



# The 2nd International Conference on Design Creativity

18th to 20th of September 2012  
Glasgow, Scotland, UK

**PROCEEDINGS**



Design Creativity 2012



Alex Duffy · Yukari Nagai · Toshiharu Taura  
Editors

# Design Creativity 2012

## Volume 2





Alex Duffy  
Strathclyde University  
Department of Design,  
Manufacture and Engineering  
Management  
75 Montrose Street, Glasgow,  
G1 1XJ  
alex.duffy@strath.ac.uk

Yukari Nagai  
Japan Advance Institute of  
Science Technology  
School of Knowledge Science  
Asahidai 1-1 Nomi-city  
932-1292 Ishikawa  
Japan  
ynagai@jaist.ac.jp

Toshiharu Taura  
Kobe University  
Department of Mechanical  
Engineering  
Rokkodai-cho  
Nada-ku  
657-8501 Kobe  
Japan  
taura@kobe-u.ac.jp

Cover Credit: Scott O'Donnell

Copyright © 2012 The Design Society

**The Design Society**

University of Strathclyde, 75 Montrose Street, Glasgow, G1 1XJ, United Kingdom

The Design Society is a charitable body, registered in Scotland,

No: SC031694

All rights reserved. No part of this publication or the information contained herein may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, by photocopying, recording or otherwise, without written prior permission from the publisher. Although care is taken to ensure the integrity and quality of this publication and the information herein, no responsibility is assumed by the publishers nor the author for any damage to property or persons as a result of operation or use of this publication and/or the information contained herein.

Published by:

**The Design Society**

DS73

ISBN: 978-1-904670-40-7



# Preface

Design Creativity is a challenging but core topic of study in design. It encapsulates the essence of originality of new concepts and the evolution of our society. A simple search on the World Wide Web for “design creativity” returns around 520,000 hits and about four thousand articles. Since the year 2000, when the Design Society was originally established as a formal body, listed articles have grown on average of over 16% per year from just over 700 to just under 4,000. A steady increase, year on year, of scholars and researchers focussing their interests and publishing their findings in this fundamental and critical field of study.

These proceedings present articles of the second conference on Design Creativity (ICDC 2012), with the first being held in Kobe, Japan (<http://www.org.kobe-u.ac.jp/icdc2010/>). ICDC 2012 was held on the 18th to 20th September 2012 in Glasgow, UK. The aim of the biennial conference is to provide an international forum to present and discuss the latest findings in the nature and potential of design creativity from both theoretical and methodological viewpoints. ICDC is an official conference promoted by the Design Creativity Special Interest Group (SIG) of the Design Society. The SIG was established in 2007; since then, its ambit has expanded to include engineering design, industrial design, artificial intelligence, linguistics, and cognitive science. Along with the SIG’s International Journal of Design Creativity and Innovation the proceedings of the conference will form a continuing archive of the contributions to design creativity.

All papers received were blind reviewed by at least two referees drawn from an international programme committee. They all deserve special thanks for their time, effort, pertinent comments and recommendations. 48 poster papers were accepted for final publication. The topics and themes of the conference and corresponding proceedings included, but were not limited to the following:

- Creativity and emotion
- Cognition in creative design
- Creative design processes, methods and techniques
- Design thinking and education
- Design creativity practice
- Creativity and innovation
- Creative design assessment and evaluation
- Collaborative creativity

The organisers are grateful for the contributions of Strathclyde University, Scottish Engineering, Tunnocks and Barr.

