
Mary Stewart
Sixth Edition
Launching the Imagination
A Comprehensive Guide to Three-Dimensional Design
Mc Graw Hill Education

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Launching the Imagination:

A Comprehensive Guide to Three-Dimensional Design

is dedicated to

Anne Stagg, MFA

dedication

Launching the Imagination treats design as both a verb and a noun—as both a process and a product. Through an immersion in 2D, 3D, and 4D concepts and possibilities, students develop visual thinking strategies that will serve them throughout their studies and their careers. They discover that design is deliberate—a process of exploring a wide range of solutions and choosing the most promising option for development. They are encouraged to analyze each resulting solution thoughtfully in order to produce the clearest and most inventive solution to each assignment. And they find inspiration in the work of others, analyzing the art of the past and the present for insights.

LAUNCH YOUR IMAGINATION WITH CONNECT

Connect helps students better understand and retain these basic concepts. Connect is a highly reliable, easy-to-use homework and learning management solution that embeds learning science and award-winning adaptive tools to improve student results.

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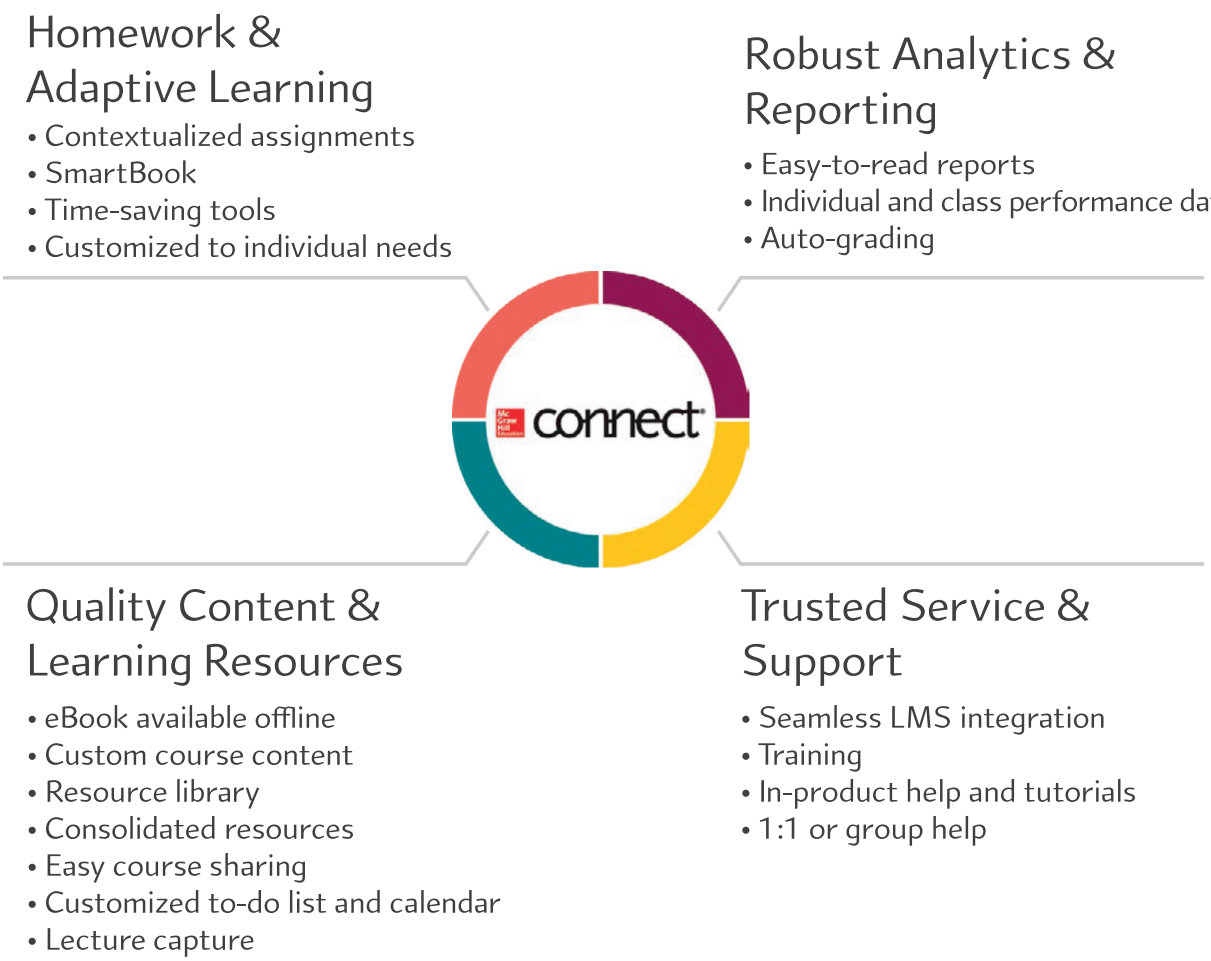
Included in Connect, LearnSmart is an adaptive learning program designed to help students learn faster, study smarter, and retain more knowledge for greater success by distinguishing what students know from what they don't, and focusing on concepts they are most likely to forget, An intelligent adaptive study tool,

LearnSmart is proven to strengthen memory recall, keep students in class, and boost grades. Connect also includes additional assessments.

Instructors can access a database of images from select McGraw-Hill Education art and humanities titles, including *Launching the Imagination*. Instructors can access a text's images by browsing its chapters, style/period, medium, and culture, or by searching on key terms. Images can easily be downloaded for use in presentations and in PowerPoints. The download includes a text file with image captions and information. Instructors can access Connect Image Bank under the library tab in Connect.

Launching the Imagination now offers two reading experiences for students and instructors: SmartBook and eBook. Fueled by LearnSmart, SmartBook is the first and only adaptive reading experience currently available. SmartBook® creates a personalized reading experience by highlighting the most impactful concepts a student needs to learn at that moment in time. The reading experience continuously adapts by highlighting content based on what the student knows and doesn't know. Real-time reports quickly identify the concepts that require more attention from individual students—or the entire class. eBook provides a simple, elegant reading experience, available for offline reading.



HALLMARKS OF OUR NEW EDITION OF *LAUNCHING THE IMAGINATION*

Building on the strengths of the previous five editions, *Launching the Imagination*, sixth edition, is even more

- **Concise.** Content has been refined so that maximum content can be communicated as clearly and concisely as possible.
- **Colorful.** In addition to the full color used throughout the book, the writing is livelier than that in most textbooks. Analogies expand communication, and every visual example has been carefully selected for maximum impact.
- **Comprehensive.** *Launching the Imagination* is the only foundational text with full sections devoted to critical and creative thinking and to time-based design. The photo program is global, represents a myriad of stylistic approaches, and prominently features design and media arts as well as more traditional art forms.
- **Contemporary.** More than half of the visual examples represent artworks completed since 1970, and over 100 represent works completed since 2000.
- **Compelling.** Interviews with exemplars of creativity have always been an important feature of this book. Three of the best past profiles have been revised and a new profile has been added. Now inserted into the body of the text, each interview deliberately builds on its chapter content. In Chapter 5, designer Steve Quinn describes the seven-step sequence he uses in developing websites, logos, and motion graphics. In Chapter 8, Jim Elniski describes *The Greenhouse Chicago,* an innovative home that is both highly energy efficient and elegant. In Chapter 11, ceramicist David MacDonald describes his influences and work process. And, in the new profile in Chapter 6, artist Sara Mast describes an ambitious art and science collaboration begun in celebration of the ideas of Albert Einstein.
- We have also added a new feature called Success Stories. These short interviews explore connections between foundational coursework and career success. In Chapter 5, Elizabeth Nelson discusses her wide-ranging design work at the Shedd Aquarium in Chicago. In Chapter 6, Jane Parkerson Ferry describes her work as Curator of Education at the Orlando Museum of Art. Jason Chin's interview in Chapter 7 connects directly to his self-designed project in the Self Assignment feature earlier in the chapter. As a freshman at Syracuse University, he completed this ambitious illustration project as the final project in a Two-Dimensional Design course. In the Chapter 7 interview, he describes his current work as a professional illustrator. In Chapter 8, Dennis Montagna describes connections between his art and design major and his current historical preservation work for the National Park Service.
- Almost fifty new images have been added, representing major contemporary artists and designers including Wolfgang Buttress, Do Ho Suh, Garo Antreasian, Janet Ballweg, Phoebe Morris, Alain Cornu, and Natalya Zahn.

To suit a variety of design curricula, *Launching the Imagination* is offered in three versions: a comprehensive version containing all four parts; a 2D-only version containing Parts 1 and 2 covering 2D design; and a 3D-only version containing Parts 2 and 3. You have the 3D version, which includes the following eight chapters: Chapter 5: Problem Seeking and Problem Solving; Chapter 6: Cultivating Creativity; Chapter 7: Developing Critical Thinking; Chapter 8: Constructing Meaning; Chapter 9: Three-Dimensional Design Elements; Chapter 10: Principles of Three-Dimensional Design; Chapter 11: Materials and Methods; and Chapter 12: Physical and Cerebral.

CHAPTER-BY-CHAPTER CHANGES

Each chapter has been updated and, where needed, reorganized to maximize clarity. Improvements include the following:

Chapter 5: The Steve Quinn interview is woven into the body of the chapter, and a *Success Story* with designer Elizabeth Nelson has been added.

Chapter 6: An interview with Sara Mast has been embedded into the chapter and a *Success Story* with Curator of Education Jane Parkerson Ferry has been added.

Chapter 7: The new Jason Chin Success Story clearly demonstrates connections between his foundational coursework and his current career as an illustrator.

Chapter 8: The interview with Jim Elniski has been updated and the Dennis Montagna Success Story has been added.

Chapter 9: Better examples of many of the artworks have been inserted.

Chapter 10: Better examples of many of the artworks have been inserted.

Chapter 11: Better examples of many of the artworks have been inserted.

Chapter 12: This chapter has been substantially distilled, making its content more relevant to foundational courses.

ACKNOWLEDGMENTS

Every new edition of *Launching the Imagination* is a significant challenge that requires work by a supportive and experienced team. At McGraw-Hill, senior editor Sarah Remington provided oversight for the project as a whole. At Laurence King Publishers, editor Donald Dinwiddie helped strengthen and clarify the writing and provided all kinds of helpful advice. Sandy Wille and Egzon Shaqiri from the McGraw-Hill production team made this new edition possible behind the scenes. Photo researcher Alison Prior was remarkably tenacious in pursuing each permission and was wonderfully inventive in suggesting alternatives when necessary. Robin Farrow worked tirelessly to develop the best possible layouts. Mat Kelly of Central College and A. Scott Baine of East Mississippi Community College contributed their expertise to assessments in Connect.

Images are at the heart of this book. I would like especially to thank all the artists and designers who granted permission for their artworks and the galleries, museums, archives, and private donors who provided the high-resolution images.

This edition is dedicated to four master educators. Dr. Dan Collins at Arizona State University has been an exemplar of innovation in education throughout his career. He is founding Co-Director of the PRISM lab (a 3D visualization and prototyping facility) and heads the foundation program in the School of Art (artCore). Through his leadership at the Telluride Institute in Colorado and as a Senior Sustainability Scholar at Arizona State, he continually seeks new ways to use art to advance the greater good. As past Director of the First-Year program at The School of the Art Institute of Chicago and co-founder of Integrative Teaching International, Jim Elniski has been a consistent and compelling voice for innovation in higher education. His community-based art projects, in conjunction with various human-service organizations, educational sites, and neighborhood

associations, explore the dynamic interplay of the aesthetic experience, human behavior, and the social and natural environment. The two-dimensional design version of this book is dedicated to Nancy Callahan, a brilliant and versatile educator from the State University of New York at Oneonta. Callahan has inspired both students and professional book artists through her teaching, workshops, and exhibitions. The three-dimensional design version is dedicated to Anne Stagg, now serving as Associate Chair of the Florida State University Art Department. A versatile and inventive educator, Stagg is renowned for her honesty and strong commitment to students. All of these remarkable people are exemplars of the very best in higher education.

