

The Language of Design

Andy Dong

The Language of Design

Theory and Computation

 Springer

Andy Dong, PhD
Design Lab
Faculty of Architecture, Design and Planning
University of Sydney
Wilkinson Building
148 City Road
Darlington
Sydney
NSW 2006
Australia

ISBN 978-1-84882-020-3

e-ISBN 978-1-84882-021-0

DOI 10.1007/978-1-84882-021-0

A catalogue record for this book is available from the British Library

Library of Congress Control Number: 2008939572

© 2009 Springer-Verlag London Limited

MATLAB® is a registered trademark of The MathWorks, Inc., 3 Apple Hill Drive, Natick, MA 01760-2098, USA. <http://www.mathworks.com>

Apart from any fair dealing for the purposes of research or private study, or criticism or review, as permitted under the Copyright, Designs and Patents Act 1988, this publication may only be reproduced, stored or transmitted, in any form or by any means, with the prior permission in writing of the publishers, or in the case of reprographic reproduction in accordance with the terms of licences issued by the Copyright Licensing Agency. Enquiries concerning reproduction outside those terms should be sent to the publishers.

The use of registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant laws and regulations and therefore free for general use.

The publisher makes no representation, express or implied, with regard to the accuracy of the information contained in this book and cannot accept any legal responsibility or liability for any errors or omissions that may be made.

Cover design: eStudio Calamar S.L., Girona, Spain

Printed on acid-free paper

9 8 7 6 5 4 3 2 1

springer.com

Preface

The imperative of design is being galvanized by the increasing consumerization of ‘good’ design. The packaging for my Apple products reminds me that they were “Designed by Apple in Cupertino, Calif.” Advertisements for David Jones, an upscale department store in Australia, remind me that David Jones support Australian designers (notwithstanding a few New Zealand-born designers re-territorialized as Australian). Companies such as Ikea and Target market affordable ‘good’ design to middle-class consumers in developed countries and in developed regions of developing countries. ‘Masstige’ brands such as Alessi, G-Star, and Puma propel the status of designers such as Michael Graves, Marc Newsom, and Philippe Starck to near pop-culture icons. Magazines focusing on good design such as *Wallpaper* create a global state of mind about design. Design matters, but which designs matter and how design matters is imaged by what people read about design and what is being said about design.

All of this dialogue about ‘good’ design is fairly removed from those whose well-being depends on their capability to design rather than being on the receiving end (or, more to the point, purchasing end) of ‘good’ design. From squatters as slum-developers in Mumbai to the Solidarity for the Urban Poor Federation in Cambodia, the urban poor are involved in ambitious programs to improve their well-being by taking part in the design of housing projects and sanitation schemes. For the urban poor in developing countries and regions, design matters, too. It is the basis for their well-being. And we should not be remiss to forget all of the multimedia and Web designers creating digital spaces in arenas such as MySpace, YouTube, and Wikipedia. So significant were they that in 2006 the Editors of *Time Magazine* named them (“You”) their “Person of the Year”.

Thus, on the one hand, there are ongoing dialogues about the meaning of design, the design identity of star designers, and the practices that distinguish ‘expert’ designers from ‘novice’ designers. On the other hand, there are those who clearly engage in what could be legitimately construed as design, yet few would label a slum dweller a ‘designer’, not at least in the terminology and attitudes toward design portrayed in the popular and academic literature. Even if the slum dweller

(or dwellers collectively) managed to achieve the design of suitable housing and sanitation where outside expertise had previously failed to do so, one would be hard-pressed to find them profiled in *I.D.* The rise of personal digital content creation has already stirred multinational media companies to include these ‘anything goes’ designers into their portfolio.

Part of the disconnect between these enactments of design lays in what is construed as design, that is, the definition of design, the state of being of design. Are these camps engaging in design? They might be if we could agree on a definition of design, but that seems unlikely nor is it necessarily desirable. At the INDEX¹ 2005 awards in Denmark, participants were asked to define design. Each of the definitions eloquently defined a position toward design, echoing themes about the production or expression of a work such as functionality, meaning, social relevance, transforming ideas into forms, etc., which are commonly held notions about design. But, no two of the definitions could be said to agree on what design is.