Alex Duffy and Andrew Wodehouse  
University of Strathclyde

On behalf of the ICDC 2012 Organising Committee  
August 2012





# Table of Contents

<b>List of Referees</b>	<b>xiv</b>
<b>Creativity and Emotion</b>	<b>1</b>
Study on the Use of Mimetic Words in Motion Design	3
<i>K. Yamada, T. Taura and Y. Nagai</i>	
Design and Emotions: A Design Method Based on Neurosciences	11
<i>M. Maiocchi and M. Pillan</i>	
Creativity Comparisons between Japanese and European at the Concept Creation Stage	20
<i>A. Gentner, C. Bouchard, D. Esquivel and G. Oprea</i>	
Yeah, I Talk to My Car,... So What? Different Roles and Levels of Closeness in Person-Object Relationships	29
<i>R. H. Jacob, M. M. Torán and M. C. Esteve</i>	
Employing Random Processes and Storytelling for Design Creativity	37
<i>D. Oswald and A. Kettenhofen</i>	
Designing Emotional Services for Underground Stations	44
<i>M. Pillan, M. Maiocchi and F. Galli</i>	
Product Aesthetics and Creativity	52
<i>S. Khalighy, G. Green and C. Whittet</i>	
Studying Designers: Affective Components of Design Creativity	61
<i>C. Mougnot and K. Watanabe</i>	
<b>Design Thinking and Education</b>	<b>70</b>
Courses in Creative Tools and Models of Design Thinking	72
<i>E. Robertson</i>	
The Development and Evaluation of a Relationship Diagram Tool to Aid Design Thinking in Nursing Education	78
<i>N. Ishii, Y. Kato, G. Sugawara, Y. Suzuki, and S. Sakuma</i>	

Defining Creativity as Problem Solving in Graphic Design Education	85
<i>S. A. Alhajri</i>	
Learning from Design Creativity; Translating Processes from Practice to Education	92
<i>A. Holder and G. Lovett</i>	
Look and Think Exercises on Visual Communication Design for Non-Designers	99
<i>T. Ariga, T. Watanabe and T. Otani</i>	
An Improvement in Method: From User Study First To Fast Concept Design First	108
<i>L. Li, Y. Hu and F. Galli</i>	
Creativity and Innovation: Developing Design Thinking and Visual Communication Skills	116
<i>D. B. Trowsdale, A. McKay and J. Giard</i>	
Empower Me - Social Design Innovation for Homeless Families: Collective Design Creativity	125
<i>G. Melles and Z. Howard</i>	
<b>Creativity and Innovation</b>	<b>133</b>
Design to Connect: Creative Tools to Design Joining Methods in Products	135
<i>T. Bleuzé, J. Detand and P. Debaets</i>	
Analysis of User Feelings during Interface Operation: Implications for Creative Design	143
<i>G. V. Georgiev, Y. Nagai, T. Taura, S. Noda and D. Willy</i>	
‘No Time Like the Present’: An Investigation into ‘Time’ as a Constituent of the Creative Process	152
<i>C. Treadaway and K. Smith</i>	
Where Do We Learn to Design? A Case Study about Creative Spaces	160
<i>K. Thoring, C. Luippold and R. M. Mueller</i>	
Creative Design Opportunities into Knowledge Based Engineering Process	169
<i>J. Boxberger, M. Leboutellier, D. Schlegel, N. Lebaaln and S. Gomes</i>	
Collaborative Creative Design Process in Medical Device Development	178
<i>M. B. Privitera</i>	
Creative Animation Design for Inverse Kinematics Motions of Shadowgraphs Shadow Puppets in Taiwan	185
<i>G. Liao</i>	
The Effects of Technology Readiness and Service Design on Service Experience Quality in Tourism	193
<i>S. S. Ho, Y. C. Wang, C. C. Huang and T. J. Sung</i>	
For Whom Are We Prototyping? A Review of the Role of Conceptual Prototyping in Engineering Design Creativity	201
<i>A. Berglund and L. Leifer</i>	
<b>Creative Design Assessment</b>	<b>209</b>
Differences in Creative Design Assessment	211
<i>A. Wojtczukand and N. Bonnardel</i>	
Experimental 3D Digital Techniques in Design Practice	220
<i>L.T. Dean and E. Pei</i>	