The following reviewers provided valuable insights and suggestions for the sixth edition:

Emily Beck, *The University of Notre Dame*
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Michael Arrigo, *Bowling Green State University*
James Wade, *University of Kentucky*
Shannon Lindsey, *University of South Carolina*

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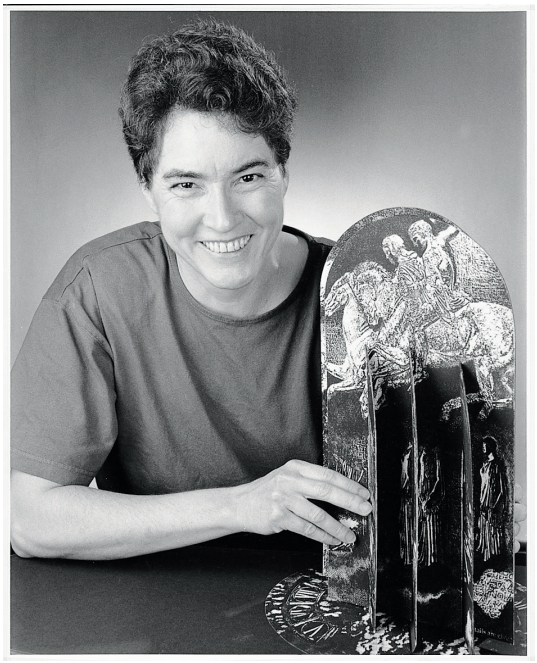
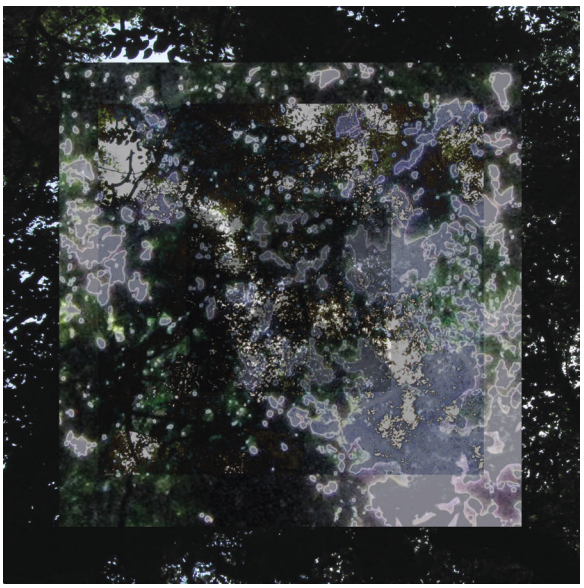
Author, artist, and educator Mary Stewart is a professor in the Department of Art at Florida State University. Her drawing, prints, and visual books have been shown in over 90 exhibitions nationally and internationally, and she has received two Pennsylvania Arts Council grants for collaborative choreography. A cofounder of Integrative Teaching International, she has given over 60 lectures and workshops on creative inquiry, curriculum design, educational leadership, and storytelling.

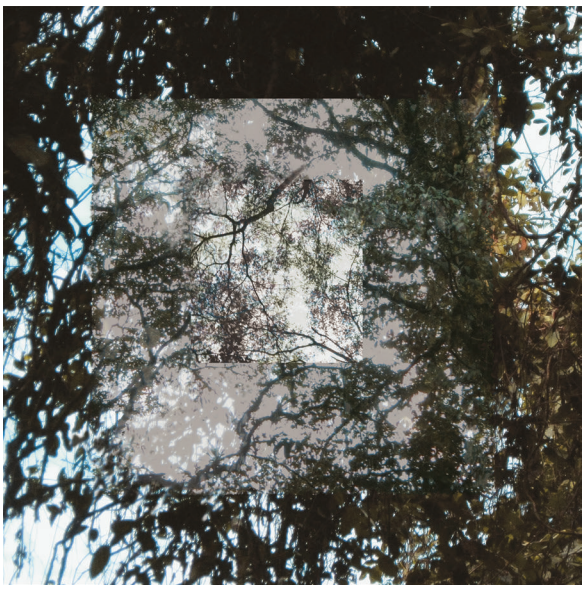
As shown below, her *Continuum Series* connects the macroscopic with the microscopic. Fragments of towering trees are juxtaposed with images that suggest activity at a cellular level. In this series, Professor Stewart seeks to explore ways in which we construct and express knowledge, both of ourselves and of the world around us.



Author Mary Stewart with *Labyrinth* book.
Courtesy the author



Mary Stewart, *Continuum #4,* 2012. Digital collage, 44 × 44 in. (111.7 × 111.7 cm).
Courtesy the author

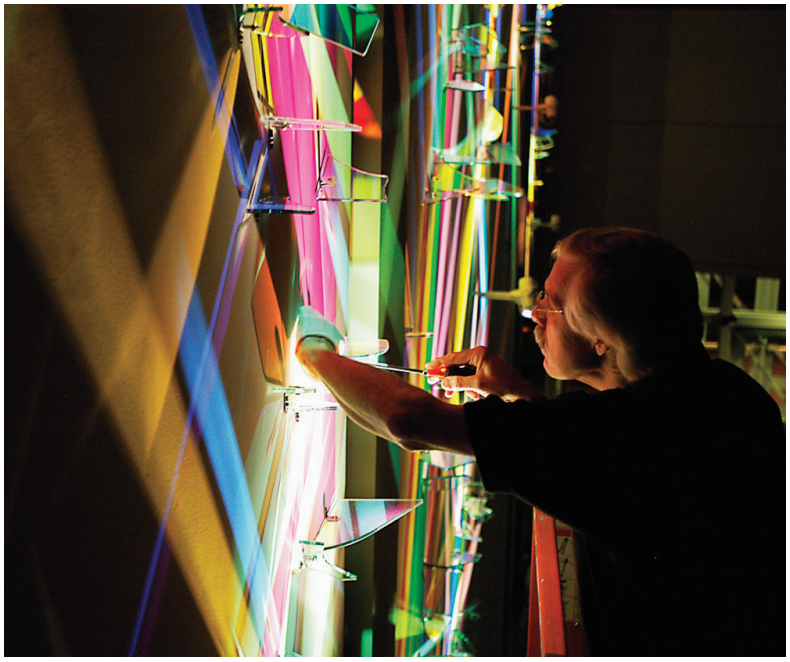


Mary Stewart, *Continuum #8*, 2012. Digital collage, 44 × 44 in. (111.7 × 111.7 cm).
Courtesy the author

What is *Launching the Imagination* about, and how can it be useful to you?

In this book, we will explore

- the components of visual construction,
- ways that these components can be used,
- characteristics of creative and of critical thinking,
- ways to increase your creativity,
- the physical characteristics of various materials,
- ways in which you can use materials to express ideas,
- the components and power of visual storytelling,
- contemporary approaches to visualization.



Stephen Knapp installing *First Symphony*, 2006. Lightpainting installation, Ball State University, Muncie, IN.

Because studio courses require hands-on work, we will treat design as a noun *and* as a verb.

As a noun, design may be defined as

- a plan or pattern, such as the blueprint for a house;
- an arrangement of lines, shapes, colors, and textures into an artistic whole, as in the composition of a painting.

As a verb, design can be defined as

- to plan, delineate, or define, as in designing a building or a functional object;
- to create a deliberate sequence of events, as in designing a film storyboard;
- to organize disparate parts into a coherent whole, as in designing a brochure.

Design is deliberate. Rather than simply hoping for the best and accepting the result, artists and designers explore a wide range of solutions to every problem, and then choose the most promising option for further development. Inspiring examples and informative text can help accelerate your learning process. In this book, over 625 images supply visual examples from many cultures and in all areas of art and design. Nine lively interviews with living artists provide insight into the creative process. Idea generation and critical thinking are thoroughly discussed in Part Two, and key questions (posted at the end of various sections of text) provide a way for you to self-assess your projects as they develop.

How high can you fly? How far can you travel? Will you work traditionally, in a specific discipline such as painting, printmaking, or ceramics? Or will you combine disciplines to create new forms of expression? Having mastered the basics of visual thinking, you will have the versatility and critical judgment needed to pursue a personal path.

Launching the Imagination

A Comprehensive Guide to Three-Dimensional Design

Roger Shimomura, *Florence, South Carolina*, from *Stereotypes and Admonitions* series, 2003. Acrylic on canvas, 20 x 24 in. (50.8 × 61 cm).

Concepts and Critical Thinking

In *A Kick in the Seat of the Pants,* Roger von Oech identifies four distinct roles in the creative process.

First, the *explorer* learns as much as possible about the problem. Research is crucial. Ignorance may result in a compositional or conceptual cliché.

Second, the *artist* experiments with a variety of solutions, using all sorts of combinations, proportions, and materials. By creating 10 answers to each question, the artist can select the best solution rather than accepting the only solution.

Third, the *judge* assesses the work in progress and determines what revisions are required. Innovative ideas are never fully developed when first presented; most need extensive revision and expansion. Rather than discard an underdeveloped idea, the judge identifies its potential and determines ways to increase its strength.

Finally, the *warrior* implements the idea. When obstacles appear, the warrior assesses the situation, determines the best course of action, and then moves ahead decisively.

We explore each of these roles in the next four chapters. Chapter Five deals with concept development and visual problem solving. Strategies for cultivating creativity and improving time management are discussed in Chapter Six. Chapter Seven is devoted to critical thinking and provides specific ways to improve any design. In Chapter Eight, we expand our discussion of visual communication and consider ways to create more meaningful artworks.

Part Two

chapter five

Problem Seeking and Problem Solving

You can increase the visual power of your work by mastering the basic elements and principles of design described in Parts One and Three. Composition, however, is only part of the puzzle. With the increasing emphasis on visual communication, ideas have become more and more complex. In contemporary art and design, conceptual invention is just as important as compositional strength.

So, to help expand your creativity, we will now explore ways to better define and solve a variety of problems.

PROBLEM SEEKING

The Design Process

In its most basic form, we can distill the design process to four basic steps. When beginning a project, the designer asks:

1. What do we want?
2. What existing designs are similar to the design we want?
3. What are the differences between the existing designs and our new design?
4. How can we combine the best ideas from past inventions with our new ideas?

By studying the classic Eames chair, we can see this process clearly. Charles and Ray Eames were two of the most innovative and influential postwar era designers. Trained as an architect, Charles was a master of engineering. He continually combined "big picture" thinking with attention to detail. Trained as a painter, Ray contributed a love of visual structure, a sense of adventure, and an understanding of marketing. Combining their strengths, this husband-and-wife team designed furniture, toys, exhibitions, and architecture, and directed more than 80 experimental films.

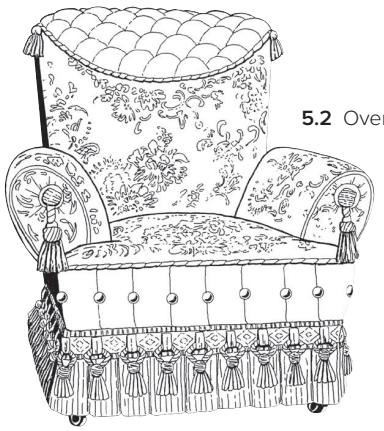
Their first breakthrough in furniture design came in 1940, when they entered a chair competition that the Museum of Modern Art in New York City sponsored. Many architects had designed furniture, and the Eameses were eager to explore this field.

Many similar products existed. The most common was the overstuffed chair, which continues to dominate American living rooms. Extensive padding on a boxy framework supported the sitter. Another popular design was the Adirondack chair, constructed from a series of flat wooden planes. Of greatest interest, however, were designs by architects such as Marcel Breuer (5.1). Using modern materials such as plywood and steel, Breuer and Alvar Aalto had begun to re-define chair design.

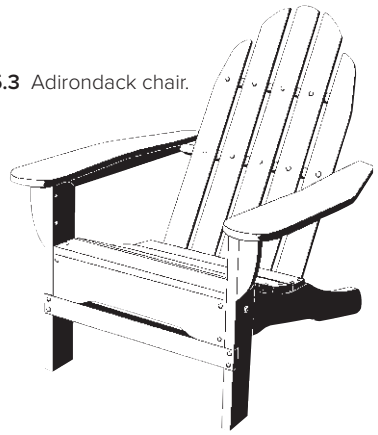
5.1 Marcel Breuer, *Armchair*, 1925. Tubular steel, canvas, 28 1/16 × 30 × 26¾ in. (72.8 × 77 × 68 cm).
Gift of Gary Laredo. Cooper-Hewitt National Design Museum, Smithsonian Institution/ Art Resource, New York

By comparing existing chairs with the chair that they wanted, Charles and Ray could identify qualities to retain, discard, or change. The familiar overstuffed chair (5.2) was bulky and awkward, but it was comfortable. The Adirondack chair (5.3) was easy to mass-produce, but too large for interior use. The modern chairs were elegant and inventive, but they were expensive to produce and often uncomfortable. The Eameses wanted to create a modern chair that was comfortable, elegant, and inexpensive.

During World War II, the Eames team had designed and manufactured molded plywood splints,



5.2 Overstuffed chair.



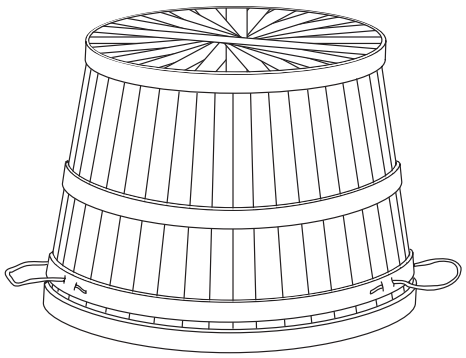
5.3 Adirondack chair.

which doctors in the U.S. Navy used. After extensive research and experimentation, they had mastered the process of steaming and reshaping the plywood sheets into complex curves. The resulting splints supported sailors' broken legs without using the precious aluminum and steel needed in the war effort.

