John S. Gero Editor

Design Computing and Cognition '16



Contents

Part I Design Synthesis

| Reducing Information to Stimulate Design Imagination | 3 |
|---|-----|
| Novelty, Conventionality, and Value of Invention | 23 |
| Characterizing Tangible Interaction During a Creative Combination Task Mary Lou Maher, Lina Lee, John S. Gero, Rongrong Yu and Timothy Clausner | 39 |
| Dissecting Creativity: How Dissection Virtuality, Analogical Distance, and Product Complexity Impact Creativity and Self-Efficacy E.M. Starkey, A.S. McKay, S.T. Hunter and S.R. Miller | 59 |
| Part II Design Cognition—Design Approaches | |
| What Can We Learn from Autistic People About CognitiveAbilities Essential to Design? An Exploratory StudyAndy Dong and Ann Heylighen | 81 |
| Solution-Oriented Versus Novelty-Oriented Leadership Instructions: Cognitive Effect on Creative Ideation Hicham Ezzat, Marine Agogué, Pascal Le Masson and Benoit Weil | 99 |
| A Protocol Study of Cognitive Chunking in Free-Hand Sketching During Design Ideation by Novice Designers Omar M. Galil, Kirill Martusevich and Chiradeep Sen | 115 |
| A Systematic Review of Protocol Studies on Conceptual Design Cognition Laura Hay, Chris McTeague, Alex H.B. Duffy, Laura M. Pidgeon, Tijana Vuletic and Madeleine Grealy | 135 |

| Part | III | Design | Support |
|------|-----|--------|---------|
| Part | III | Design | Support |

| Is Biologically Inspired Design Domain Independent? | 157 |
|---|-----|
| A Meta-Analytic Approach for Uncovering Neural Activation Patterns of Sustainable Product Preference Decisions Kosa Goucher-Lambert, Jarrod Moss and Jonathan Cagan | 173 |
| Second Guessing: Designer Classification of Problem Definition Fragments Meghna Polimera, Mahmoud Dinar and Jami Shah | 193 |
| The Analysis and Presentation of Patents to Support Engineering Design Gokula Vasantha, Jonathan Corney, Ross Maclachlan and Andrew Wodehouse | 209 |
| Part IV Design Grammars | |
| Classifications of Shape Grammars | 229 |
| From Shape Computations to Shape Decompositions Djordje Krstic | 249 |
| Automated Induction of General Grammars for Design | 267 |
| Generative Shape Design Using 3D Spatial Grammars, Simulation and Optimization Luca Zimmermann, Tian Chen and Kristina Shea | 279 |
| Part V Design Cognition—Design Behaviors | |
| Comparing Two Approaches to Studying Communications in Team Design | 301 |
| Individual Differences in Tendency for Design Fixation Song Liang Lai and L.H. Shu | 321 |
| Functional Thinking: A Protocol Study to Map Modeling Behavior of Designers Ashwinraj Thiagarajan, Apurva Patel, Steven O'Shields and Joshua D. Summers | 339 |
| To Copy or Not to Copy: The Influence of Instructions in Design Fixation Experiments Luis A. Vasconcelos, Chih-Chun Chen, Eloise Taysom and Nathan Crilly | 359 |

| Part | VI | Design | Processes |
|------|----|--------|-----------|
|------|----|--------|-----------|

| A Self-Organizing Map Based Approach to Adaptive System Formation | 379 |
|---|-----|
| Dizhou Lu and Yan Jin | |
| Utilizing Markov Chains to Understand Operation Sequencing in Design Tasks Christopher McComb, Jonathan Cagan and Kenneth Kotovsky | 401 |
| Designerly Pick and Place: Coding Physical Model Making to Inform Material-Based Robotic Interaction Daniel Smithwick, David Kirsh and Larry Sass | 419 |
| Knowledge Distribution and the Effect of Design Tools | |
| on the Design Process | 437 |
| Part VII Design Synthesis | |
| A Heuristic Approach for the Automated Generation of Furniture Layout Schemes in Residential Spaces Sherif Abdelmohsen, Ayman Assem, Sherif Tarabishy and Ahmed Ibrahim | 459 |
| 3DJ: An Analytical and Generative Design System for Synthesizing High-Performance Textures from 3D Scans | 477 |
| Automated Best Connected Rectangular Floorplans | 495 |
| Individual Coffee Maker Design Using Graph-Based Design Languages Claudia Tonhäuser and Stephan Rudolph | 513 |
| Part VIII Design Activity | |
| Translating Analytical Descriptions of Cities into Planning and Simulation Models Kinda Al-Sayed and Alan Penn | 537 |
| Exploring the Cognitive Dynamics of Product Appreciation | 555 |
| A Means to Characterise and Measure the Information Processes of Engineers Using Eye Tracking Duncan Boa and Ben Hicks | 575 |
| Personalised Specific Curiosity for Computational Design Systems | 593 |

Kazjon Grace, Mary Lou Maher, David Wilson and Nadia Najjar

Part IX Design Knowledge

| Traversing the Barriers to Using Big Data in Understating How High School Students Design Robin S. Adams, Molly Goldstein, Şenay Purzer, Jie Chao, Charles Xie and Saeid Nourian | 613 |
|---|-----|
| Generalizability of Document Features for Identifying Rationale Benjamin Rogers, Connor Justice, Tanmay Mathur and Janet E. Burge | 633 |
| The Topology of Social Influence and the Dynamics of DesignProduct AdoptionSomwrita Sarkar and John S. Gero | 653 |
| Using Graph Complexity Connectivity Method to Predict Information from Design Representations: A Comparative Study C.V. Sri Ram Mohinder, Amaninder Gill and Joshua D. Summers | 667 |
| Identifying Sentiment-Dependent Product Features from Online Reviews Dedy Suryadi and Harrison M. Kim | 685 |
| Author Index | 703 |