

Harold G. Nelson and Erik Stolterman

second edition

the design way

Intentional Change
in an Unpredictable World

THE DESIGN WAY

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Second Edition

Harold G. Nelson and Erik Stolterman

**The MIT Press
Cambridge, Massachusetts
London, England**

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This book was set in Stone Sans and Stone Serif by Toppan Best-set Premedia Limited. Printed and bound in the United States of America.

Library of Congress Cataloging-in-Publication Data

Nelson, Harold G.

The design way : intentional change in an unpredictable world / Harold G. Nelson and Erik Stolterman.—Second edition.

p. cm.

Includes bibliographical references and index.

ISBN 978-0-262-01817-3 (hardcover : alk. paper)

1. Design—Philosophy. 2. System design. 3. Design—Study and teaching.

I. Stolterman, Erik. II. Title.

NK1505.N43 2012

745.401—dc23

2011053205

10 9 8 7 6 5 4 3 2 1

This book is dedicated to:
Anne, Autumn, Erikka, Evelyn
Adam, Ludvig

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Preface to the Second Edition

It was with mixed feelings of excitement and hesitancy that we approached the opportunity and concomitant responsibility for developing a second edition of this book. The excitement came from the opportunity both to refine some of the ideas introduced in the first edition and to add many of the new ideas that we have been working with over the last few years. The hesitation came from the realization that we might easily make changes and additions that would not necessarily be seen as improvements over what was accomplished in the first edition.

The responses we received from readers of the first edition convinced us that there indeed had been a need for the kind of book about design we wrote. Based on feedback from an astonishingly broad spectrum of readers we realized that there are people from all around the globe who are deeply engaged in advancing design scholarship. We found that there are many design practitioners who devote a significant amount of time and effort to the development of both their understanding of design as well as their improved practice of design. We also discovered that there are an immense number of people, new to the game of design, who are interested in becoming designers in newly emerging fields and professions that were just beginning to appear when we published the first edition. In addition, the growing interest in adapting design thinking to established fields, domains, or professions became apparent from the diversity of backgrounds of the readers making contact with us.

It is with amazement and satisfaction that we have followed the development over the last few years of the increasing general interest among a broad set of stakeholders in design thinking, design theory, and even in the philosophy of design. We started our work on the first edition in the early 1990s, finalizing the writing about ten years later. During that time we had little idea that design learning, design thinking, and design practice

would become such a recognized part of not only academia, but the realms of business and government as well.

The ever-growing interest in design as an important and essential approach to intentional change made it compelling to further develop our ideas from the first edition of this book. However, even if awareness and interest in design have grown, there is still a need for further advancing and championing the “big” ideas introduced in the first edition. We are still pushing to make a case for the recognition of design as its own intellectual and practical tradition of human inquiry and action on equal footing with science, art, and the humanities. Today it is even more important to make the case for an intellectually viable and well-grounded scholarly approach to design.

We see the second edition of our book as a continuation of the first edition’s support for the development of a widespread design culture and a philosophy of design that is stable and true to the “nature” of design. Our intention is that this new edition will be even more supportive of the individual designer learning how to think and act with increasing competence in a designerly way.

This second edition has gone through both large and small revisions. Every chapter has been refined and modified. We have revisited our use of core concepts and terms with the purpose of being more consistent. We have added, updated, or removed references where it was important to do so.

We have also changed our approach to graphics in the second edition. We have introduced the notion of *schema* as the primary means for representing holistic concepts, ideas, and fundamental knowledge in visual form. This means that there is an increased importance vested in the graphics—that is, the schemas—to expand and complement the text in revealing or reflecting deeper understandings of design.

Among the bigger changes that appear in the second edition are two rewritten chapters—chapter 3, formerly “Systems,” is now “Systemics” and chapter 10, “Production and Caretaking,” is now “Craft and Material.” We have completely removed the last part of the first edition—Character and Competence—and added a new part V—A Drawing Together—with two new chapters—chapter 14, “Becoming a Designer,” and chapter 15, “Being a Designer.” We have added an epilogue—“The Way Forward”—where we invite the readers to take a look into the future of design and their own design futures.

