In the Suzhou landscapes the scholar's gardens meandering walks and narratives, which were devised through traversing idealised landscapes, are regarded in relation to the dispossession and re-association of spatial traditions transformed as a result of hyper-urbanisation; here, the organising mode resides in stone in all its forms as symptomatic of the local and the global.

Abstract coincidences draw from the basic elements of scholar's gardens and landscapes, between the Flinders Ranges landscapes at Glass Gorge and the Suzhou landscapes miniaturised in the gardens. Four form and material elements inform the work: mountain topography, water dynamics, meandering and narrative pathways and stone materialisation and dematerialisation.

Media: Mixed; photograph on trace, video, plaster, plastic, stone, soil

Long Liu was born in Chongqing, China, in 1967. He received the B.S. and M.S. degrees in industrial design from Chongqing University, Chongqing, China, in 1985 and 1989, respectively, and the Ph.D. degree in Ergonomics from Technical University Kaiserslautern, Germany, in 2006. He is currently an Associate Professor of the College of Design and Innovation at Tongji University, Shanghai, China. From January 2007 to June 2010, he was with the College of Mechanical Engineering, Tongji University, as an Associate Professor. His professional interests include human factors for design of products and complex systems such as hospitals, transport systems, etc. His major projects include safety management, risk management, information design and optimisation, usability study, etc. He has over 70 publications in international journals, conference proceedings, and book chapters and has participated in many key research projects both in China and in Europe. Dr. Liu is a committee member of Chinese Ergonomics Society.

Hua Dong returned to Tongji University as a Professor at the College of Design and Innovation, following 12 years of research and teaching in the United Kingdom (University of Cambridge, Royal College of Art, and Brunel University, London).
She has extensive experiences of cross-cultural and interdisciplinary design research. She has published over 100 papers, and has been a Principal Investigator for a number of research projects in the UK and China. Hua is directly involved in the teaching of design at both undergraduate and postgraduate levels.
Hua founded the Inclusive Design Research Group at Brunel University and Tongji University. She is the international coordinator of the Inclusive Design Research Interest Group (InclusiveSIG), and serves as a council member of the Design Research Society (DRS).

Ergonomics Research on Writing Tools for Children

Long Liu and Hua Dong

As writing is one of the most important and frequent activities of school-aged children, handwriting patterns, as well as their influencing factors, should be well studied and considered in writing tools design. Previous research and reports concluded that incorrect writing grasps contribute to the wide spread short-sightedness among Chinese school-aged children and that well designed writing tools should be developed. However, research has not clearly revealed which factors in writing tools design would influence final grasp patterns.

Recently, in the College of Design and Innovation at Tongji University, researchers have conducted an extensive study on the writing grasp issue, in cooperation with a leading stationery manufacturer in China to begin to address these deficiencies of knowledge. Three groups of Chinese children are involved in the study: 3–6 year olds in kindergarten; 6–8 year olds in Grades 1–2; and 8–10 year olds in Grades 3–4. The objectives of the study are to reveal how serious the writing pattern problem among the children is; to identify which factors in writing tools design contribute to the correction of writing patterns among different groups; and how to transfer the research findings into practical writing tools design.

The first two stages of research have been completed and initial results on writing pattern problems and their contributing factors in writing tools design have been revealed. The design concepts of well balancing the distribution of the holding force, either with large surface fingers or in the palm, seems to have a large potential to develop promising writing tools design. Design concepts have been selected to go further into product design stage, to produce practical products with attractive and functional forms.

Maarit Mäkelä (2007), Small Wound, Ceramic chandelier, Silkscreen to Northern bone china, diameter 70 cm. Photo: Rauno Träskelin.