So, to develop their competition entry, they combined their knowledge of splints, love of modern chairs, understanding of anatomy, and mastery of architecture. After their plywood chair won the first prize, they created a more refined model (5.4) that combined plywood with aluminum.

5.4 Charles and Ray Eames, *Side chair, Model DCM*, 1946. Molded ash plywood, steel rod and rubber shockmounts, 28¾ × 19½ × 20 in. (73 × 49.5 × 50.8 cm).
Courtesy of Knoll, Inc.

5.5 Frank Gehry, *Cross Check Armchair*, 1992. Maple, 33⅝ × 28½ × 28½ in. (85.3 × 72.4 × 72.4 cm). Courtesy of Knoll, Inc.



5.6 Wood-strip bushel basket.

A series of Eames designs followed, including numerous cast plastic versions. Variations on these stackable chairs are still being used in many schools. To create the plastic chairs, the Eames team invented a new manufacturing process. This led to a breakthrough in the field of furniture design.

By addressing a need, researching existing designs, making comparisons, and combining the best characteristics of existing chairs, the Eames team produced a new kind of chair and thus firmly established themselves as leaders in the design field.

The Fine Art Process

As this example demonstrates, the design process begins when a client requests help or the designer identifies a societal need. With the Eames chair, the museum competition provided the impetus for an experiment that reshaped an industry.

By contrast, contemporary sculptors, filmmakers, painters, and other fine artists generally invent their own aesthetic problems. Ideas often arise from personal experience. Combining self-awareness with empathy for others, many artists have transformed a specific event into a universal statement. For example, Pablo Picasso's *Guernica*, painted in response to the 1937 bombing of a Spanish village, is now seen as a universal statement about the horrors of war. Working more independently than designers, and with fewer deadlines, artists can more easily explore ideas and subjects of personal interest.

Sources of Ideas

Regardless of the initial motivation for their work, both artists and designers constantly scan their surroundings in a relentless search for images and ideas. As the interviews that appear throughout this book demonstrate, the most improbable object or idea may provide inspiration. Biological systems and architecture inspire sculptor Kendall Buster. Images from art history inspire painter Carrie Ann Baade. Jim Elniski and Frances Whitehead combined a commitment to their urban community with a fascination with solar and geothermal energy to create their "greenhouse." If you are at a loss for an idea, take a fresh look at your surroundings. Here are three strategies.

Transform a Common Object

Architect Frank Gehry based the exuberant armchair in figure 5.5 on the wood-strip bushel basket that farmers use (5.6). If you consider all the ideas that you can generate from a set of car keys, a pair of scissors, or a compass, you will have more than enough to start a project.

Study Nature

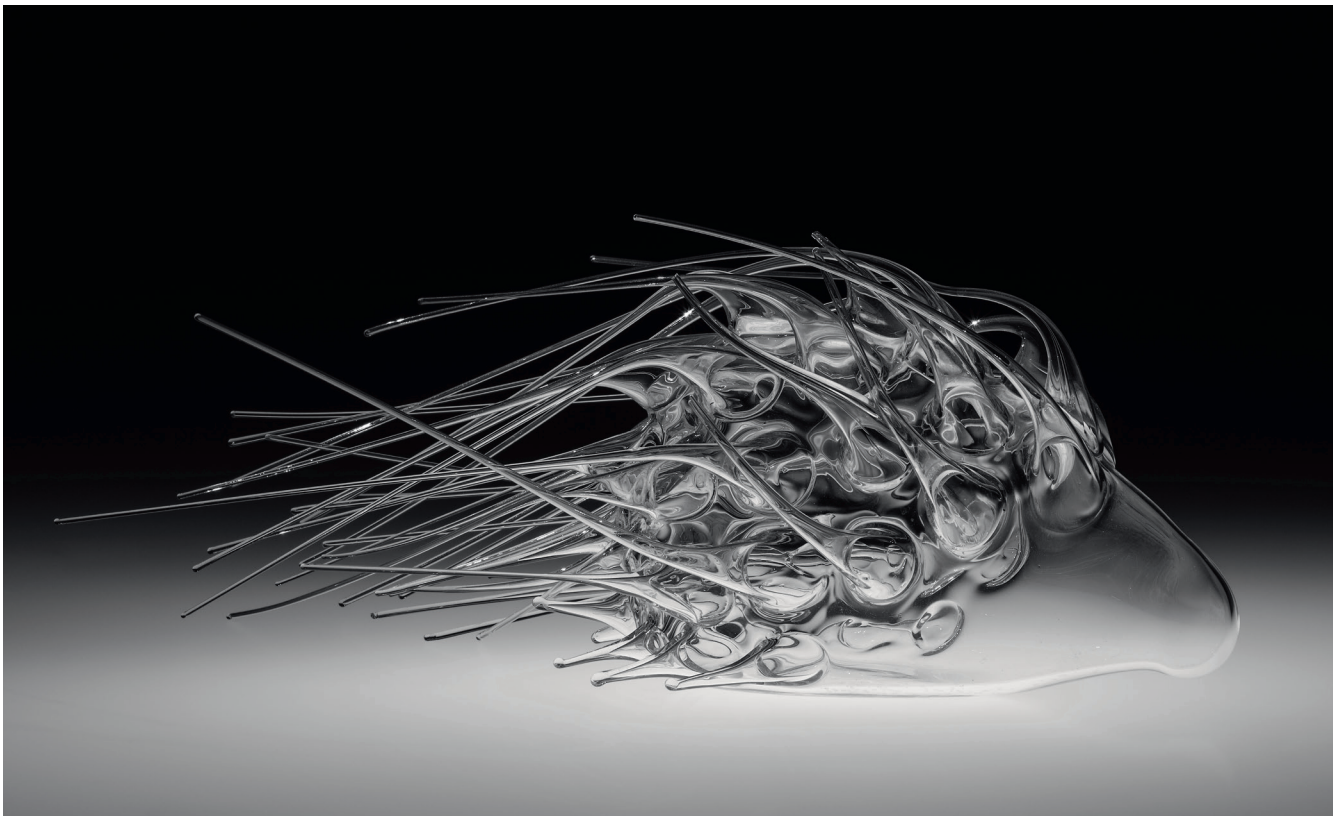
Natural forms such as seashells, stones, leaves, and nests have inspired many artists. Trained in scientific illustration, Suzanne Stryk is particularly attentive to both the visual nuances of natural forms and the wide range of ideas they may suggest. In *Journey Work* (5.7), she combined fragments of topographic maps, strips of text, plant stains, and paint. Two carefully drawn birds explore this elegant matrix of lines, shapes, and patterns. In figure 5.8, Vera Lisková used the fluidity and transparency of glass to create a humorous version of

5.7 Suzanne Stryk, *Journey Work*, 2011. Mixed media (paper, plant stains, gesso, topographic map, map pin, book pages, acrylic, pencil), 12 × 12 in. (30.5 × 30.5 cm).
© Suzanne Stryk

a prosaic porcupine. Through an inventive use of materials, both artists reinterpreted nature.

Visit a Museum

Artists and designers frequently visit all kinds of museums. Carefully observed, any culture's history and physical objects can be both instructive and inspirational. Looking at non-Western artwork is especially valuable. Unfamiliar concepts and compositions can stimulate creativity. Richard Hunt's Sisiutl mask (5.9) is one example. In Native American mythology, Sisiutl is a giant three-headed sea serpent whose glance can turn an adversary into stone. A benevolent and powerful presence, his image is often carved into the cross beams of clan houses. When he transforms himself into an invincible war canoe, or into a magic belt, Sisiutl becomes a powerful ally. By understanding the story and studying this mask, you



5.8 Vera Lisková, *Porcupine*, 1972–80. Flame-worked glass, 4¼ × 11 in. (10.8 × 28.2 cm).
Collection of the Corning Museum of Glass, Corning, NY, Anonymous gift (86.4.180)

5.9 Dr. Richard Hunt, *Raven and Sisiutl Transformation Mask*, 1988. Red cedarwood, cloth, and string, painted black, red, and green, approximately 16 in. wide × 14 in. tall × 20 in. long (40.6 × 35.6 × 50.8 cm).

5.10 Albrecht Dürer, *The Knight, Death, and the Devil* (detail), 1513. Engraving, full image 11 × 14 in. (28 × 36 cm).
Open Access Image from the Davison Art Center (Photo: R. Lee). Gift of George W. Davison, 1949.D3.1

can more readily design a mask based on your own experiences.

Historical examples such as Albrecht Dürer's *The Knight, Death and the Devil* (5.10) can be equally inspiring. Some 200 years before this print was made, the Black Death killed nearly half the population of Europe. This horrific disease remained a threat in Dürer's time. As a result, Renaissance conceptions of life and death were very different from our contemporary viewpoint. This difference can spark a new way of thinking and lead you to a fresh idea.

Characteristics of a Good Problem

Regardless of its source, the problem at hand must fully engage either the artist or the designer. Whether somebody commissions it or you invent it, a good problem generally includes the following characteristics.

Significant

Identifying and prioritizing your major goals can help you determine a task's significance. Is it truly essential, or just a distant dream?

Socially Responsible

With the human population exceeding 7 billion, it is unwise to pursue a project that squanders natural resources. What materials will you need, and how will you dispose of the resulting waste? Today, artists and designers often consider each project's environmental and economic implications.

Comprehensible

It is impossible to solve a problem that you don't fully understand. Ask questions if the assignment specifications and objectives are unclear to you.

Open to Experimentation

It is important to distinguish between clear definition and restrictive limitations. Consider the following two assignment descriptions:

1. Organize at least 20 photographs in such a way that they convey an idea or emotion.
2. Organize 20 photographs by American Civil War photographer Mathew Brady to tell a story about the life of Abraham Lincoln.

In the first case, the project requirements are clearly stated, but the solution remains open. The second case describes the *solution* as well as the *problem*.

For the professional artist or designer, there are no "bad" problems, only bad solutions. However, when limited to a narrow range of possible solutions, even the most inventive person will become frustrated. If you find yourself in a straitjacket, rethink the problem and try a new approach.

Authentic

Regardless of the source, every person approaches each problem in his or her own way. Each of us has a unique perspective, and the connections we make vary. As a student, you will learn more when you really embrace each assignment and make it your own. Ask questions so that you can understand each project's conceptual implications. When you reframe the *question* in your own terms, the creative possibilities will expand and your imagination can soar.

CONVERGENT AND DIVERGENT THINKING

Now, let's work our way through an actual assignment, using two problem-solving strategies.

> *Problem:* Organize up to 20 photocopies or prints from historical sources so that they tell a story. Use any size and type of format. You can enlarge, reduce, crop, or repeat any image.

Using Convergent Thinking

Convergent thinking involves the pursuit of a predetermined goal, usually in a linear progression and through a highly focused problem-solving technique. The word *prose* can help you remember the basic steps:

1. Define the *problem*.
2. Do *research*.
3. Determine your *objective*.
4. Devise a *strategy*.
5. *Execute* the strategy.
6. *Evaluate* the results.

In convergent thinking, the end determines the means. You know what you are seeking before you begin. For this reason, clear definition of the problem is essential: the most brilliant idea is useless if it doesn't solve the problem.

Convergent thinking is familiar to most of us in the scientific method, which follows the same basic procedure. It is orderly, logical, and empirical. There are clear boundaries and specific guidelines. Clearly focused on the final result, convergent thinking is a good way to achieve a goal and meet a deadline. Let's analyze each step.

Define the Problem

Determine all the assignment's physical and technical requirements and ask whether there are any stylistic limitations. Be sure that you understand the preliminary steps as well as the final due date.

Next, assess your strengths and weaknesses relative to the assigned problem, and determine your best work strategy. Let's consider the approaches of two hypothetical students, Jeremy (as a convergent thinker) and Angela (as a divergent thinker).

Using a dictionary, Jeremy begins by analyzing the words *story* and *images.* He finds that a *story* is shorter than a novel, that it may be true or fictitious, that it requires a series of connected events, and that it may take many forms, including a memoir, a play, or a newspaper article. Next, he determines that an *image* is a representation of a person or thing, a visual impression that a reflection in a mirror produces, or a mental picture. This means that photographs from books, magazines, and the Internet are all fair game. Jeremy realizes that he can even include a mirror in the project, to reflect the viewer's own image.

He spends the first hour of class on brainstorming, and then decides to develop a story about Irish immigration to America in the 1890s.

Do Research

Creativity is highly dependent on seeking connections and making new combinations. The more information you have, the more connections you can make. For this assignment, Jeremy reads extensively, then develops a plausible story based on immigrant diaries. He begins to collect images of ships, cities, and people.