We are extremely grateful to all the students and colleagues who have commented on and critiqued the book over the years. This includes non-

academic colleagues and interested individuals as well who have provided us a tremendous amount of support and encouragement. The critiques, both positive and negative, have been very helpful and are appreciated. They have helped us to understand how we can further develop and communicate our ideas—to make them more available and relevant to our readers.

We would like to thank our colleagues and students at Carnegie Mellon University; The Naval Postgraduate School; Indiana University Bloomington; and Umeå University, Sweden. We thank the School of Computer Science at the University of Montana for their support. We also thank Anne Nelson for her continued invaluable assistance in crafting the draft document. We are very appreciative of Robert Sandusky's reviews of earlier drafts and his invaluable suggestions for their improvement.

We are particularly grateful to Doug Sery and the MIT Press for giving us this opportunity to publish the second edition of *The Design Way*.

Harold G. Nelson
Erik Stolterman

Acknowledgments from First Edition

Many people have helped us in developing both the content of this book and its form. We owe them a great deal and would like to give them our thanks for their friendship, support, and professionalism. We have had the chance to work with a number of colleagues in different design fields over the years. Their questions, thoughts, and ideas have greatly helped us to formulate our own composition. But, since our work on the book has been going on for quite some time, we know that we cannot acknowledge all of you, who in one way or another contributed to this final version of the book. So, to all of you: Thanks!

We are deeply thankful to our students, both in the United States and in Sweden, who have helped us by reading earlier versions, asking questions, and being honestly critical of ideas, but especially for encouraging us to go on with our work.

We want to thank the following individuals and organizations specifically. We would like to thank our colleague and friend Bob Sandusky, cofounder and officer in the Advanced Design Institute. We send our thanks to Elizabeth Heffron as well, for her invaluable insights, guidance, and support in crafting the final text. We also thank Torbjörn Nordström, Anna Croon Fors, Kristo Ivanov, Jonas Löwgren, and Lawrence Lipsitz for their willingness to read, reflect, and comment on earlier versions of this text. In addition, we would like to thank Anne Nelson for her assistance with the early drafts as well as the final drafting of our manuscript. Her energy and support were the constants we came to depend on. Finally, we would like to thank those who read and commented on our final draft of the manuscript: Russell Ackoff, Tom Fisher, Russell Osguthorpe, Jim Platts, and Gordon Rowland.

We also want to express our gratitude to the Swedish research funds, The Bank of Sweden Tercentenary Foundation and The Swedish Research

Council, for their financial support; without their assistance this work would never have been possible.

Most important, we want to thank our families for their unconditional support and encouragement.

Harold G. Nelson, Seattle

Erik Stolterman, Djäkneböle

Prelude

Genesis is ongoing. As human beings, we continuously create things that help reshape the reality and essence of the world as we know it. When we create new things—technologies, organizations, processes, environments, ways of thinking, or systems—we engage in design. To come up with an idea of what we think would be an ideal addition to the world, and to give real existence—form, structure, and shape—to that idea, is at the core of design as a human activity. This book is about that activity.

Design is a natural and ancient human ability—the first tradition among many traditions of human inquiry and action. Everyone is designing most of the time—whether they are conscious of it, or not. Framing our understanding of design in this way, we define, and promote, a new philosophical look at this seminal human tradition through a reconstituted culture of inquiry and action. We identify that culture as *The Design Way*—manifested as a schema of the first tradition. This approach applies to an infinite variety of design domains including those fields that are traditionally thought of when we consider the concept of design, such as architectural and interior design, industrial design, engineering design, graphic design, urban design, information systems design, software design, interaction design, fashion design, and other forms of material and immaterial design. But our approach also allows us to include nontraditional design areas, such as organizational design, social systems design, educational systems design, workplace design, and healthcare design. Such a design approach can even be applied to significant social institutions such as governance, including the design of democratic constitutions (Sunstein 2001).