This may not be the real problem we face, though. Our energies may be wasted in trying to define design. Here, we might, as the post-structuralist thinkers have done, not dwell on the state of being of design, demanding a definition of design, but rather think about the ‘becoming-design’ as Deleuze and Guattari theorize in their book *A Thousand Plateaus*. For Deleuze and Guattari, the question of becoming rather than the question of being allows us to escape the trap of models that try to hierarchically organize the world. Their concept of becoming focuses on the complex relations by which objects can be conceptualized. The becoming of the ‘Other’ that Deleuze and Guattari write about seems right when thinking about design because design is always about transforming. And the conditions for becoming seem rather similar to the conditions for design. In becoming, there is always an interior (e.g., ‘man’), an exterior (e.g., ‘animal’) and a “line of deterritorialization” that passes between these two “forming so many becomings between things, or so many lines of deterritorialization” (Deleuze and Guattari 1987, p. 294) that transform becoming-man through becoming-animal. In design, there is always a problem space, a solution space, and the differential and dynamic processes that transform one space into the other. Where can this notion of becoming-design take us in thinking about design? And, how might we enter into the becoming-design?

In this book, we turn to this issue of the becoming-design by examining another mode of becoming – the language of design. Designing is certainly a language on its own, partly performing what cannot be conversed or said but only enacted by designing. The designed work is also a language on its own, giving us accounts on its identity and states of being through a visual vocabulary. What is said and written about design give expression to the manner of actualization of the designed work – the becoming-design – the inputs into the activities from which the designed work was produced and can be appreciated, and how the designed work was dissolved and formed through the motions and emotions of design practice.

¹ The INDEX Awards sponsored by the Danish Government recognize designed works and design programs that improve the lives of people around the world.

It is the seductive and sensual pleasure of experiencing becoming-design that after all lures us to these stories about design. Printed and verbal accounts of designed works form an image of the vector of forces that enact design. This image of the designed work expressed in language makes it possible for us to fantasize the becoming-design. I think this is what is meant by Deleuze and Guattari in thinking about becoming. Becoming-design is about perceiving and anticipating what a designed work is not yet, but will become. And even the final designed work is not static – it is always becoming. It can become an Other through mass customization by users or indefinitely cycled ‘cradle-to-cradle’ into other designed works as William McDonough implores.

The situation I related above is akin to what David Brooks wrote in his book *Bobos in Paradise*. It is not enough any more for us to buy an orange juicer. We want a post-modern treatise on the juicer; we want to know about the NURBS equation for the curvature of the juicer; we want to know what school of design the juicer belongs to. For me, reading design texts reminds me of touching the lightning balls I used to play with in kitschy tourist shops dotting America. These lightning balls produce streams of electrically charged particles that jump from the center to your palm or fingers as you touch the glass exterior. Each of these streams of charged particles seems like one of these vectors. With every read, as with every touch, one of the vectors of power recalls an image of thought about a designed work.

Our aim in this book is to examine the language of design in order to grapple with becoming-design. We approach this issue by problematizing how the language of design constitutes an account of designing and the designed work. For quite some time now, cognitive science and social science have served as the bases for predominant approaches to understanding design. In my own field of design computing, understanding how designers design through the methods of cognitive science has inspired models of computing, which in turn serve as the foundation for design tools and computational systems that enact design. The homology between design and cognition (models of human mental processing) are taken as a given because design (at least in its purposeful and intentional senses) seems to be a uniquely human endeavor. What is somewhat problematic about the cognitive science and social science approaches is their tendency to reduce design to repeatable steps. The idea is that if we can learn how it is that designers do design, then we can, in a sense, codify the process and thereby repeat the process reliably. Moreover, these steps can be encoded computationally so that computers could enact design. It is undeniable that these approaches have generated a wide variety of useful computational tools and systems, and I certainly do not discount the fruitfulness of these approaches. What this book questions, however, is whether knowing design by understanding actions undertaken in design thereby leading to faithful repetitions of design simply lets us know what design is without knowing what design feels like. If we want to know design, perhaps we need to become-design, not just imitate design, but instead enter into the compositioning of design.

The examination of design texts will be our mechanism for entering into the becoming-design. Computational interpretations of design texts will help us render perceptible what these texts produce – the designed work – and the transformations (i.e., multiple becomings) that occurred as a result of a set of powers operating behind the texts.

Our project is informed by the post-structuralist view that texts are an expression or representation of something else, some other extra-lingual phenomena, some other effect. While motivated and guided by post-structural philosophy in thinking about how the language of design harnesses and represents that which can be conversed and said, thereby producing the act of designing and the consequent designed work, our method of analysis will be drawn from the techniques of computational science. Our conjecture is that design partially subsists in language; the substrate is the language of design. Entering into the language of design lets us inhabit the becoming-design through the becoming of another mode – language.

Once we get past the seductions of the accounts of designing and the designed work in language form, the language of design reminds us that design is an assemblage, continually made anew each time, and reiteratively deployed through various forms of discourse about design. It is re-thinking the ‘designer’ and what allows the designer to perform designing in a certain way as not necessarily a ‘willful’ choice but one that is anchored into what is said and written about design that I hope to provoke you into considering. That is, we need to think about *becoming-design* not being design.