Maarit Mäkelä is an Associate Professor of Practice-Led Research at Aalto University School of Arts, Design, and Architecture in Helsinki, Finland. She has published her articles in different arenas, and is a co-editor of the anthologies *The Art of Research I: Research Practices in Art and Design* (University of Art and Design Helsinki, 2006) and *The Art of Research II: Process, Results and Contribution* (Aalto University, Helsinki, 2012). Mäkelä also works as an artist in the junction of ceramics and fine art. She has had several solo exhibitions in Finland and has taken part in frequent group exhibitions in Finland and abroad. Her works deal with femininity. She has discussed this theme broader in her doctoral thesis entitled *Memories on Clay: Representations of Subjective Creation Process and Gender* published in 2003.

Exploring Through Practice: Making and Reflecting in Studio

Maarit Mäkelä

In the last three decades, practising artists, designers, and craft people have taken up an innovative position as practitioner/researchers in academia by conducting academic research through their own practice. The core thought behind this contribution is the idea of a researcher who is simultaneously an artist/designer, whose creative process and production of artefacts is the target of the reflection. The presented case is related to my doctoral dissertation *Memories on Clay: Representations of Subjective Creation Process and Gender* (Finland, 2003). Having my background in studio ceramics, I wanted to find a local transparent ceramic material that would allow me to work with form, light, and image. In furthering the use of reindeer bone as a raw material for a clay body, I was particularly interested in whether it was possible to use this unique material with an image, and what kinds of technical and material solutions this requires.

The first results of this enquiry were exhibited as part of my dissertation. Altogether, the study contains three exhibitions that are all documented by professional photographers. I also kept working diaries throughout the creative processes, where I collected various textual and visual materials related to the material explorations and design process. The contribution shows this data arranged in a form of four printed panels. In addition, the submission contains one original chandelier, Small Wound from 2007, as I have continued to explore the material further, after my doctoral study.

Media: Installation - silkscreen on ceramics and light.

The Liquid Air (Prototype), 2013, 204 x 192 x 206cm; aluminium, perforated acrylic sheet, sand; installation view, Sydney. Photo: Ainslie Murray.

Ainslie Murray is an interdisciplinary artist, architect, and academic working principally in painting and installation. Her work explores the augmentation of architectural space through subtle realisations of intangible, hidden, and forgotten spatial forces. The air of architectural space, the choreography of the body, and the repetitious rituals of the construction process each find a focus in her work. The two and three-dimensional works may be considered as active architectural spaces, where undulating surfaces draw attention to both artefact and process, and evidence sequences of conception, assembly and inhabitation. Ainslie was awarded her PhD in Visual Arts from the University of Sydney, and teaches a wide range of interdisciplinary architectural design and communications studios in the Faculty of the Built Environment at the University of New South Wales.

Particulate Matter + The Liquid Air (Prototype Elevations)

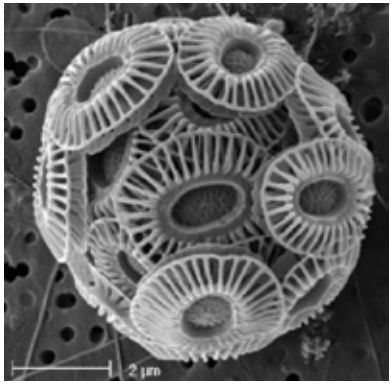
Ainslie Murray

The works presented in Shared Territories are part of a major practice-led research project titled The Liquid Air. It functions as a multi-pronged, iterative project that evolves in response to various geographic and atmospheric conditions.

One iteration, The Liquid Air (Prototype), is a semi-permanent installation in Sydney that explores the atmosphere by considering the permeability of architectural space. The walls of the structure, seen here in four speculative elevations, are densely perforated to visually suggest an immersion in air. Forests of glinting apertures rise from the floor as the structure sinks, settles, and quietly rests in the landscape. On approach, the walls shimmer in the early morning light. Bushland quivering in the breeze softens the sunlight; perforations in the walls capture the movement of foliage and appear to set the structure into a subtle oscillation. Inside, a space of quiet contemplation allows a further recognition of the atmosphere.