Determine Your Objective

Jeremy now has the necessary raw material to solve the problem. However, many questions remain unanswered, including the following:

- What happens in this story? Is it fiction or nonfiction?
- Who is the storyteller? A 12-year-old boy will tell a very different story from a 20-year-old woman.
- What is the best format to use? A dozen letters that fictitious brothers in Dublin and Boston sent to one another? A website describing actual families? A photo album?

At this point, Jeremy pauses to rethink his strategy. What does he really want to communicate? He considers:

- *Does it solve the problem?* He reviews the assignment parameters.
- *Is the solution conceptually inventive?* Is it really intriguing, or is it something that we have all seen before, a cliché?
- *Is the planned solution visually compelling?*
- *Can he complete this solution by the due date?* To meet the due date, it may be necessary to distill a complex problem down to an essential statement. In this case, Jeremy decides to simplify his project by focusing on one main character.

Devise a Strategy

Although Jeremy can complete some assignments in an afternoon, three-dimensional projects and multiple-image works tend to take longer. He determines the supplies that he needs and considers the best time and place to work on the project.

Execute the Strategy

Now Jeremy just digs in and works. He works best with great concentration and determination at this point, rather than second-guessing himself.

Evaluate the Results

At the end of each work session, Jeremy considers the strengths and weaknesses of the work in progress. What areas in each composition seem cluttered or confusing? How can he strengthen those areas? He finally presents the project for a class critique.

Convergent Thinking Applications

Convergent thinking is most effective when

- You can clearly define the problem.
- You can solve the problem rationally.
- You must solve the problem sequentially.
- You must meet firm deadlines.

Because many problems in science and industry fit these criteria, scientists, businesspeople, and graphic designers favor convergent thinking.

Using Divergent Thinking

The advantages of convergent thinking are clarity, control, focus, and a strong sense of direction. For many tasks, convergent thinking is ideal. In some cases, however, convergent thinking can offer *too* much clarity and not enough chaos. Inspiration is elusive. Over-the-edge creativity is often messy and rarely occurs in an orderly progression. If you want to find something completely new, you will have to leave the beaten path.

In **divergent thinking**, the means determines the end. The process is more open-ended, and specific results are hard to predict. Divergent thinking is a great way to generate completely new ideas.

Two major differences exist between convergent and divergent thinking. First, in divergent thinking, we define the problem much more broadly. Research is more expansive and less tightly focused. Second, because the convergent thinker discards weak ideas at the thumbnail stage, the final image is more planned and predictable. The divergent thinker, on the other hand, generates many variables, is less methodical, and may have to produce multiple drafts of a composition to obtain a polished result.

Whereas convergent thinking is usually more efficient, divergent thinking is often more inventive. It opens up unfamiliar lines of inquiry and can lead to a creative breakthrough. Divergent thinking is a high-risk/high-gain approach. By breaking traditional rules, the artist can explore unexpected connections and create new possibilities.

Let's try the same assignment again, now using Angela's divergent thinking.

> *Problem:* Organize up to 20 photocopies or prints from historical sources so that they tell a story. Use any size and type of format. You can enlarge, reduce, crop, or repeat any image.

Realizing that the strength of the source images is critical, Angela immediately heads to a library section or website devoted to historical photography. By leafing through a dozen books or webpages, she finds 40 great photographs, ranging from images of railroad stations to trapeze artists. She scans or prints the photographs, enlarging or reducing them to provide more options. Laying them out on a table or on a large computer screen, she begins to move the images around, considering various stories that they might generate. Angela soon discards 20 of the images. They are unrelated to the circus story that she decides to develop. She then finds 10 more images to flesh out her idea.

At this point, her process becomes similar to the final steps that we described in the preceding section. Like Jeremy, she must clarify her objective, develop characters, decide on a format, and construct the final artwork. However, because she started with such a disparate collection of images, her final story is more likely to be nonlinear. Like a dream, her images may *evoke* feelings rather than *describe* specific events.

Divergent Thinking Applications

Divergent thinking is most effective when

- The definition of the problem is elusive or evolving.
- A rational solution is not required.
- A methodical approach is unnecessary.
- Deadlines are flexible.

Which is better—convergent or divergent thinking? A good problem-solving strategy is one that works. If five people are working on a website design, a clear sense of direction, agreement on style, an understanding of individual responsibilities, and adherence to deadlines are essential. On the other hand, when an artist is working independently, the open-ended divergent approach can lead to a major breakthrough. Combining convergent and divergent thinking is ideal. When you need to expand an idea through open-ended exploration, use divergent thinking. When you need focus or distillation, shift to convergent thinking.

In the following interview, designer Steve Quinn uses both divergent and convergent thinking to efficiently create a simple and straightforward website.

Profile: **Steve Quinn,** Website Designer

Design Thinking

© Steve Quinn

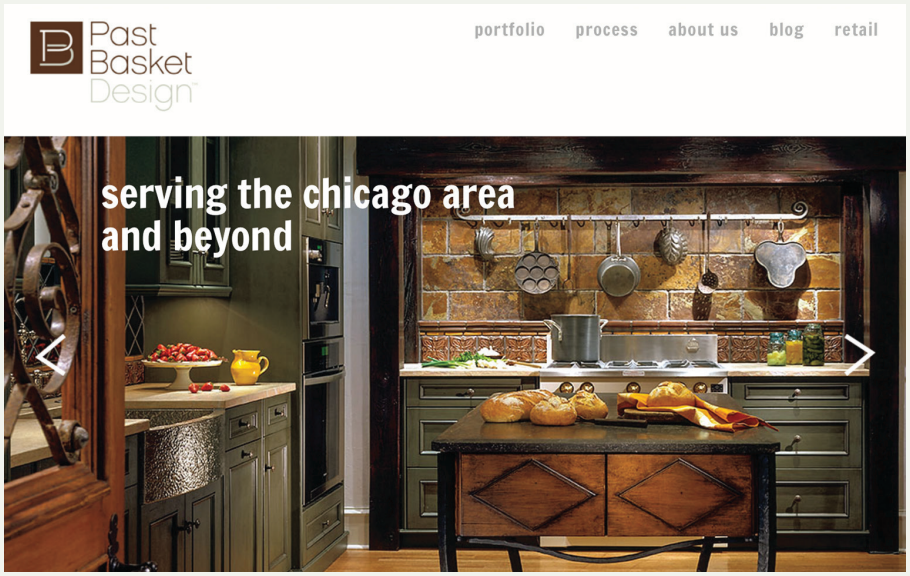
Steve Quinn of Quinn Design develops websites, branding, and advertising for a wide range of public organizations and private companies, such as Kimberly-Clark, Milwaukee Ballet, and the City of Chicago. While teaching at Northern Illinois University, he developed a seven-step problem-solving process that can be applied to all types of design. In the following interview, we discuss the steps in this process and their application.

MS: Let's start with your seven-step ideation to implementation process.

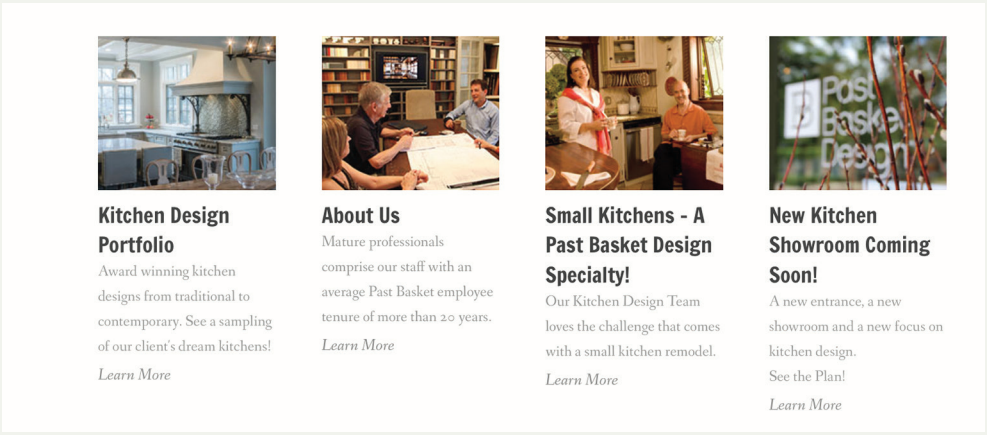
SQ: Sure. This process can be used for large and small projects, and can frame up our entire conversation.

Step One: Develop a Problem Statement. Clients arrive with problems they want designers to solve. However, they may underestimate or misread the real problem, and thus miss the mark completely. For example, just redesigning a logo will not improve sales if poor product design is the real problem. So, I begin my work by asking a lot of questions and listening carefully. As an advocate for the customer as well as the client, I must view the problem from multiple perspectives.

Step Two: Define Objectives. It is impossible to hit a target I can't see. By defining our objectives, both the client and I can agree on the targets we must hit. This stage further clarifies our overall intention and creates a strong bridge between the problem statement and the solution.



Steve Quinn, Past Basket Kitchen Design website page home page, 2013.
© Steve Quinn



Steve Quinn, Past Basket Kitchen Design website contents portal, 2013.
© Steve Quinn

Step Three: Set Parameters. Every design problem is developed within various restrictions, or parameters. What is the budget? If I am designing a brochure, how large can it be and how many colors can I use? When working on a video advertisement, what is the maximum duration? What is the deadline? Without clear parameters, we could waste a lot of time and money on infeasible proposals. I continue to advocate for both the client and the customer at this stage. We want the best possible solution, delivered on time, within defined parameters.

Step Four: Research. Research provides us with deeper understanding of potential solutions—and of potential obstacles we must overcome. Reviewing existing solutions to similar problems is especially valuable. When we know what already exists, we can deliberately push our solution a bit further. On large, complex projects, research may also include customer surveys, reading up on specific subjects related to the project, and simply tracking customer response to a product.

Step Five: Solution Development. We can focus on the solution once the problem has been defined, the objectives and parameters clarified, and research done. Based on knowledge I gain in the first four steps of this process, I think through or sketch out many ideas before I begin to finalize anything.

Step Six: Evaluation and Feedback. When we have a range of potential solutions sketched out, we can evaluate each one. Does each solution meet the objectives and solve the problem, while still working within the parameters set? Which solutions meet the criteria most fully—and are most visually distinctive? When working on a website, I often test-drive it with actual clients, to identify problem areas and increase ease of navigation.

Step Seven: Execution. I can now finalize the project. Diplomacy is crucial: the client is very eager to see a final result within the budget we have approved. Just as a great idea can be ruined by a weak design, so a great design can be ruined by poor craftsmanship or substandard materials. By seeing the project through from start to finish, I can insure the best quality possible. This always pays off in the long run!

MS: Can you talk us through an actual project, based on this problem-solving sequence?

SQ: In 2012, a kitchen design firm called Past Basket Design hired me to develop new signage, a website, and a brochure. Developed in 1988, this company was best known for offering high-quality and custom products within a very user-friendly sales environment. They wanted to establish themselves as a forward-looking firm—yet had "past" built right into their name.

Rather than starting on a simple redesign of their existing materials, I therefore started with Step One: Problem Statement. I asked lots of questions about their mission and what they really wanted to accomplish as a company.

Moving on to Step Two, I interviewed three customers at some length regarding what they wanted to see in a new design. What attracted them to Past Basket in the first place? What information did they need when considering the investment in a custom-made kitchen design? I found that knowledgeable and friendly marketing staff was a major attraction and that seeing lots of beautiful design examples was essential.

These initial steps set the stage for all the remaining steps. Functionality is always a top priority; customers need easy access to the information they want. I have created complex websites, with motion graphics and other effects. However, flashy effects would not attract Past Basket customers, so I distilled the design as much as I possibly could. We featured beautiful photographs of past projects, each accompanied with a brief description. The friendly sales staff was a major asset, so I featured them in two areas, in a section called "about us" and in a section devoted to the

design process itself. A section on testimonials from happy customers and accolades provided even more information and increased confidence in the company.

MS: How many designs does the client need to see?