In the struggle to understand and interact in an ever more complex and dynamic reality, we believe the current traditions of inquiry and action prevalent in our society do not give us the support we need—as designers and leaders—to meet the emergent challenges that now confront us and

will continue to confront us in the future. The world is changing rapidly, sometimes with intent, but too often by accident. The world has proven to be unpredictable, despite the best attempts of science and technology to bring predictability and control to worldly affairs. The laws of nature may be universal, but the complex interactions of everyday events, whether provoked by accident or fate, result in unpredictable outcomes. The one thing that makes this state of affairs tolerable is the inchoate knowledge that change—desired change—can be wrought by human intention. Human intention, made visible and concrete through the instrumentality of design, enables us to create conditions, systems, and artifacts that facilitate the unfolding of human potential through designed evolution in contrast to an evolution based on chance and necessity—a highly unpredictable process.

In our attempts to design the world to be what we would like it to be, we find that the intellectual traditions at hand cannot fully support that task. Science, art, spirituality, economics, and technology are all important traditions of inquiry in their own right. However, they do not embody the unique attributes and competencies of the design tradition, with its corresponding approach to scholarship and praxis. Each of the prevailing traditions has developed a depth of knowledge and insight that is impressive, but it is often focused on only one aspect or dimension of our human experience—one that is necessary but not solely sufficient in the management of human affairs.

We believe the culture of inquiry and action that infuses design thinking is an essential part of the variety of human traditions of being in the world—of “human being.” Even though other outstanding scholars (Schön 1983; Margolin and Buchanan 1995; Banathy 1996; Cross 2001; Krippendorff 2006) have investigated the concept of a design tradition, design has remained surprisingly invisible and unrecognized in the world at large. This book is an attempt to change this, making the case for design as its own tradition by formulating its fundamental core of ideas. *The Design Way* does not present a ready-made recipe on how to think about or engage in design. This is not a detailed hands-on book about design praxis (which is a topic that deserves several books of its own). It is not exclusively something for professional designers or design academics. It is a way to approach the reality of the human condition by intentionally embracing the richness of possibilities; the complexity of choices and the overwhelming challenges of getting it right—in short, a book on how to understand design.

Our ultimate desire is to encourage and promote a design culture. For any tradition to flourish, that tradition requires a nurturing environment,

a protective container within which its frontiers and prospects are defined and protected. A viable design tradition requires the enabling presence of a design culture, one that defines conceptual expanses and boundaries, and provides a context for setting particular limits on any design project. Such a design culture acts as a catalyst in the formation of social crucibles essential for sustaining the intensity of design action. It is a protective environment that provides the space and freedom necessary to foster a process that is both powerful and vulnerable at the same time.

What is presented in this book is a composition of what we believe a broad and deep understanding of design—as a tradition of inquiry and action—should include. This composition is, in itself, a design. It is not an attempt to present a scientifically true or accurate description of a design culture. Nor is it an attempt to answer all questions that might emerge concerning what a design culture might, should, or ought to, be. It is our understanding of design, as its own tradition and not merely a variant of science, or art, or technology, or spirituality. It is an effort to build a deeper understanding of design, based on ideas we believe must be present in the development and implementation of a design culture—the necessary ingredients for the release of design’s full potential and promise for generative human agency.

What we have set out to do was to write a book about the philosophy of design in distinction to a book about the philosophy of science, the philosophy of the science of design, or the philosophy of design science. Those were all candidates but we very carefully attempted to look at design as its own tradition and not as a specific or special form of science, art, or any other existing approach.

It follows that we did not attempt to make our case using evidence-supported design (a Lockean analysis), or theorizing about design, (a Leibnizian analysis), or as a dialectic approach focused on design issues (a Hegelian analysis). Instead, we want to make our case using a design approach to inquiry. We do not ignore or reject science, art, and other traditions of inquiry—we sweep them in as part of design inquiry. This does not mean that we have just “made things up,” however, any more than an artist just “makes up” a painting or a composer “makes up” a symphony. We have used the same design foundations and fundamentals we write about as touchstones for crafting the book. What we hope readers will do is to look at the ideas presented here from the stance of a designer.

