Design Computing and Cognition ’10
Preface ........................................................................................................... v

List of Reviewers ............................................................................................ xiii

Part I: Design Cognition

A Comparison of Cognitive Heuristics Use between Engineers and Industrial Designers ...................................................................................... 3
Seda Yilmaz, Shanna R. Daly, Colleen M. Seifert, Richard Gonzalez

Studying the Unthinkable Designer: Designing in the Absence of Sight ......................................................................................................................... 23
Ann Heylighen

Design Heuristics: Cognitive Strategies for Creativity in Idea Generation ....................................................................................................................... 35
Seda Yilmaz, Colleen M. Seifert, Richard Gonzalez

An Anthropo-Based Standpoint on Mediating Objects: Evolution and Extension of Industrial Design Practices ........................................................................... 55
Catherine Elsen, Françoise Darses, Pierre Leclercq

Part II: Framework Models in Design

Beyond the Design Perspective of Gero’s FBS Framework ................................................................................................................................. 77
Gaetano Cascini, Luca Del Frate, Gualtiero Fantoni, Francesca Montagna
A Formal Model of Computer-Aided Visual Design .......................... 97
Ewa Grabska, Grażyna Ślusarczyk

Design Agents and the Need for High-Dimensional Perception .................................................. 115
Sean Hanna

A Framework for Constructive Design Rationale ................................................................. 135
Udo Kannengiesser, John S. Gero

Part III: Design Creativity

The Curse of Creativity ................................................................. 157
David C. Brown

Enabling Creativity through Innovation Challenges: The Case of Interactive Lightning ..................... 171
Stefania Bandini, Andrea Bonomi, Giuseppe Vizzari, Vito Acconci

Facetwise Study of Modelling Activities in the Algorithm for Inventive Problem Solving ARIZ and Evolutionary Algorithms ......................................................... 189
Céline Conrardy, Roland de Guio, Bruno Zuber

Exploring Multiple Solutions and Multiple Analogies to Support Innovative Design ......................... 209
Apeksha Gadwal, Julie Linsey

Creative and Inventive Design Support System: Systematic Approach and Evaluation Using Quality Engineering ................................................................. 229
Hiroshi Hasegawa, Yuki Sonoda, Mika Tsukamoto, Yusuke Sato

Part IV: Line, Plane, Shape, Space in Design

Line and Plane to Solid: Analyzing Their Use in Design Practice through Shape Rules ......................... 251
Gareth Paterson, Chris Earl

Interactions between Brand Identity and Shape Rules ................................................................. 269
Rosidah Jaafar, Alison McKay, Alan de Pennington, Hau Hing Chau
Approximate Enclosed Space Using Virtual Agent ...... 285
Aswin Indraprastha, Michihiko Shinozaki

Associative Spatial Networks in Architectural Design:
Artificial Cognition of Space Using Neural Networks
with Spectral Graph Theory ................................. 305
John Harding, Christian Derix

Part V: Decision-Making Processes in Design

Comparing Stochastic Design Decision Belief Models:
Pointwise versus Interval Probabilities ..................... 327
Peter C. Matthews

A Redefinition of the Paradox of Choice ...................... 347
Michal Piasecki, Sean Hanna

Rethinking Automated Layout Design: Developing a
Creative Evolutionary Design Method for the Layout
Problems in Architecture and Urban Design .............. 367
Sven Schneider, Jan-Ruben Fischer, Reinhard König

Applying Clustering Techniques to Retrieve Housing
Units from a Repository ........................................ 387
Álvaro Sicilia, Leandro Madrazo, Mar González

Part VI: Knowledge and Learning in Design

Different Function Breakdowns for One Existing
Product: Experimental Results ............................. 405
Thomas Alink, Claudia Eckert, Anne Ruckpaul, Albert Albers

A General Knowledge-Based Framework for
Conceptual Design of Multi-disciplinary Systems .......... 425
Yong Chen, Ze-Lin Liu, You-Bai Xie

Learning Concepts and Language for a Baby
Designer ............................................................. 445
Madan Mohan Dabbeeru, Amitabha Mukerjee

Organizing a Design Space of Disparate Component
Topologies .......................................................... 465
Mukund Kumar, Matthew I. Campbell
Part VII: Using Design Cognition

Imaging the Designing Brain: A Neurocognitive Exploration of Design Thinking ........................................ 489
Katerina Alexiou, Theodore Zamenopoulos, Sam Gilbert

A Computational Design System with Cognitive Features Based on Multi-objective Evolutionary Search with Fuzzy Information Processing .................. 505
Michael S. Bittermann

Narrative Bridging ......................................................... 525
Katarina Borg Gyllenbäck, Magnus Boman

Generic Non-technical Procedures in Design Problem Solving: Is There Any Benefit to the Clarification of Task Requirements? ..................................... 545
Constance Winkelmann, Winfried Hacker

Virtual Impression Networks for Capturing Deep Impressions ................................................................. 559
Toshiharu Taura, Eiko Yamamoto, Mohd Yusof Nor Fasiha, Yukari Nagai

Part VIII: Collaborative/Collective Design

Scaling Up: From Individual Design to Collaborative Design to Collective Design ........................................ 581
Mary Lou Maher, Mercedes Paulini, Paul Murty

Building Better Design Teams: Enhancing Group Affinity to Aid Collaborative Design .............................. 601
Michael A. Oren, Stephen B. Gilbert

Measuring Cognitive Design Activity Changes during an Industry Team Brainstorming Session .................. 621
Jeff W.T. Kan, John S. Gero, Hsien-Hui Tang

Part IX: Design Generation

Interactive, Visual 3D Spatial Grammars ........................................ 643
Frank Hoisl, Kristina Shea

A Graph Grammar Based Scheme for Generating and Evaluating Planar Mechanisms ................................ 663
Pradeep Radhakrishnan, Matthew I. Campbell
A Case Study of Script-Based Techniques in Urban Planning .......................... 681
Anastasia Koltsova, Gerhard Schmitt, Patrik Schumacher, Tomoyuki Sudo, Shipra Narang, Lin Chen

Complex Product form Generation in Industrial Design: A Bookshelf Based on Voronoi Diagrams .... 701
Axel Nordin, Damien Motte, Andreas Hopf, Robert Bjärnemo, Claus Christian Eckhardt

A Computational Concept Generation Technique for Biologically-Inspired, Engineering Design ................. 721
Jacquelyn K.S. Nagel, Robert B. Stone

First Author Email Address .......................................................... 741

Author Index ........................................................................... 743