Another iteration, Particulate Matter, is a site-specific installation investigating Shanghai's atmosphere. Data reflecting the fine particulate matter in the air is ordered and coloured according to concentration, season, and wind conditions. On still days, the particulate matter renders the air visible and it hangs there—everywhere—as toxic matter to be wrestled, resisted, filtered. On windy days, the air is invisible again, but spaces are torn into the atmosphere by fast moving particulate matter. The structure of the atmosphere is interrupted, its composition compromised and patterns of violent intrusion dominate the skyline.

Media: The Liquid Air (Prototype Elevations), 2013, 610 x 1346mm; Giclée prints and pencil on paper; Particulate Matter, 2014, dimensions variable; crushed glass, water-soluble embroidery film, tape.



Scanning electron micrograph of *Emiliania huxleyi*, an example of a marine micro-organism that uses calcite to make highly elaborate 'designed' surface structures. These nanostructures, which have a diameter of two millionths of a metre, are engineered from a material that human designers find difficult to work with. Further, they are fabricated precisely and rapidly even at low temperatures. Source: National Oceanography Centre, Southampton, UK.

Professor David O'Connor is Dean of Research and Graduate Studies at Xi'an Jiaotong-Liverpool University. Following an undergraduate degree in Biological Chemistry & Zoology, he pursued postgraduate studies in Biochemistry at University College, London and at the University of Liverpool, UK. Subsequently, he was awarded a Royal Society Post-doctoral Research Fellowship to work at the Medical School at the University of Geneva. Following his appointment to a 'New Blood' lectureship, and subsequently to a Chair, at the University of Southampton, UK, his research has focused on using proteomics to study host-pathogen interactions as well as to develop new proteomic approaches. His research in these areas has continued since joining XJTLU. He has authored, or co-authored more than 100 peer-reviewed publications, including two books. Professor O'Connor was recently President of the British Society for Proteome Research (2009-2011) and is a Fellow of the Society of Biology.

Design Without Designers

David O'Connor

Is it possible to create artefacts that have all the hallmarks of good design but that have been created without human intervention? Biology, and more specifically evolutionary studies, suggest that the answer may be 'yes.' Indeed, many of the designs that living creatures have come up with have been tested by a process of incremental trial and error over millions of years, and some approach perfection. For example, certain enzymes (biological catalysts) have attained maximum efficiency—it is physically impossible for them to operate any faster. Because the processes used by living creatures to optimise designs are so different from those used by human designers, we can learn useful lessons from their design solutions. Sometimes different organisms address the same design challenge in different ways (convergent evolution). By comparing different solutions one can gain fundamental insights into the design principles needed to solve a problem.

Biological processes not only generate solutions to structural design problems but also have relevance to process design. Living organisms are amazingly complex and complexity is normally associated with fragility. Surprisingly, however, organisms are robust—they continue to function despite multiple perturbations. It is of some interest to determine how life achieves such resilience as the principles can be used to design better systems and processes of particular interest to us. Evolutionary principles can now be used by human designers to derive innovative products that would have been unlikely to have been imagined in traditional design studios. Further, we are beginning to impose designs on life itself.

For British writer and critic **Anjuli Pandavar**, the ideal human is every human, all human. For her, the urban environment encapsulates that ideal more than anything else. She is urban to the core. Anjuli has spent significant amounts of time in over 300 cities on four continents. She has had a portfolio career covering research, graphic design, project management, lecturing, urban development consultancy, architecture and a few more besides. She now teaches 'Cities and Urban Consciousness', an English for Academic Purposes course at New York University in Shanghai, where she lives with her partner, Belinda Allan. Anjuli is currently working on her first novel, a story of self-discovery set in the twelfth century.

The Heart Knows the Beat

Anjuli Pandavar

How do you prepare design students for the urban environment: for the buildings and structures, for the spaces between them, for the people who move in and out and over and through and under and behind and in front of and beside all of these, for the wildlife that flourishes or barely hangs on, for the surprising pockets of music in the deafening background drone, for the arresting dash of colour in the otherwise dusty haze? Long before we talk about designing away a city's problems, or the perfect building for that site, there needs to be a basic openness towards the urban experience, a sense of a city's life.