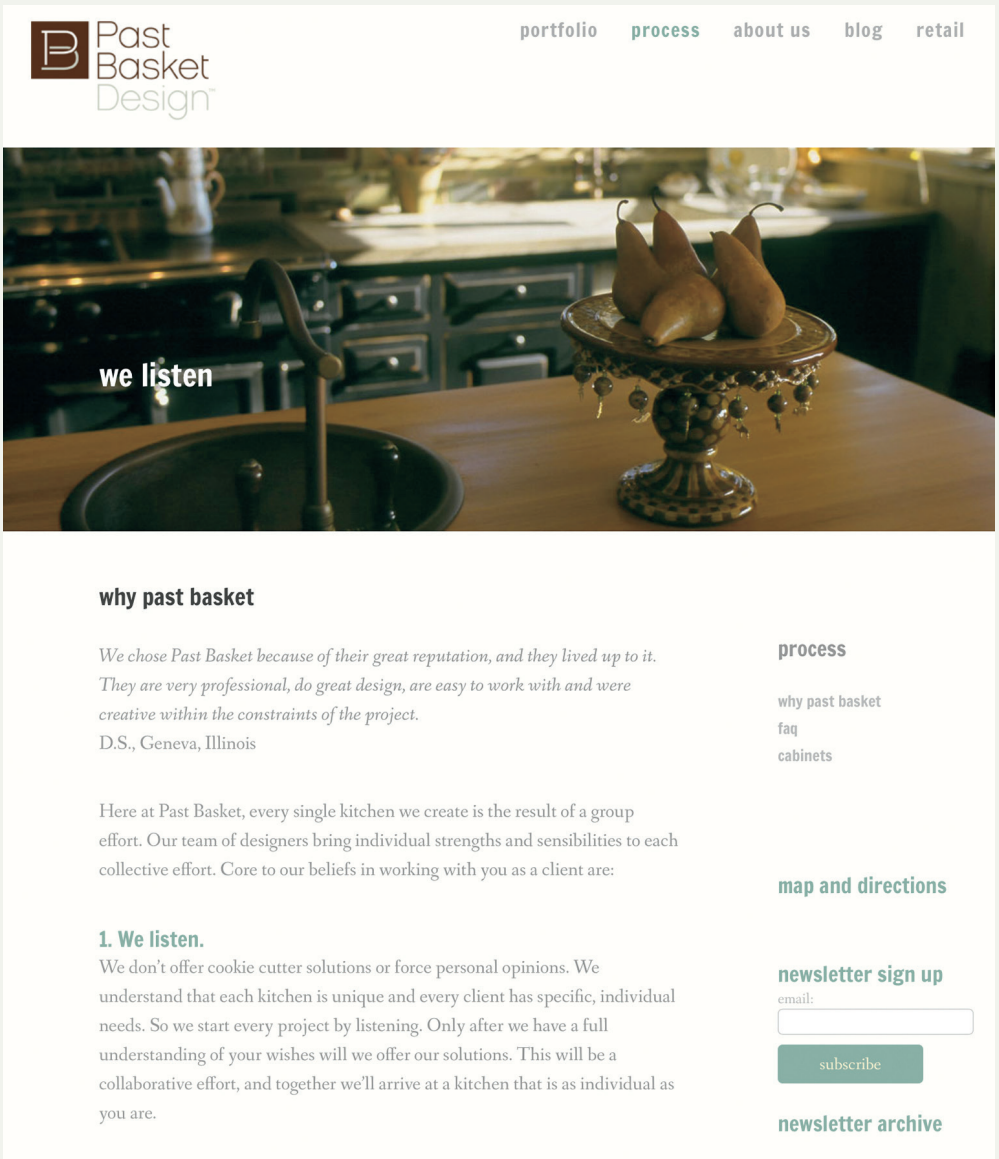
SQ: Paul Rand, one of the masters of graphic design, presented only one solution to his clients. His design process was very effective and he was able to hit the nail on the head just about every time. I try to follow this model. By making adjustments early in the process, I can generally create an effective design that will be accepted with only minor changes.

MS: The phrase "think outside the box" has become a cliché—but it describes an important idea. When we "think outside the box" we go beyond the ordinary, seeking something challenging and new. To what extent does your design process invite such invention?

SQ: Actually, I start by thinking *inside* the box created by the problem statement, client objectives, and design parameters. Without understanding these essentials, I could create a wonderful design that totally misses the point. I can become really inventive once I understand the limitations. It is like playing a game within various rules.

MS: You've talked and written a lot about the social responsibility of design. Do you have any advice for my students?

SQ: Designers have an important responsibility: to ensure that what we put in that space enhances it, rather than polluting an already cluttered visual environment. Designers must provide a meaningful service to their clients, advocate for the user, proactively solve problems, and provide engaging, effective solutions—no matter who the client may be.



Steve Quinn, Past Basket Kitchen Design "process" page, 2013.

BRAINSTORMING

Brainstorming plays an important role in both convergent and divergent thinking. It is a great way to expand ideas, see connections, and explore implications. Following are four common strategies.

Make a List

Suppose that the assignment involves visualizing an emotion. Start by listing every emotion that you can, regardless of your interest in any specific area. Getting into the practice of opening up and actively exploring possibilities is crucial—just pour out ideas!

By investigating specific kinds of anger and determining the causes and the effects, you now have many specific images that you can develop.

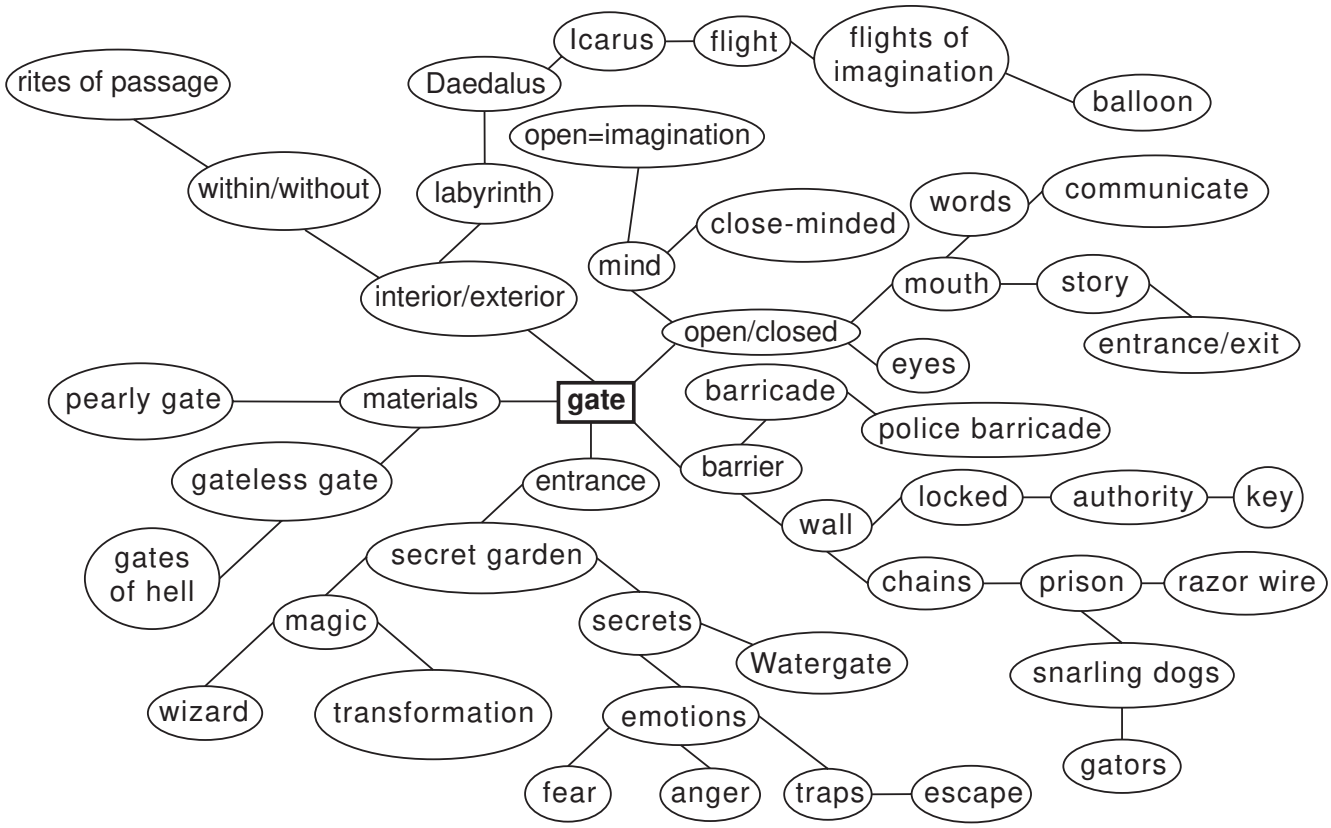
Use a Thesaurus

Another way to explore an idea's potential is to use a thesaurus. Be sure to access a thesaurus that lists words conceptually rather than alphabetically. Use the index in the back to look up the specific word that you need. For example, *The Concise Roget's International Thesaurus* has a section titled "Feelings," including everything from *acrimony* to *zeal*. Here is a list of synonyms from the section on resentment and anger: *anger*, *wrath*, *ire*, *indignation*, *heat*, *more heat than light*, *dudgeon*, *fit of anger*, *tantrum*, *outburst*, *explosion*, *storm*, *scene*, *passion*, *fury*, *burn*, *vehemence*, *violence*, *vent one's anger*, *seethe*, *simmer*, and *sizzle*! Thinking about a wide range of implications and connections to other emotions can give you a new approach to a familiar word.

Explore Connections

By drawing a conceptual diagram, you can create your own thesaurus. Start with a central word. Then, branch out in all directions, pursuing connections and word associations as widely as possible. In a sense, this approach lets you visualize your thinking, as the branches show the patterns and connections that occurred as you explored the idea (5.11).

In *Structure of the Visual Book* (1984), Keith A. Smith demonstrates the value of verbal connections. He seeks immersion in his subject. He wants to know it so well that he can pursue his images intuitively, with all the power and grace of a skilled cyclist. Try to follow the steps in figure 5.12, as he explores the word *bicycle*. Using a single object, he explores movement, friendship, and geometry.



5.11 Mapping an idea.

If I am going to make drawings or photographs which include a bicycle, I might go for a bike ride, but more importantly I would fantasize about a bike. I would picture a bike in my mind. The most obvious depiction is the side view because this is the significant profile. I would then imagine a standing bicycle with no rider, looking from above, directly down on the bike, or from behind or in front of the standing bike with my eye-level midway between the ground and the handlebars. In these three positions the bicycle is seen from the least significant profile. It is a thin vertical line with horizontal protrusions of the pedals, seat and handlebars. The area viewed is so minimal that the bicycle almost disappears.

Before long in examining a bike I would become involved with circles. Looking at the tires, I think about the suspension of the rim and the tire, indeed, the entire vehicle and rider, by the thin spokes. It amazes me that everything is floating in space, connected only by thin lines. I imagine riding the bike through puddles and the trace of the linear journey from the congruent and diverging water marks left by the tread on the pavement. I might think about two friends together and separated. Symbolism.

I think about cycles of being with friends and apart. And again I would think literally of cycles, circles and tires.

I would think of the full moon as a circle and how in its cycle it turns into a line. I would see the tires from the significant profile and in my mind I would turn it in space and it would become an ellipse.

If I turned it further, until it was on an axis 90 degrees from the significant profile, it would no longer be a circle or an ellipse, but it would be a line. So again, line comes into my thoughts.

A circle is a line.

A circle is a straight line.[1]

5.12 Keith A. Smith. Brainstorming.

1. Keith A. Smith, *Structure of the Visual Book* (Fairport, NY: The Sigma Foundation, 1991), pp. 17–18.

Keep a Journal

Keeping a journal or a sketchbook is an ideal way to record your ideas and create connections. In it, you can

- Classify, arrange, and record information
- Develop new ideas
- Examine your current beliefs and analyze the beliefs of others
- Record your responses to critiques
- Make connections among your various classes

Recording your ideas at the end of each class and reviewing them at the beginning of the next can help you construct your own learning process. Anything that expands your thinking is fair game, including

- Plans for projects, such as thumbnail sketches and rough drafts
- Comments on how you can improve your work
- Notes from textbook readings and clippings from magazines
- Notes on visiting artists or gallery visits
- Technical notes or information on class materials
- Questions that you want to pose in the next class meeting

Your record keeping can take many forms, including

- Drawings and diagrams
- Written ideas, descriptions, and lists
- Poetry and song lyrics

Periodically ask yourself the following questions:

- What was the most compelling image that I saw today? What made it compelling?
- What similarities and differences were there among my studio classes this week?
- What connections were there between my lecture classes and my studio classes?
- What do I need to know to push my ideas further?

Viewing the journal as a record of your creative process is liberating. A random idea today can help you solve a specific problem tomorrow. It is wise to review the journal as you move into upper-level classes. Many ideas that were too ambitious for a first-year class are perfectly suited to further development later on.

Collaborative Creativity

Designers generally use group brainstorming. This helps them explore a wider range of possibilities and better meet client needs. In *The Art of Innovation* (2001), IDEO general manager Tom Kelley lists seven characteristics of effective group brainstorming. The following list is based on a chapter titled “The Perfect Brainstorm.”

1. Sharpen your focus. A good brainstormer will generate a lot of ideas. When these ideas all address

the same problem, many viable solutions result. On the other hand, when participants don't understand the problem, chaos can result.