At this point, one should be thinking why focus on language. When one thinks of designing, language is probably not the first type of representation thought of; visual forms are if you are an architect or user interface designer, equations and diagrams if you are an engineer. Moreover, designers produce representations in various formats including drawings, equations, diagrams, and multimedia. More often than not, though, these representations are accompanied by language-based descriptions. Language is a medium by which designers give an account of design and almost always accompany visual forms. My assumption, which may be optimistic, is that the practice of design may be studied more or less independently of these other representations because language is intertwined in the ontological circuit of recognition between a designed work, the designers, and the users. How the activities, methods and practices of design work to constitute the materiality of the designed work through language and how the language itself is designing are one focus of this book. Second, language produces a common sense that anchors designers and their work to a body of knowledge and practice. The language tells stories about design, which design stories to relate, and how to tell them, and how to construe the meaning of design. Thus, analyzing design as produced by the discursive deployments of the language of design may turn our attention toward design practice and the designed work as the effect of what Judith Butler described as ‘reiterative performances’ and their institutions that confer authority on certain work practices as being identifiable as design and on certain objects and environments as being designed.

Studying the language of design has always been problematic because the language often refers to things which do not yet exist and which may never materialize. My hope is that by thinking of the language of design as part of and enacting design, we can register the ways in which the constitution of design relies on language beyond cataloging types of design conversations and statements as “elements of the language of designing” (Schön 1983, p. 95). Following Michel Foucault’s thoughts on language from *The Order of Things*, our analysis of the language of design moves “towards the place where things and words are conjoined in their common essence, and which makes it possible to give them a name.” (Foucault 1994, p. 117) Rather than mapping design into deterministic and proceduralized structures, language is seen as expressing the possibilities of design, channeling chance and patterning words across a series of journeys where language is design’s structuring structure.

Using This Book

Interested readers are invited to download sample MATLAB[®] code from a Web page accompanying this book. The sample code implements the Computational Implementations described in the chapters.

Go to <http://www.arch.usyd.edu.au/~adong/book/lod/> to download the code.

Acknowledgements

Writing, like designing, involves multiple stakeholders. This project is no exception.

It is difficult to trace the origins of any project, but one event stands out for me. My friend and colleague Petra Gemeinböck, upon her arrival into Sydney, house sat for me while I went away on a conference. That night, after helping Petra to connect to my wireless network, my friend David McInnes and Petra engaged in a long discussion on performativity. That discussion galvanized my interest in performativity. I have benefited enormously from David and Petra, who both introduced me to and tutored me on Butlerian performativity. Cristyn Davies organized tickets for me to attend Judith Butler's lecture at Angel Place in Sydney as part of the Judith Butler Symposium at the University of Western Sydney. David also introduced me to the theories of Basil Bernstein whose ideas permeate the last chapters of this book. My friendship with him has left an inexorable intellectual mark.

Even earlier thinking on this book started when I was a postdoctoral researcher at the University of California, Berkeley, with Professor Alice Agogino. She, a Master of Science student Andrew Hill, and I started formulating ideas about using computational linguistic algorithms to address the problem of monitoring and coaching student design teams. It was Andrew Hill who first suggested of the idea of using latent semantic analysis and with whom I was able to make the first working system that could analyze design text for linguistic characteristics associated with successful creative design work. The quality of this idea was recognized by the Design Research Society and Elsevier Ltd. by awarding me the Design Studies Prize in 2005 for my publication *The latent semantic approach to studying design team communication*. Along with the prize of £500 and the recognition in my community, the award motivated me to think that the study of language and design, computationally, might just be a worthwhile pursuit.

The work on lexical chain analysis was greatly advanced by the astute and careful programming by my research assistant and friend Kevin Davies. That his code has been ported across computers and operating systems attests to the great care he took in implementing the algorithms. Justin Clayden took all of the code,

a draft user interface and inscrutable Matlab code, and wrote a distributable software package that could be used by other researchers. He added in text processing code to make it accessible to, as he says, “non-geeks”. Colleagues at the University of Bath, Massachusetts Institute of Technology, and Nanyang Technological University tested the software and offered informative feedback.

Xiong Wang came to me as a PhD student in 2005 with an interest in furthering his research in support vector machines. Little did he know that I would throw to him the task of using support vector machines to analyze appraisals in design text and implement my language model of appraisal. He took all of the changes to the model in stride; I am thankful for his patience in a rather quixotic young academic with an idea that, at times, did not seem stable.