Yet we neither assess our design students' urban sensibilities nor address whatever deficiencies they may have in these. 'The heart knows the beat' tests for and awakens urban consciousness: it's about making design students emotionally literate so they may engage the full play of human experience in their design exploration and decisions. It suggests that design, in the urban context, starts long before the designer starts 'designing', goes way beyond what happens between the designer and the design, and continues long after the final product has been admired, derided or ignored. 'The heart knows the beat' is a work-in-progress, focusing on the problem of researching the essentially unquantifiable, the barely knowable and the not necessarily describable, as they work their magic on design and how all this is communicated.

Boeing Assembly Plant, Seattle, 1989, 149.2 x 108.7 cm, pen, ink and wash on paper, The Imperial War Museum London. Commissioned by the Artistic Records Committee of the Imperial War Museum, 1989.

Deanna Petherbridge is an artist, writer, and curator primarily concerned with drawing. Her book, *The Primacy of Drawing: Histories and Theories of Practice*, was published in 2010 by Yale University Press. Formerly Professor of Drawing at the Royal College of Art, London, she is Professor Emeritus, University of the West of England, Bristol. Her curated exhibitions include *The Primacy of Drawing: An Artist's View* (1991), *The Quick and the Dead: Artists and Anatomy* (1997), and *Witches and Wicked Bodies*, National Galleries of Scotland, Edinburgh (2013), currently showing at the British Museum, London until 2015. She was an International Scholar at the Getty Research Institute in Los Angeles 2001–2, has lectured internationally and undertaken residencies and study tours in Britain, Europe, USA, India, Singapore, Pakistan, Malaysia and Australia. Her drawings are in major British collections and she writes regularly on art and architecture in popular and scholarly journals.

See: www.deannapetherbridge.com

From Graphic Module to Bamboo Pavilions

Deanna Petherbridge

Since the 1970s I have been creating pen and ink drawings derived from forms of linear geometry, sometimes precisely delineated with a hard edge and mathematical templates or in recent years drawn with freer lines and ink wash. The simple graphic elements of my repertoire are amplified into pictorial 'constructions' that are architectonic, both in their formal arrangements on the page and in their references to architecture and mechanical elements or architectonic meditations on structure and the contradictory human usages of buildings, cities and landscape. My practice has see-sawed between abstraction and referentiality: sometimes opposed, sometimes interchangeable.

Alongside my drawing practice, I have investigated and written about vernacular architecture. The manner in which basic modules can be amplified into a consistent genus of built forms based on repetition, inversion, variation and number relates to the principles of my core drawing practice whereby complexity is explored within a deliberate austerity of means.

This ongoing project is a commentary on bamboo, from free drawings that investigate how it grows in nature to the way its simple tubular elements are used in construction. Drawing II, based on observation in India, examines how bamboo scaffolding, held together by crude rope ties, creates a semi-transparent web around a growing concrete structure. It becomes a form of theatrical scrim or front cloth, that partially masks but also gives rise to an unrelated technology and contrary aesthetic. Drawing IV celebrates some vernacular usages of bamboo, while Drawing V work is a joke about historical adaptations of European orders, where natural tropical liana plants and manufactured bamboo blinds threaten the colonial imposition. The future bamboo pavilions that will arise from this ongoing project are still growing in my imagination.

Media: Pen, ink and wash drawings

Bill Seaman's work often explores an expanded media-oriented poetics through various technological means—'Recombinant Poetics.' More recently he has been exploring notions surrounding 'Recombinant Informatics'—a multi-perspective approach to inventive knowledge production. He is currently working on a series of art/science collaborations — poetic installations and scientific research papers. The book *Neosentience: The Benevolence Engine* with Otto Rössler has come out on Intellect Press. He is also collaborating with artist/computer scientist Daniel Howe on multiple works exploring AI and creative writing/multi-media and has completed an album of experimental music with Howe entitled Minor Distance. He has developed a new generative work and is undertaking interface research with Todd Berreth; is exploring the creation of a trans-disciplinary research tool 'The Insight Engine;' and is collaborating with John Supko on a new generative audio/visual work; his most recent music collaboration is with Craig Tattersall from The Boats / The Humble Bee et al. They have finished a large audio work entitled Light Folds.