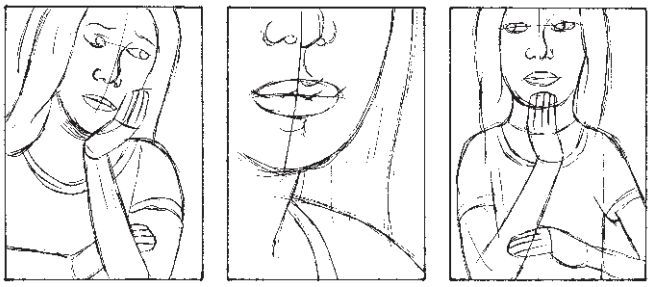
2. Use playful rules, such as "write it down" and "think bigger." A visual and verbal record of your ideas is helpful. Premature criticism is not.
3. Number your ideas. Numbers ("Let's aim for 50 ideas in the next hour") can create quantitative targets and provide a record of the order in which ideas occurred.
4. Build and jump. As the momentum builds, more and more ideas burst forth. A thoughtful question can then help the group leap to the next level, rather than getting stuck on a plateau.
5. The space remembers. Fill your brainstorming space with 22 × 30-inch Post-it notes covered with ideas that the group has developed. By *seeing* the information, you can more easily spot bridges and build connections.
6. Warm up. If you are working with a completely new group, it may be necessary to provide an ice-breaker to build trust. This is especially true if the participants are unfamiliar with brainstorming. I often ask each participant to present one succinct question or to draw a quick cartoon of the problem as they see it. It may be an enraged elephant, a tangle of thorns, or a whirling chain saw. Both the questions and the cartoons can reveal participant insights without demanding too much too soon.
7. Get physical. A wide range of simple materials opens up possibilities, especially if you are brainstorming a three-dimensional design problem. Cardboard, plasticine, and canvas all behave very differently. Playing with various materials can lead to a wider range of possibilities.

VISUAL RESEARCH

Thumbnail Sketches

Now let's practice turning ideas into images.

Return to the original list of emotions that you developed in the brainstorming exercise. Circle the most promising words or phrases and look for connections between them. Start working on thumbnail sketches, about 1.5 × 2 inches in size (5.13). Be sure



5.13 Examples of thumbnail sketches.

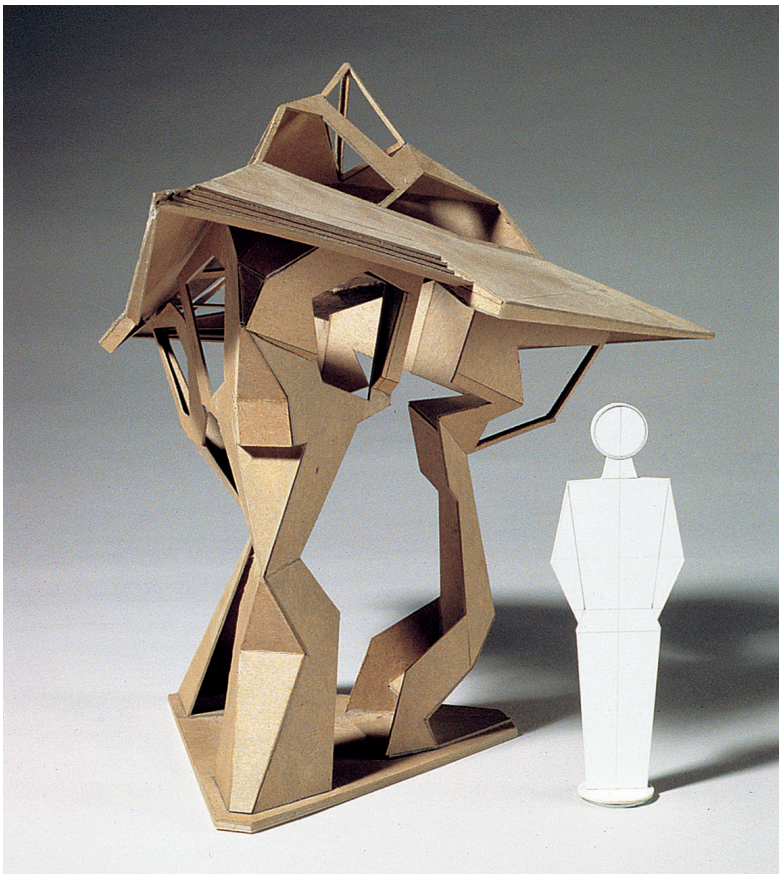
to draw a clear boundary for the sketches. The edge of the frame is like an electric fence. By using the edge wisely, you can generate considerable power!

As with the verbal brainstorming, move fast and stay loose at this point. It is better to generate 10 to 20 possibilities than to refine any single idea. You may find yourself producing very different solutions, or you may make a series of solutions to the same problem. Either approach is fine—just keep moving!

Model Making

When working two-dimensionally, it is often necessary to make one or more full-sized rough drafts to see how the design looks when enlarged. Refinements that you make at this stage can mean the difference between an adequate solution and an inspired solution.

Prototypes, models, and maquettes serve a similar purpose when you are working three-dimensionally. A **maquette** is a well-developed three-dimensional sketch. Figure 5.14 shows Peter Forbes's maquette for *Shelter/Surveillance Sculpture*. In this chipboard "sketch," Forbes determined the sculpture's size relative to the viewer and developed a construction strategy. As a result, when he constructed the final, 11-foot-tall sculpture, Forbes was able to proceed with confidence. A **model** is a technical experiment. A **prototype** can be quite refined, such as the fully functional test cars that automobile companies develop. As shown in figure 5.15, three-dimensional printing has greatly increased the speed and ease with which complex prototypes can be made. In addition to the aesthetic benefit of such preliminary studies, we can often use models and prototypes to solve specific problems. Is the cardboard that you are using heavy enough to stand vertically, or does it bow? Is your adhesive strong enough? If there are moving parts, is the action fluid and easy, or does the mechanism constantly get stuck? Does the object look good from all sides?



5.14 Peter Forbes, model for *Shelter/Surveillance Sculpture*, 1994. Mixed media, 10½ × 9½ × 9 in. (27 × 24 × 23 cm).

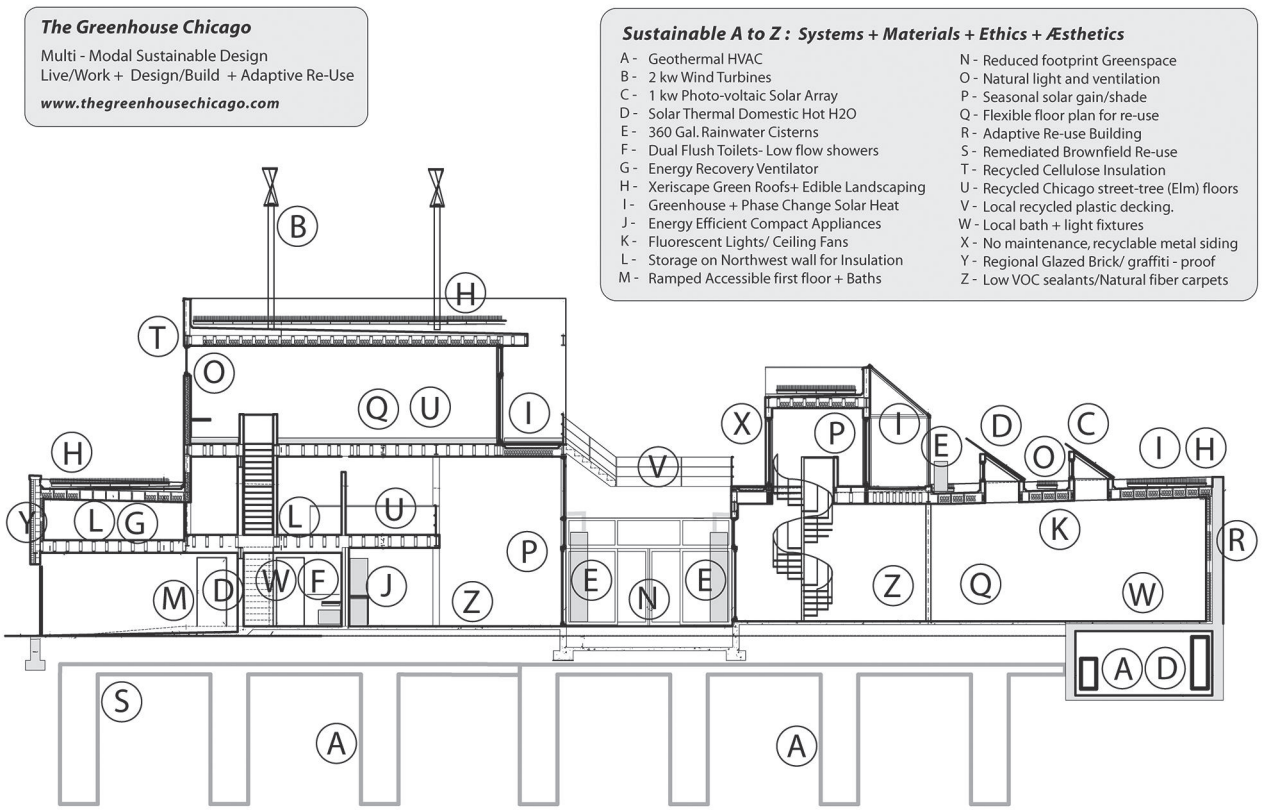
5.15 Prototype of shoe made with 3D printer. Digitally generated image.
Maciej Frolow/Getty Images

By completing these preliminary studies, you can refine the idea, strengthen the composition, and improve the final piece. As with a well-rehearsed performance, the work that you bring to the critique now is ready for discussion.

AN OPEN MIND

The very best artists and designers are often accomplished in more than one field. For example, Michelangelo was acclaimed as a painter, sculptor, and poet, and Leonardo da Vinci was a master of art, biology, and engineering. The study of philosophy has had a major impact on videographer Bill Viola and on installation artist Robert Irwin. As we will see in Chapter Eight, Jim Elniski and Frances Whitehead researched energy systems, roof gardens, and architecture to create a unique artwork—which is also their home (5.16). Whenever the base of knowledge expands, the range of potential connections increases. When the islands of knowledge are widely scattered, as with interdisciplinary work, we can create transformative connections.

The message is clear: the more you know, the more you can say. Read a book. Attend a lecture. Take a course in astronomy, archaeology, psychology, or poetry. Use ideas from academic courses to expand your studio work. Art and design require conceptual development as well as perceptual and technical skill. By engaging your heart, your eye, your hand, and your mind, you can fully use your emotional, perceptual, technical, and conceptual resources to create your very best work.



5.16 Frances Whitehead, *The A to Z*, 2007. Diagram of multimodal sustainable features.
© Jim Elniski

summary

- Concept and composition are equally important aspects of art and design.
- Designers usually solve problems that their clients present. Artists usually invent aesthetic problems for themselves.
- Ideas come from many sources, including common objects, nature, mythology, and history.
- Good problems are significant, socially responsible, comprehensible, and authentic. They provide basic parameters without inhibiting exploration.
- Convergent thinking is highly linear. The word *prose* can help you remember the steps.
- Divergent thinking is nonlinear and more open-ended than convergent thinking. It is less predictable and may lead to a creative breakthrough.
- You can expand or enrich any idea using brainstorming. Making lists, using a thesaurus, making a conceptual diagram, and creating connections are all common strategies.
- Visual and verbal research can provide the background information that you need to create a truly inventive solution.
- The best artists and designers have a wide range of interests and approach new challenges with an open mind.

key terms

brainstorming
convergent thinking
divergent thinking
maquette
model
prototype

Success Story: Elizabeth Nelson, Designer

Shedd Aquarium, Chicago, Illinois

© Shedd Aquarium/Brenna Hernandez

Elizabeth Nelson is a design graduate from the University of Illinois-Chicago. Now Director of Graphic Design at Shedd Aquarium, she established there an in-house advertising and design agency to meet the many communication and design needs of one of Chicago's most popular tourist attractions.

MS: What did you find most challenging in your initial design classes?

EN: The University of Illinois-Chicago department was founded by faculty from the Bauhaus, a pioneering German art school that was closed in 1933 as the Nazis rose to power. Instead of making beautiful paintings, we made geodesic domes, shot weird photos with pinhole cameras, and drew seemingly random lines with messy ink pens. Figurative art was barely tolerated. Everything was "conceptual."

It was like being in outer space with no sense of direction. I had no idea when I was going to be praised or sent back to the drawing board. There was zero understanding of what we were doing or why we were doing it.

And yet, the foundation program transformed the way I thought about experimentation, aesthetics, and the role of design in the world. Art was not about being "pretty." It could shine a spotlight on issues and conditions critical to human culture. The role of a creator was not that of a decorator, but of a provocateur, instigator, and collaborator.

MS: How did you make the transition from your BFA coursework to your current position?