The book is not a scientific treatise or a manifesto. It is a composition of ideas. We are not basing our concept on a body of data or a consensus of agreement among experts as would be rightly expected in a science-

based dissertation. It is true that there are habits of thinking that will be challenged in the way the book has been composed and in the ideas forming the color and texture of the overall composition. We hope that the book will be read from the design tradition rather than regarded from a science or arts and humanities tradition.

The Design Way is an introduction to many ideas that deserve a composition of their own. We feel that it is important, however, to present them here as a whole, as part of our composition. We are not proposing a particular theory, or a set of theorems, or axioms. Instead, we have chosen to use a schema of *foundations*, *fundamentals*, and *metaphysics* as the unifying elements of the book. The foundations are equivalent to the first principles or causes of other traditions such as science. The fundamentals we identify as those core concepts of the design approach that can be learned and improved on through practice and reflection. The metaphysics arises as a consequence of the interaction of the foundations and fundamentals of the design tradition, with one another and with the larger domains of human existence.

This structure of foundations, fundamentals, and metaphysics best reflects the level of our intention in making a case for a design culture. Over the years, we have found that these are emergent patterns that have continually informed the integration of our ideas as a whole. We find that it is possible to make a composition from this tripartite relationship; one that reflects, in different ways, what we see as the core of a design approach—a design way. The concluding part V titled A Drawing Together brings the foundational, fundamental, and metaphysical issues discussed in the book to bear on two integrative discussions concerning what is entailed in becoming a designer and what one must understand in order to practice as a designer. These two design dialogues form distinct compositional depictions of what a design culture might look like from a learner's perspective and from a practitioner's perspective.

The idea of a design culture is one that promotes an understanding of design as transcendent of particular contexts, specific disciplines, or single concepts. For instance, it is commonly believed that design is simply a form of creativity. Creativity is thought of as the activity that gives design its special qualities even though creativity is equally important in the arts and sciences. But, even though creativity is seminal to design, design is larger and more comprehensive than that. Design is inclusive not only of creative thinking but innovative, productive, and compositional activities as well. Innovation and production differ from creativity in that they are

oriented to taking action in the real world whereas creativity can be done for its own sake. Design is realized through the manifestation and integration of ideal, if not always creative, concepts into the real world. Design is a compound of rational, ideal, and pragmatic inquiry. Design is constituted of reflective and critical thinking, productive action, and responsible follow through. Therefore, a single concept, such as creativity, does not capture the full richness of the design tradition.

A design culture needs to be broad in its scope and deep in its meaning and utility. Thinking about design in this way, we hope to define a firm platform from which designers, in any field, can bring this new appreciation for the potential of design into action. With this in mind, we will often use the term “design” to stand for this broader meaning of a design culture.

The process of design is always the most effective and efficient means of getting organizations and individuals to new places. Design is therefore about leadership—and leadership is therefore an essential element of any design culture. Leadership today demands action and the ability to act, based on an overwhelming amount of insufficient information within restrictive limits of resources and time. These demands cannot be met primarily from within the traditions of science, art, or pragmatic technology. These demands require leaders to imagine, implement, and communicate adequate responses that are sustainable—in all their implications. This is a task that calls for good judgment—not problem solving. It calls for compelling compositions and effective creations—not true solutions. We argue therefore that *The Design Way* is not only for designers, but for leaders as well. We believe that leaders and designers are often one and the same, and that it is important for leaders to recognize that their challenge is that of a designer—to determine direction and destination via the design tradition.