Maaïke Kleinsmann arrived from Delft University of Technology as a Visiting Researcher just in time to help me operationalize the language of appraisal in design and to test it on real data. She spent hours with me analyzing transcripts of designers working and clarifying the language model and rules to analyze the language. The language model for appraisal is better for her contributions, and any continued deficiencies stem from my intransigence to make further changes. Neil McCann designed the illustration which appears on the cover and in Fig. 2.2 and played language games with me while I was writing. Rachel AC Luck read an early draft of the book and gave poignant comments and invaluable moral support to the overall project. Other people, who I only know via the Internet, sent in e-mails of support with questions and suggestions on a Web-based working copy. All projects benefit from a good bout of good luck, and I am fortunate to have my share from the kindness of strangers and colleagues alike.

It would not have been possible to validate the results of the computational linguistic algorithms without the assistance of several colleagues in my research community. Rianne Valkenburg provided me with her marked up copy of the Delft Workshop Protocols study data set so that I could compare my computational results with hers. Professor Petra Badke-Schaub and her research assistant Joachim Stempfle offered me their data set. Their intellectual generosity in sharing data has, I believe, helped to progress our field of design studies by allowing research instruments to be developed, calibrated, and experimented with on common data. I hope this will become the norm.

Support for my empirical research for this book has been provided by the Australian Research Council and the University of Sydney. I express a very deep gratitude to these institutions for, as I see it, taking a risk on a young academic.

This book integrates, reworks and updates several papers which I have previously published. Portions of the text in Chap. 3 appeared in the following papers: Dong A (2005) The latent semantic approach to studying design team communication. *Design Studies* 26:445–461. doi:10.1016/j.destud.2004.10.003; Dong A, Hill A, Agogino AM (2004) A document analysis technique for characterizing design team performance. *Journal of Mechanical Design* 126:378–385; and Hill A, Dong A, Agogino AM (2002) Towards computational tools for supporting the reflective team. In: Gero JS (ed) *Artificial Intelligence in Design '02*. Kluwer Academic Publishers, Dordrecht, 305–325. Portions of the text in Chap. 5 appeared in the

following paper: Dong A (2006) Concept formation as knowledge accumulation: a computational linguistics study. *Artificial Intelligence for Engineering Design, Analysis and Manufacturing* 20:35–53. doi:10.1017/S0890060406060033. Portions of the text in Chaps. 2 and 6 appeared in the following paper: Dong A (2007) The enactment of design through language. *Design Studies* 28:5–21. doi:10.1016/j.destud.2006.07.001. Portions of the text in Chap. 5 appeared in the following papers: Dong A (2006) How am I doing? The language of appraisal in design. In: Gero JS (ed) *Design Computing and Cognition '06*. Kluwer, Dordrecht; and Wang X, Dong A (2008) A Case Study of Computing Appraisals in Design Text. In: Gero JS, Goel A (eds) *Design Computing and Cognition '08*. Springer, Dordrecht. I am thankful to the publishers for allowing me to incorporate these papers into this book.

Lastly, this book is dedicated to my family. I am indebted to the support of my mother Tu, my sister Anh, and our dog Norton. Thanks for making this struggle worthwhile. I am particularly thankful to my ‘adopted’ grandparents, my Nana and Da Mary-Alice and Bill Aultman. Nana and Da helped to sponsor our family from Vietnam and worked tirelessly to re-settle us in Pasadena, California. Nana even gave me the name of Andy when it was clear that my Vietnamese name was not going to be easily recognized as a boy’s name in America. How do you express your gratitude for such generosity? I hope ‘my’ achievements can be seen as a reflection of theirs.

Contents

1 Designing and the Language of Design	1
Rethinking the Designer.....	1
Design and Language.....	10
2 Framing the Language of Design.....	23
Design Studies	23
A Cognitive Framing	25
The Individual Band: Cognitivist Models	27
The Social Band: Design as a Socio-cultural Cognitive System	28
The Societal Band	34
A Textual Framing	35
Accounts of Design.....	38
The Performativity of the Language of Design.....	42
Why Computational Linguistics	47
3 Aggregation	51
Form Words to Concept.....	51
Latent Semantic Analysis.....	55
Language Theory.....	55
Computational Implementation	65
Sample Study.....	67
Summary	79
4 Accumulation.....	81
Building Up to the Designed Work.....	81
Lexical Chain Analysis	86
Language Theory.....	86
Computational Implementation	89
Sample Study.....	92
Summary	105

5 Appraisal..... 107
Design and Affect 107
Sentiment Analysis 112
 Language Theory..... 112
 Computational Implementation 129
 Sample Study..... 135
Summary 138

6 The Language of Design and Its Politics 141
Design, Language, Codes..... 141
The Sociology of Design Education..... 143
Non-cognitive Enactments of Design 160
Performance and Tension..... 164

7 Looking Back, Looking Forward..... 169
Looking Back..... 169
Looking Forward..... 173
Looking Far Ahead 175

References..... 181

Index 191