See http://billseaman.com; and for music, http://light-folds.tumblr.com

Todd Berreth is an architect, artist, and programmer living in North Carolina, USA. His work involves developing computational creativity and generative design systems, and exploring the opportunities emerging from the increasingly pervasive use of digital media, display, sensor and networking technologies in the built environment. Berreth is a researcher and instructor at Duke University in the Art, Art History, and Visual Studies Department and as part of the Visualization and Interactive Systems (VIS) group of the Media Arts and Science program (MA+S).

See: http://toddberreth.com

An Engine of Many Senses

Bill Seaman [Principal Investigator and Artist: concept and initial design]
Todd Berreth [Programmer: creative coding and collaborative design]

An Engine of Many Senses is a generative computational work exploring the history and potential future of the computer. It includes a series of media elements that combine and recombine over time: 3D images, 2D stills, generative audio, generative media 'landscapes', generative text and video components. The work has a series of internal rules that play out different combinatoric strategies, as drawn from an extensive database of architectural typologies and processes. In particular, the work includes a series of allegorical time-based images of computers as well as collaged images from the history of the computer and computational history in general. It also includes diagrams of systems that have never been built. The text in the work is combinatoric and is displayed across a series of moving glyphs. The work is always different in that it never plays out the same media elements and/or processes twice. It is an example of computational creativity.

The allegorical computers include:

1. world –World Computer – Digital Philosophy for Fredkin/Wolfram
2. binary – Von Neumann Machine – for Turing and von Neumann
3. differential – Abstracted Differential Analyzer – for Vannevar Bush
4. dna – DNA Computer for Michael Conrad and Leonard Adleman
5. neural – Neural Network for Hava Siegelmann and Steven Smale
6. human – Human as Computer for Seaman and Ada Lovelace
7. light – Light Computer (Rössler/Seaman)
8. memex – Memex for Vannevar Bush
9. nano – Nano Computer for Eric Drexler
10. electrochemical – Electrochemical Computer for Gordon Pask
11. quantum – Quantum Computer for David Deutch and Stuart Hemeroff
12. replicant – Self-replicating Computer – for von Neumann
13. spin – Electron (Spin) computer for Rössler/Seaman
14. time – Time Computer (T-Computer) for Scott M.Hithcock
15. analogue – Analogue Computer / Maverick Machine for Gordon Pask
16. wave – Wave Computer / Well Stirred – for O.E. Rössler and Hugh Everett the 3rd

Media: Generative installation (video excerpt); custom software written in C++/OpenGL, digital video/audio/image/3d source material

Katrina Simon is a designer and visual artist trained in architecture, landscape architecture, and fine art. She has research and teaching interests in cartography and landscape representation, urban landscape architecture, particularly in earthquake-affected cities, and cemetery history and design. She is currently senior lecturer in the faculty of the Built Environment at the University of New South Wales. Katrina has completed a PhD by creative practice and thesis on the topic of mapping and landscape representation at the University of Sydney. She has exhibited in numerous solo and group shows, and has competed successfully in a number of design awards, as a sole entrant and design team member. She has also undertaken residencies in New York at the Interdisciplinary Laboratory of Art Nature and Dance, and in Paris at the Cité Internationale des Arts.

The Affordance of Iteration: (Per)forming Landscape's Ambiguous Surfaces

Katrina Simon

Can ideas embedded within mapping be a way to reconsider the concept of landscape, given their intersecting histories of negotiation between picture, territory, and place? The map is an inscription with agency. Can the ambiguity of landscape inscriptions themselves be inscribed, and can the activation of the agency of mapping be a way to do this, via the potentially 'contradictory moments,' (to use John Pickle's phrase), of projection, iteration, and operation?