EN: With 25 years of hard work! But it started with learning to assess my own shortcomings and ask for help. After graduating, I realized my portfolio consisted of a few nice projects and a lot of filler. Making the effort to rebuild it would be a time-consuming but necessary investment. I also needed a really tough mentor, so I asked Tad Takano, the teacher who liked me the least. He was known as a take-no-sh*t taskmaster. The cigarette literally fell out of his mouth when I asked him.

To my dismay, he tossed my entire portfolio and declared we would start from scratch. It took more than eight months to rebuild all the work. Tad negotiated a talent tuition waiver to help cover my fees, but he also locked me in his basement when I wanted to go out dancing because he thought my typography needed work. "This is illegal!" I banged on the locked door, "It's kidnapping!"

Based on my transformed portfolio, Professor Takano helped me find my first full-time job in a huge public relations firm. He would later occasionally appear like a grumpy guardian angel to help advance my career.

MS: What are the most challenging aspects of your current position?

EN: As a design director, I am often equal parts visionary, diplomat, accountant, logistics expert, therapist, and IT specialist. Maintaining design integrity and organizational priorities is critical, but I also need to manage relationships with clients, upper management, our peers, my team, and our vendors. All this goes on while keeping track of about 50 active projects at any time. There are days when I feel more like an air traffic controller than a designer.

To deal with the volume of work, my team has developed processes that we follow religiously. Real basics, such as consistent file naming, greatly increase efficiency. When I first started in design, I hated having to work in organized systems. Now I realize how liberating constraints can be. They give a

solid framework so that we can take care of the business side before leaping into the creative pool.

But designers also have to be ready to abandon frameworks when necessary. Being flexible and adaptable is a valuable and highly underrated skill that is quite difficult to teach. People depend on having a "right" and "wrong" way of doing things as a safety net against risk taking. "I can't do it," they say, "It's against the rules." "Break the rules," I tell them, "We'll live."

Breaking the rules is the only way to make new rules and develop truly creative and innovative solutions. However, there is a fine line between being disruptively innovative and just being obnoxious. It takes a while to learn how to walk that tightrope.

MS: What basic design skills inform your work today?

EN: I spent years honing my understanding of great design. I now find that I often have to put my preconceived notions aside, so that I can see the genius in a truly unexpected solution.

MS: What advice would you give to students starting college today?

EN: Invest in yourself. Ask for help (as often as it takes). Be willing to work hard. Accept opportunities. Work for and with people you respect. Take targeted risks. And embrace kindness. It's different from empathy, which is still about being stuck in your own head. Kindness is acting on empathy. It's thinking and behaving unselfishly.

Aquarium interior

Cultivating Creativity

"The heart of all new ideas lies in the borrowing, adding, combining or modifying of old ones. Do it by accident and people call you lucky. Do it by design and they'll call you creative."

Michael LeBoeuf, in *Imagineering*

The convergent problem-solving process described in Chapter Five seems methodical and predictable. Even the more open-ended divergent thinking process is based on a pattern that alternates between idea expansion and idea selection. Why, then, do we need to know anything more about creativity?

The answer is simple. We confront much messier creative challenges whenever we begin our work. Artists and designers often encounter creative blocks or problems that stubbornly resist solution. So, this chapter is designed to help bridge the gap between the ideal situation that we explored in Chapter Five and your actual experience in the studio. In it we consider characteristics of creative people, discuss goal setting, list time-management strategies, and explore habits of mind and habits of work that you can use to increase success.

SEVEN CHARACTERISTICS OF CREATIVE THINKING

"Conditions for creativity are to be puzzled, to concentrate, to accept conflict and tension, to be born every day, to feel a sense of self."

Erich Fromm, in *Creativity and Its Cultivation*

Creativity is inherently unpredictable. Through creative thinking, we break old habits and transform familiar patterns of thought. Anything can happen. Predicting the future based on past experience becomes inadequate when a creative breakthrough occurs. Like a shimmering drop of mercury, creativity eludes capture.

We can actively cultivate creative thinking, however. Rather than waiting for inspiration, we can set up the conditions that favor it. First, let's look at the characteristics of highly creative people, based on the work of many researchers.

Receptivity

Creative people are open to new ideas and welcome new experiences. Never complacent, they question the status quo and embrace alternative solutions to existing problems. Listening more and talking less is helpful. As journalist Larry King says, "I never learn anything new when I'm the one talking!"

Curiosity

Researching unfamiliar topics and exploring unusual systems are a source of delight for most creative people. "How does it work?" and "How can it work better?" are questions that creative people frequently ask.

Wide Range of Interests

With a broad knowledge base, a creative person can make a wider range of connections. Consider the number of words that you can quickly create from the letters in the word *image*:

age, game, gem, am, aim, a, I, me

Try the same game with the word *imagination*:

gin, nation, gnat, ton, tan, not, man, again, gain, oat, got, tag, am, aim, ant, no, on, tin, gamin, inn, ingot, main, a, I

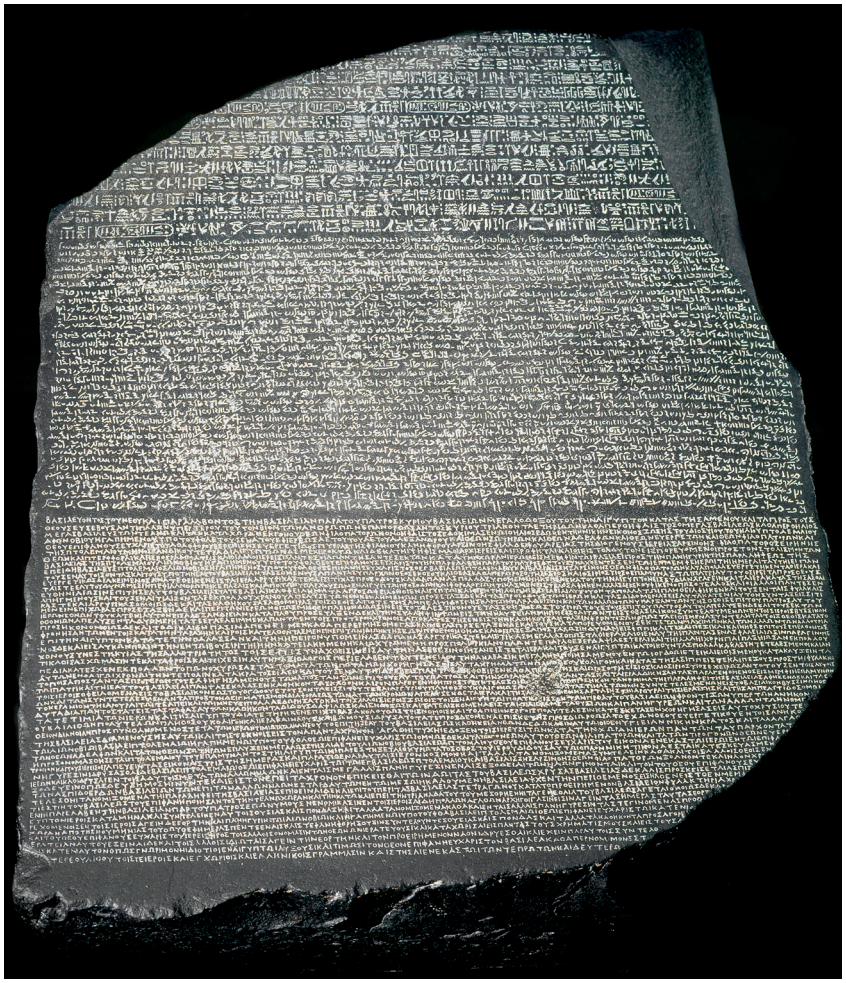
With more components, the number of combinations increases. Likewise, an artist who has a background in or knowledge of literature, geology, archery, music, and other subjects can make more connections than can a strict specialist.

Attentiveness

Realizing that every experience is valuable, creative people pay attention to seemingly minor details. Scientists often develop major theories by observing small events, which they then organize into complex patterns. Artists can often see past superficial visual chaos to observe an underlying order. Playwrights develop dramatic stories by looking past the surface of human behavior to explore the comedy (and tragedy) of human existence. By looking carefully, creative people see possibilities that others miss.

Connection Seeking

A creative breakthrough often occurs when we see connections between seemingly random fragments. For example, Egyptian hieroglyphs became readable when a young French scholar realized that they carried the same message as an adjacent Greek inscription on a slab of stone, now called the Rosetta Stone (6.1). By comparing the two and cracking the code, Jean-François Champollion opened the door for all subsequent students of ancient Egyptian culture.



6.1 Rosetta Stone, Egypt, Ptolemaic period, 196 BCE. 5.7 × 28.5 × 11 in. (14.4 × 72.3 × 27.9 cm).
British Museum, London. Leemage/Getty Images

Conviction

Because we often derive new ideas from old ones, it is foolish to ignore or dismiss the past. However, creative people embrace change and actively pursue an alternative path. Never satisfied with routine answers to familiar questions, they invent new possibilities and often challenge the status quo.

Complexity

In lectures, our instructors encourage us to think rationally and write clearly. In studio classes, they encourage us to explore, experiment,

and use our intuition. Synthesis, visualization, spatial perception, and nonlinear thinking are valued highly in art and design.

To be fully effective, a creative person needs to combine the rational and the intuitive. Although we may use intuition to generate a new idea, we often need logic and analysis for its realization. As a result, the actions of creative people are often complex or even contradictory. As psychologist Mihály Csíkszentmihályi[1] noted, creative people often combine

- *Physical energy with a respect for rest.* They work long hours with great concentration, then rest and relax, fully recharging their batteries.
- *Savvy with innocence.* Creative people tend to view the world and themselves with a sense of wonder, rather than clinging to preconceptions or stereotypes. They use common sense as well as intellect in completing their work.
- *Responsibility with playfulness.* When the situation requires serious attention, creative people are remarkably diligent and determined. They realize that there is no substitute for hard work and drive themselves tirelessly when nearing completion of a major project. On the other hand, when the situation permits, they may adopt a playful, devil-may-care attitude. This provides a release from the previous work period.
- *Risk taking with safekeeping.* Creativity expert George Prince noted two behavioral extremes in people.[2] Safekeepers look before they leap, avoid surprises, punish mistakes, follow the rules, and watch the clock. A safekeeper is most comfortable when there is only one right answer to memorize or one solution to consider. Risk takers are just the opposite. They break the rules, leap before they look, like surprises, are impetuous, and may lose track of time. A risk taker loves inventing multiple answers to every question.

  Creative thinking requires a mix of risk taking and safekeeping. When brainstorming new ideas, risk takers use open-ended exploration. However, when implementing new ideas, deadlines, budgets, and feasibility become major concerns. It often seems that the risk taker jump-starts the job and the safekeeper completes it.
- *Extroversion with introversion.* When starting a new project, creative people are often talkative and gregarious, eager to share insights and explore ideas. When a clear sense of direction develops, however, they often withdraw, seeking solitude and quiet work time. This capacity for solitude is crucial. Several studies have shown that talented teenagers who cannot stand solitude will rarely develop their creative skills.
- *Passion with objectivity.* Mature artists tend to plunge into new projects, convinced of the importance of the work and confident of their skills. Any attempt to distract or dissuade them is futile. However, when they complete a model or preliminary study, most pause to assess their progress. At that point, a dispassionate objectivity replaces the emotional attachment required while creating. The artist reworks or discards the work that does not pass this review, regardless of the hours he or she has spent on it. In major projects, this alternating process of creation and analysis may be repeated many times.
- *Disregard for time with attention to deadlines.* Time often dissolves when studio work begins. An artist or a designer can become engrossed in a project: when the work is going well, 6 hours can feel like 20 minutes. On the other hand, attention to deadlines is necessary when preparing an exhibition or working for a client.
- *Modesty with pride.* As they mature, creative people often become increasingly aware of how teachers, family, and colleagues have contributed to their success. Rather than brag about past accomplishments, they tend to focus on current projects. On the other hand, as creative people become aware of their significance within a field, they gain a powerful sense of purpose. They delete distractions from the schedule, and set increasingly ambitious goals.

When the balance is right, all these complex characteristics fuel even greater achievement.

GOAL SETTING

As humans, our behavior is strongly goal-directed. Every action occurs for a reason. When we focus our attention on a specific task, we can channel our energy and better manage our time. When we reach our goals,

1. Mihály Csíkszentmihályi, *Creativity: Flow and the Psychology of Discovery and Invention* (New York: HarperCollins, 1996), pp. 55–76.

2. George Prince, "Creativity and Learning as Skills, Not Talents," *The Philips Exeter Bulletin*, June–October, 1980.

6.2 Michael LeBoeuf, *Imagineering*, 1980. Achievement feeds self-confidence, while nonachievement induces inertia.

our self-esteem increases. Michael LeBoeuf has diagrammed this effect clearly (6.2). Goal achievement creates a positive loop; procrastination or failure creates a negative loop. Because they are so important, let us now consider ways to develop good personal goals.