The Design Way is based on the notion of reflections and substance. We hope that the book, as a composition, will evoke an appreciation for what design is all about in both its form and substance. Each chapter is an attempt to reflect that substance and give it some form. Each reflection reveals an image of one aspect of design, which obviously is not enough on its own to reveal the bigger picture of design. We do believe, though, that by moving among these different reflective images, recognition and understanding of the substance itself (i.e., what design is all about) and its compound form will emerge. This means we encourage readers to choose to read those reflections (or chapters) that seem most interesting or suitable

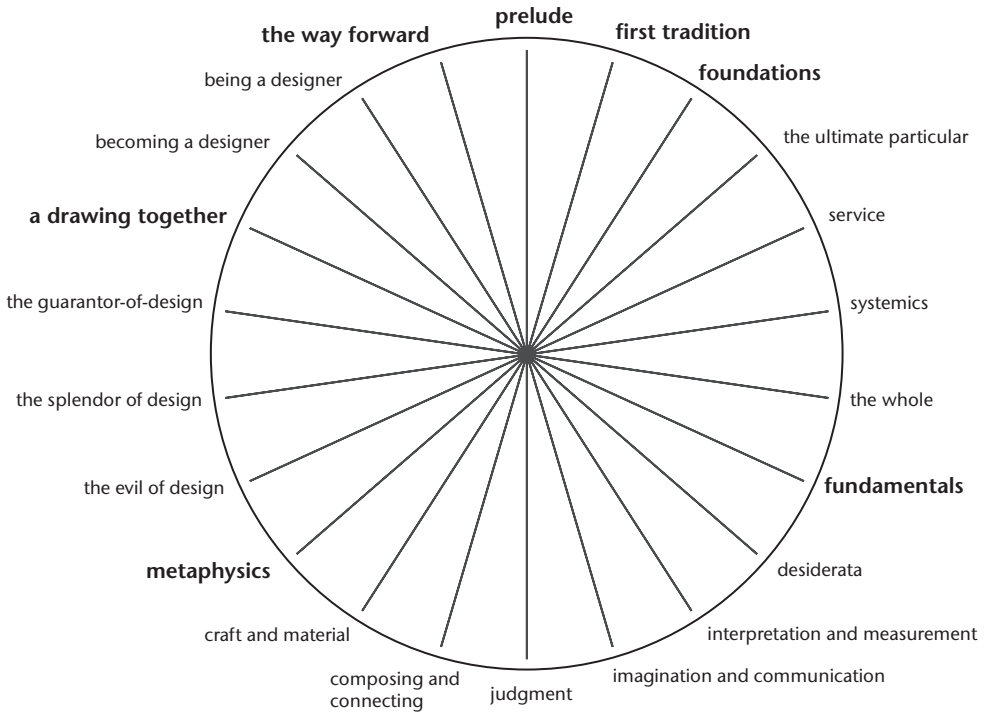


Figure P.1

The Design Way hyperlogue

to them. Even if the book is designed as a composition with an overarching structure, it is possible to read the chapters independently, as parts of a *hyperlogue* (see figure P.1). In a hyperlogue one can start on any topic and move to another in no particular order, other than interest, with the assurance that a pattern of interests will emerge and that all topics will be interconnected at the end.

Our hope is that each reflection or image of design, each chapter, will intrigue the reader to delve further, eventually creating a more comprehensive understanding of the substance of design. This is also true of the individual graphics found throughout the text. The graphics are not meant merely to illustrate the text, as the text is not meant merely to explain the graphics. The graphics in many cases are meant to momentarily arrest the progress of the acquiring eye in order to give the reflective eye time and space to provoke questions and elicit understandings and insights that are relevant to the reader's own experiences and understanding. In this way the author's ideas can be translated into the reader's own ideas.

The graphics or illustrations in this book should be understood and read as design *schemas*. Schemas can be divided into two different categories—ontological (inquiry into the nature of real things) and epistemological (inquiry into how we learn and know about things). *Ontological schemas* are cognitive models, or mental models, that humans create for themselves to help make sense of complex real-world experiences. *Design schemas* are epistemological models utilized in design inquiry. They are compositionally ordered or organized cognitive schematics used to support design inquiry and action, just as scientific schemas—hypothesis and theories, for example—are structured to assist in predicting the behavior and nature of things in the real world:

As Immanuel Kant put it, more than 200 years ago, scientific theories are *schemas*: they “enable the understanding to apply its categories and unify experience.” In other words, the grand strategy of research is not just to trace out itineraries of cause and effect: it is to *represent* “schematically” those aspects of nature that can be grasped in principle and/or used in practice.