Differentiating Co-Design and Mass Customisation from a User-Completion within the Realm of Product Design	227
<i>R. Bernabei and J. Power</i>	
Investigating the Development of Imaginative and Creative Capacity in Product Design	235
<i>K. Chen</i>	
Elevating the Perception of Design Creativity to Increase Customer Satisfaction:	244
<i>M. Shams, L. Busayawan and S. Silve</i>	
Design Theories Analysis in Frame of the Definition of Inventive Design Efficiency	253
<i>A. Taheri, D. Cavallucci and D. Oget</i>	
Headspace: The Stanford Imaginarium	262
<i>G. Kress, H. Hoster, C. Chung, and M. Steinert</i>	
Concept Creation in Transportation Design – Model and Tools	270
<i>J. Krzywinski and C. Wölfel</i>	
<b>Collaborative Creativity and Education</b>	<b>279</b>
Considerations about Creative Environments for Students	281
<i>J. Lloveras</i>	
Redesign and Unite Industries to Meet the Basic Human Needs	290
<i>S. Fukuda</i>	
Exploring a Less Tech-Dependent side of Collaborative Creative Design	295
<i>M. Mortati and B. Villari</i>	
‘Kids in Design’: Designing Creative Schools with Children	304
<i>P. Izadpanahi, L. Xu, H. Elkadi and S. Ang</i>	
Educating Creativity – Experiences from the International Summer University on Creativity Engineering	312
<i>H. Ostad-Ahmad-Ghorabi and D. Collado-Ruiz</i>	
Necessity is the Mother of Innovation: Constraints and Community Engagement	318
<i>T.L. Allen, B.A.Chornyak</i>	
Innovation without Design: The Dynamics of Role Making and the Gradual Emergence of the Collective Designer	325
<i>R. Pinheiro-Croisel and T. Hernes</i>	
<b>Design Creativity Methods and Integration</b>	<b>333</b>
Stimulating Creativity in Building Design Education: Introducing Experts and C-K’s C-Projectors	335
<i>W. Zeiler</i>	
Music Style Analysis Using the Random Forest Algorithm	344
<i>A. Gómez de Silva Garza and E. Herrera González</i>	
Kinetic Typography Studies Today in Japan	352
<i>J.E.Lee</i>	
Geometry, Xoros, Synthetic Principles	360

<i>H. Varlamou</i>	
Biology and The Written Word	368
<i>L. C. Weilein</i>	
Challenges of Integrating Islamic Art and Culture in Commercial Brands	375
<i>H. A. Silsilah, B. Lam and S. Silve</i>	
How to Construct Form Logically Based on Human Desin Technology and Form Construction Principles	384
<i>T. Yamaoka</i>	
Design and Control of a Prosthetic Knee for Transfemoral Amputation	393
<i>Ö. Taga, K. Yaman and K.K. Yeşilkaya</i>	
<b>Authors Index</b>	<b>397</b>



# List of Referees

Anders Berglund (Sweden)  
David Brown (USA)  
Ingi Brown (France)  
Julie Stal-Le Cardinal (France)  
Hernan Casakin (Israel)  
Gaetano Cascini (Italy)  
Amaresh Chakrabarti (India)  
Denis Choulier (France)  
Henri Christiaan (The Netherlands)  
Elies Ann Dekoninck (UK)  
Andy Dong (Australia)  
Tomas Dorta (Canada)  
Marcio Dupont (Brasil)  
Mark Evans (UK)  
Nusa Fain (UK)  
Ken Friedman (Australia)  
Georgi Georgiev (Japan)  
Ashok Goel (USA)  
Gabriela Goldschmidt (Israel)  
Ian Gwilt (UK)  
Karl Hain (Germany)  
Tom Hay (Denmark)  
Tom Howard (UK)  
Yi Ting Huang (Taiwan)  
William Ion (UK)  
Norio Ishii (Japan)  
Parisa Izadpanahi (Australia)  
Kathryn Jablokow (USA)  
Harrison Hyung Min Kim (USA)  
Jieun Kim (Republic of Korea)  
Masakazu Kobayashi (Japan)  
Barry Kudrowitz (USA)  
Pascal Le Masson (France)  
Ji-Hyun Lee (Republic of Korea)  
Lassi Liikkanen (Finland)  
Julie Linsey (USA)  
Joaquim Lloveras (Spain)  
Mary Lou Maher (USA)  
Anja Maier (Denmark)  
Gavin Melles (Australia)  
Celine Mougnot (France)  
Yukari Nagai (Japan)  
Hesamedin Ostad-Ahmad (Austria)  
David Oswald (Germany)  
Lubomir Savov Popov (USA)  
Vesna Popovic (Australia)  
Emma Robertson (Australia)  
Risdiyono (Indonesia)  
Paul Rodgers (UK)  
Filippo Salustri (Canada)  
Prabir Sarkar (India)  
Steven Smith (USA)  
Ricardo Sosa (Singapore)  
Hsien-Hui Tang (Taiwan)  
Toshiharu Taura (Japan)  
Katja Tschimmel (Portugal)  
Noe Vargas Hernandez (USA)  
Anthony Williams (UK)  
Deny Willy (Japan)  
Andrew Wodehouse (UK)  
Paul Wormald (Singapore)  
Cara Wrigley (Australia)  
Jesvin Yeo (Singapore)  
Wim Zeiler (The Netherlands)  
Yong Zeng (Canada)