This installation is part of a larger ongoing study to experiment with the depiction and generation of the inherent ambiguity in these contradictory moments. Initially tested from direct translations from existing maps, these images are produced through further and increasingly more autonomous iterations of the original process. The projected slides are ink drawings made at a scale of 1:1 and superimposed in rotation onto monoprint panels. This layering amplifies the texture, atmosphere, pattern and patina of the projected and perceived territory, suggesting territories, and vistas of a more ambiguous and beguiling character.

This research project thus explores the limits and potentials of landscape representations, by 'thickening' the apparatus of inscription, and thus 'making present' their interconnection. The productively ambiguous procedures of map projection, generalization operation and iteration are performed, rather than represented, through the iterative act of making.

In the domain of landscape, the dimension of representation cannot be completely separated from the dimension of the phenomenal or experiential; these research iterations thus participate directly in the transformation of landscape as idea, image, territory, and map.

Media: Mixed; Suspended panels of ink on polyester drafting film, projected slides of ink on polyester drafting film.

Michael Tawa is an architect, Professor of Architecture and Director of the Masters of Architecture Program at The University of Sydney. His research interests are trans-diciplinary and span architecture, cinema, music, and the language of design. Recent publications include *Agencies of the Frame: Tectonic Strategies in Cinema and Architecture* (Cambridge Scholars Publishing, 2010) and *Theorising the Project: A Thematic Approach to Architectural Design* (Cambridge Scholars Publishing, 2011).

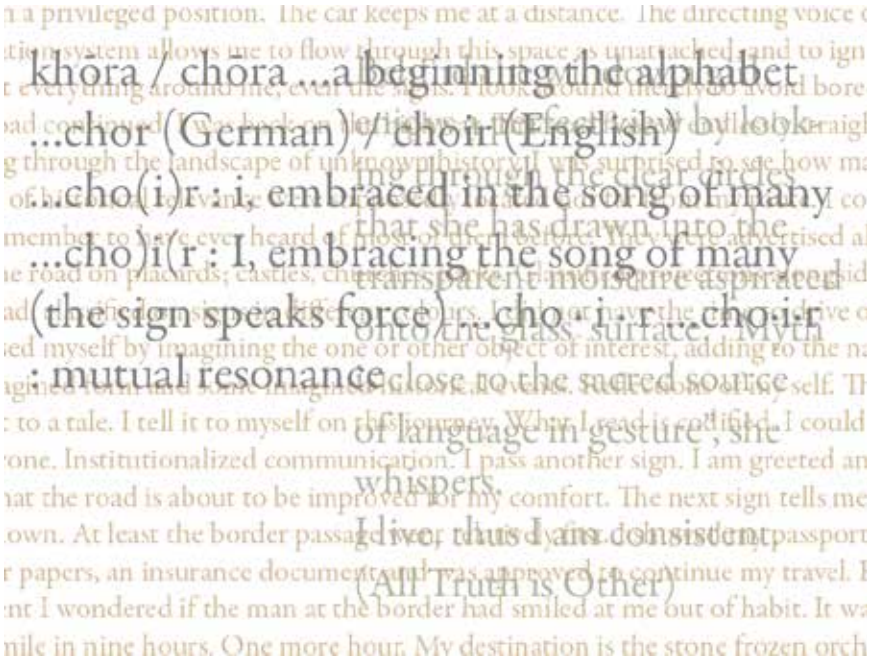
Anatomy of Atmosphere

Michael Tawa

The theme of 'atmosphere' has gained significant currency in contemporary architectural theory and practice; but its conceptualisation and deployment remain vague and opaque. What we lack are a rigorously articulated anatomy and inventory of atmosphere that can enable more systematic and enduring means of engagement through design.

Throughout this project an iterative process of inquiry and research-through-making were deployed. Keywords were co-investigated through filmmaking, photography, and lexical scholarship to venture new insights on the theme, while capitalising on the contingent, the unexpected, and the serendipitous.