Thus, the conceptual culture of science includes a number of characteristic schemas. Of these, the simplest and most widely used is the notion of a *system*. (Ziman 2000)

Unlike scientific schemas, which represent true things, design schemas are used to form particular representations or aspects of ideal things out of a cloud of possibilities, in support of a divergent or expansive process of inquiry. It is a process that brings things into existence and whose outcomes are not predetermined but are the consequence of human volition and judgment.

A design schema is insufficient as a sole guide to design inquiry, since it offers only a singular perspective, among multiple possible perspectives, of phenomena or concepts too complex to be captured from a single station point. A schema’s value is determined by its advantage in use. There are no true or false design schemas, as in the case of scientific schemas, but only ones that turn out to be very effective or else prove to be unhelpful. Specific design schemas may work better for some designers than other designers.

We have chosen to use design schemas as a means throughout the book to visualize, conceptualize, and structure our understanding of design inquiry. These schemas do not have the same epistemological purpose as scientific schemas, that is, they do not take on the intention of representing a true description of reality. Design schemas instead are strategies or tactics for design inquiry that can be characterized as:

- Organized patterns of thinking, that is, models of design inquiry.
- Ordered clusters of ideas for guiding design inquiry.

- Strategies for gaining design knowledge with the purpose of taking action.
- Knowledge structures or cognitive representations of design thinking.
- Cognitive frameworks representing a means for managing systemic inquiry formulated around specific design issues.
- Insights into how to give form to infinitely complex information and sense data.
- Cognitive structures that organize subjective, objective, and imaginative design-thinking processes.

Design schemas are the product of creative insights into how to engage in design inquiry in the same way that breakthrough thinking—the “ah-ha!” moments in creative endeavors—are representations of possible solutions for particular design outcomes. They share the same underlying processes of subconscious judgment making that unify immensely complex inputs of information and design reasoning into singular images. The ability to create and use high-value schemas is at the heart of design scholarship, just as the ability to creatively posit well-formed hypotheses and test their validity is at the heart of scientific scholarship. We therefore hope that the reader will take the needed time to pause, examine, and reflect on the (often graphical) schemas we present. In line with the saying “a picture is worth a thousand words” we believe that a good schema has the same quality as a great photo. Great schemas invite close readings, offer many ways to be interpreted, and inspire different meanings and understandings.

We also hope that reading *The Design Way* will sway others to participate in the creation of a design culture as a consequence of the influences of a revitalized and reconstituted tradition of design. This means the book is not only for designers, or for those who hope to become designers: it is for everyone. Each person, in his or her own way, can become responsible for the creation of a design culture. With such a design culture in place, designers will find themselves encouraged to safely pursue their design intentions in an open and supportive environment on behalf of those they serve.

In our attempts to present a broad understanding of design, we have been pragmatic in our relation to other sources. We have drawn from many intellectual traditions, and we have used philosophers and design thinkers in ways not always obvious from a standard perspective. When we make a reference to a specific philosopher, or thinker, this does not imply that we endorse the entirety of his or her work.

To make the design tradition visibly distinct from other intellectual traditions, we sometimes portray those traditions in ways that may not do

them full justice. To make these traditions visible, we sometimes use an idealized and simplified understanding of their essential nature. This may seem offensive to some readers, who are led to believe our purpose is to diminish the richness of the other traditions in order to make the design tradition appear more valuable. This is not our intention, however, but merely an artifact of our pedagogical approach.

When it comes to our own ideas, we have tried to be congruent with the design tradition we are trying to explore and develop. It is the composition of our thoughts—as a whole—that carries the primary message. This means that when we discuss specific concepts—such as judgment, composition, contracting, communication, or character—we do this from within the design tradition. We do not try to provide universal definitions of these concepts that would apply across other traditions of inquiry and action. These concepts are defined through use in pragmatic design ways, with the specific purpose of revealing our grasp of design as a whole.

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