The proposal demonstrates a research-by-design approach. Making and editing the film produced ideas that eclipse cinematography; just as theoretical and precedent research produced directives for cinematography that eclipse the textual limits of research. In this way, the project aimed to push the boundaries of what can be considered design research. It is not research 'about' design, research that construes pre-existing 'intentions' that are then manifest in design, or research that 'explicates' design. Rather, it indicates a form of research whereby textual and filmic practices are mobilised in parallel and mutually interact to form a productive ambiance (or atmosphere) through which the work emerges. The process contends that design is not the direct implementation of a predetermined idea but a practice of iteration and transaction, a shuttling between different kinds of materials, affects, and conditions which, as the process proceeds, prompt the emergence of the designed artifact in the gaps and interstices between the various registers being investigated through making.



Claudia Westermann is a chartered architect, Associate Professor in Architecture at Xi'an Jiaotong-Liverpool University. Holding postgraduate degrees in both Architecture and Media Art, Claudia Westermann further explored the relation of art/architecture, technology and epistemology in her PhD research, supervised by the British pioneer in telematic art Professor Roy Ascott. Her current research and related art/design portfolio emphasises questions on the relation of the material to the virtual world, and essentially addresses questions of place (making). Her works have been exhibited and presented internationally at conferences and at more than 30 exhibitions, for example, at the Venice Biennale (Architecture), the Moscow International Film Festival, ISEA Symposium for the Electronic Arts in Japan, and the ZKM (Centre for Art and Media) in Karlsruhe, Germany. Key publications include 'Blank Spaces, an Excursion to Another Future' in ISEA 2014 proceedings (forthc.), and 'Myths of Complexity' in Design Ecologies, 1.2 (2011).

Inhabitable Theories – Exhibited

Claudia Westermann

Exploring notions of spatiality in design practice, 'Inhabitable Theories – Exhibited' is a research and design project in the widest sense. The 'Inhabitable Theories' project generally actualises in the form of performative lectures at the border of theory and practice, questioning the existence and the relevance of this separation. A set of site and theme specific 'Inhabitable Theories' performances have been developed since 2003. They attempt to clarify spatial practice as encompassing both writing and designing, and performing at its own limits. Spatial practice is therefore to be conceived as a practice that is critical of its own rules. In this context architectural design is understood as a performative process that creates borders rather than borderlines, limits rather than limitations, and is therefore a discipline of radical communication that always seeks to extend itself towards an Other – the unknown – addressing it without previously quantifying it to render it provable.

Media: Voice recordings, prints on fabric, video projections

Anuradha Chatterjee is an architect, historian, scholar, author, and design educator from India and Australia, now based in China. She has taught design, history, and theory in Australia for ten years. Her recent publications and contracted publications include: *Surfacing the Fabric of Architecture: John Ruskin's Adorned "Wall Veil,"* Ashgate Publishing, UK, (Contracted); *Built, Unbuilt, and Imagined Sydney*, COPAL Publishing, New Delhi, India (In Press); Editor, *Surface and Deep Histories: Critiques, and Practices in Art, Architecture, and Design*, Cambridge Scholarly Publishing UK, 2013.

Thomas Fischer is a design educator who explores human creativity and technology in theory and practice. He holds a PhD in Education from the University of Kassel, Germany and a PhD in Architecture and Design from the Royal Melbourne Institute of Technology University in Melbourne, Australia. He is a Fellow of the Design Research Society and an executive board member of the American Society for Cybernetics. At XJTLU, he is teaching at the Department of Architecture and at the Department of Industrial Design, and he is the Director of XJTLU's Design Research Institute.

Marian Macken is designer and educator, trained in architecture, landscape architecture and visual art, currently Associate Professor of Architecture at XJTLU. Marian's research examines temporal aspects of architecture, and the role of artists' books as documentation of architecture, with particular interest in the implications and possibilities for architectural drawing and exhibition as design outcome. Marian was awarded a PhD, by thesis and creative work, from Sydney College of the Arts, University of Sydney in 2012. Her work has been acquired by various international public collections of artists' books and she has undertaken visiting artist residencies in London, Tokyo and Wellington, New Zealand.

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