Characteristics of Good Goals

Ambitious yet Achievable

Too modest a goal will provide no sense of accomplishment. Too ambitious a goal will reduce, rather than increase, motivation. No one wants to fight a losing battle! Analyzing your strengths and weaknesses can help you set realistic goals.

Compatible

To train for the Boston Marathon while simultaneously trying to gain 20 pounds is unwise, because you will burn off every calorie that you consume. Trying to save a thousand dollars while touring Europe is unrealistic, because travel always costs more than you expect. On the other hand, by taking a dance class or joining a hiking club, you may be able to combine a fitness goal with a social goal.

Self-Directed

It is best to avoid goals that are primarily dependent on someone else's actions or opinions. "I want to earn an A in drawing" is an example. The instructor determines your grade and you can't really control his or her judgment. Instead, try focusing on improving your drawing as much as possible. This will increase your receptivity to learning and will focus your attention on actions that you *can* control. When you do your best work, good grades generally follow.

Temporary

Set clear target dates, get the job done, and move on to the next project. As figure 6.2 shows, each completed task increases your self-confidence and adds momentum. By contrast, unfinished work can drain energy and decrease momentum. If you are overloaded, delete secondary goals so that you can complete primary goals.

TIME MANAGEMENT

Time management can help you achieve your goals. Working smarter is usually more effective than simply working harder. In a world bursting with opportunity, using your work time well can increase the time available for travel, volunteer work, or socializing. Many artists and designers have used the following time-management strategies.

Set the Stage

Choosing when and where to work can significantly increase your output. If you are a lark, bursting with energy and enthusiasm early in the morning, tackle major projects before noon. If you are a fierce and nocturnal owl, work on major projects after dinner. If you are distracted by clutter, clean your desk before beginning your workday, and tidy up your desk before you leave. These seemingly minor actions can really increase your productivity.

Prioritize

Note which tasks are most *urgent* and which tasks are most *important.* Timing can be crucial. When you pay your phone bill on time, you easily complete an urgent but unimportant task. When your phone bill is overdue

and the service is cut off, this unimportant task becomes a major headache. Dispense with urgent tasks quickly so that you can focus on more important things.

See the Big Picture

Use a monthly calendar to record your major projects and obligations. Organizing your calendar by months can help you see which weeks will be packed with deadlines and which weeks will be relatively quiet. To avoid all-nighters, distribute large, important tasks over several weeks. To avoid missing a pivotal lecture or critique, schedule out-of-town trips during "slow" weeks.

Work Sequentially

Often, it is most effective to tackle activities in a specific sequence. If you are writing a 20-page paper, you should start with research, craft an outline, complete a rough draft, make revisions, and *then* write the final draft. If you are designing a poster, begin with research, make thumbnail sketches, assess the results, create a full-size rough draft, consult the client, and *then* complete the poster. To eliminate the intermediate steps and move directly to the final draft rarely works. With most large projects, you learn more, save time, and do better work by tackling the problem one step at a time.

Use Parts to Create the Whole

When you look at a major project as a whole, it can become overwhelming. In an extreme case, creative paralysis sets in, resulting in a condition similar to writer's block. Breaking down big jobs into smaller parts helps enormously. In *Bird by Bird* (1998), Anne Lamott provides a wonderful description of this process:

> Thirty years ago my other brother, who was ten years old at the time, was trying to get a report on birds written that he'd had three months to write. [It] was due the next day. . . . He was at the kitchen table close to tears, surrounded by binder paper and pencils and unopened books on birds, immobilized by the hugeness of the task ahead. Then my father sat down beside him, put his arm around my brother's shoulder, and said, "Bird by bird, buddy. Just take it bird by bird."[3]

By breaking the job down into manageable parts, you are likely to learn more and procrastinate less.

Make the Most of Class Time

Psychologists tell us that beginnings and endings of events are especially memorable. An experienced teacher knows that the first 10 minutes of class set the tone for the rest of the session, and that a summary at the end can help students remember the lesson. Similarly, master learners tend to arrive 5 minutes early for class and maintain attention to the end of class.

Be an active learner. You can use that 5 minutes before class to review your notes from the previous session or set up your materials. Try to end the class on a high note, either by completing a project or by clearly determining the strengths and weaknesses of the work in progress. By analyzing your progress, you can organize your thinking and provide a solid beginning point for the next work session.

When in Doubt, Crank It Out

Fear is one of the greatest obstacles to creative thinking. When we are afraid, we tend to avoid action. Consequently, we may miss opportunities.

Both habit and perfectionism feed fear. If you consistently repeat the same activities and limit yourself to familiar friendships, you may become even more anxious about new experiences. Perfectionism is especially destructive during brainstorming, which requires a loose, open approach.

Creativity takes courage. As IBM founder Thomas Watson noted, "If you are not satisfied with your rate of success, try failing more." Baseball player Reggie Jackson is renowned for his 563 home runs—but he also struck out 2,597 times. Thomas Edison's research team tried more than 6,000 materials before finding the carbon-fiber filament used in light bulbs. "When in doubt, don't!" is the safekeeper's motto. "When in doubt, do!" is the risk taker's motto. By starting each project with a sense of adventure, you increase your level of both learning and creativity.

Work Together

Many areas of art and design (including digital media, industrial design, and advertising design) often require collaborative creativity. Together, artists and designers can complete projects that are too complex or time-consuming to be done solo. Furthermore, collaborative thinking helps us break familiar patterns and teaches us to listen to alternative or opposing ideas.

Lexicon (6.3A–C), a year-long project by Lynda Lowe in Washington and Georgiana Nehl in Oregon, beautifully demonstrates the value of collaboration. The artists took turns initiating and responding to

3. Anne Lamott, *Bird by Bird: Some Instructions on Writing and Life* (New York: Anchor Books, 1998), pp. 18–19.

A–Memory

B–Primordial

C–Dilemma

6.3A–C Lynda Lowe and Georgiana Nehl, *Lexicon*, 2000. Mixed media on paper, 5 × 7 in. (13 × 18 cm).

each other's images as they sent small groups of paintings back and forth through the mail. Despite distinct stylistic differences, the artists share a mutual fascination with the unconscious, commitment to the power of symbols, and mastery of composition. By working together, Lowe and Nehl were able to complete a remarkable series of 100 paintings that have been shown nationally.

This process greatly expands when the collaborative team is multidisciplinary. In the following interview, painter Sara Mast describes the challenges and opportunities of a collaboration between art and science.

Profile:
Sara Mast, Painter
Applying Art to Science


© Sara Mast

Sara Mast's paintings have been exhibited nationally and internationally in *The Art of Encaustic Painting: Contemporary Expression in the Ancient Medium of Pigmented Wax* (2001), *Art & Science Now* (2010), and *Encaustic Art in the Twenty-First Century* (2016). Her collaborative art and science installation *Black (W)hole* is now traveling worldwide.

MS: Your father, noted inventor Gifford Morrison Mast, was educated in physics and mechanical engineering. His projects ranged from a robot he built as a child to his work in the design of optical and measuring devices. Your brother is a marine biologist and president of the Oceanic Society. Other relatives have excelled in the fields of educational psychology and engineering. Where do you fit into this family of scientists?

SM: We all bring an open-minded curiosity to our work. However, I see the world through an aesthetic and interdisciplinary lens and am most interested in ways that language, images, and experience can be connected to communicate ideas. In a sense, mathematics and prose are the languages of science. Both require the distillation of complex information into correct answers or concise theories. My work is more poetic. It relies on metaphors to multiply and expand meaning.

MS: How did you get started?

SM: In 2011, I began collaborating with physicists Nico Yunes, Joey Shapiro Key, and Charles Kankelborg on a project dealing with black holes. Scientific accuracy was a primary concern as we began to develop the installation. To communicate more broadly, I soon proposed a more intuitive and expansive approach. I wanted to immerse the viewer in a powerful experience, rather than try to simply illustrate scientific content.

MS: An immersive environment requires many collaborators and work within an unfamiliar realm. What inspired you to shift from painting to pursue this route?

SM: My paintings are built using encaustic, which employs layers of melted wax to create the image. Made of fragments of information, they are designed to suggest possibilities rather than illustrate events. Recently, I noticed that fewer and fewer people take the time to stand quietly before a painting, contemplating the layers of meaning. So, for this project, I decided to expand my practice and engage a broad audience in a way that does not require the viewer to "speak" the language of painting.

MS: Please describe *Black W(hole)*.

SM: In this installation, the viewer enters a laser field of stars and stands on the edge of an accretion disk, which visually swirls into a supermassive black hole. Suddenly, the viewer zooms to the edge of the first black hole as a second, smaller black hole is captured and begins to orbit. The sounds that gravitational waves produce in such an encounter surround the viewer. A film of morphing images plays in a continuous loop on the back wall of the space, referencing Einstein's 1915 General Relativity equations scrawled in chalk on his blackboard, the solutions of which predicted the existence of black holes 100 years ago.

MS: Painting is usually a solitary and individual activity. How did you transition into collaborating?

SM: For this project, I was the collaborative leader of a richly diverse team that included a solar physicist and optics expert, an architect, an artist-animator, a composer, an experimental filmmaker, and two science advisors, both of whom were physicists and experts in gravitational wave astronomy. This synergy of disciplines required an ability to bridge

languages and seek common ground, which was my job. Although the idea of working alone in a studio seems very different from working with a group of multidisciplinary collaborators, the skill set is the same. How can we unify a range of ideas into one coherent and powerful work?

MS: The team is even larger for *Cave,* your current project. How can you get 10 people from different disciplines working together well?

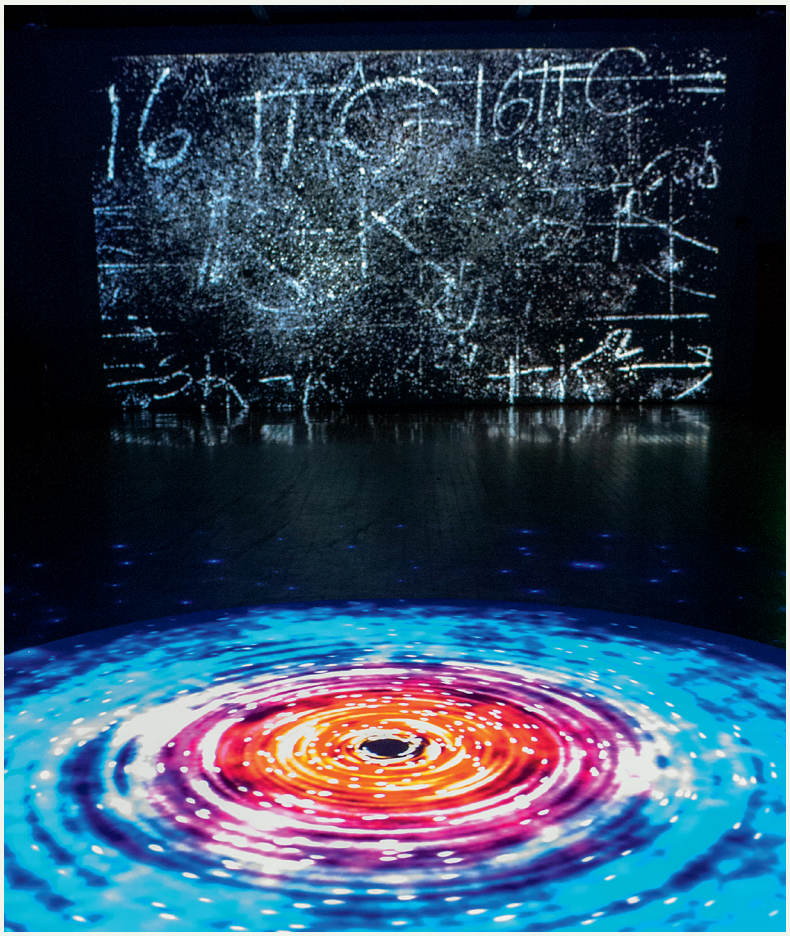
SM: The NeuroCave Collaborative includes a visual team, a computer science team, and a sound team. Our neuroscientist works across all the teams. The project focuses on the use of neurofeedback devices to generate individual sound and color "readings," allowing the viewer-participant to interact and respond to others in the space. The gallery becomes a scientific instrument from which we collect data on "co-variance," a trending area of neuroscience research. Bi-weekly meetings keep everyone moving in the same direction, provide updates, and integrate the work by various teams into the larger vision.

MS: As an art student, why study science?

SM: Science is our society's dominant paradigm. In a way, it is our culture's secular religion. Whenever one paradigm reigns supreme, there is value in questioning its authority and exploring its pervasive myths. As an artist, I embrace the awe and wonder of science, and am fascinated by the speed at which discoveries are made and ideas implemented. But that is also why it is important for artists to challenge science and ask the questions that scientists may not ask in the rush of progress.

MS: As a scientist, why study (or make) art?

SM: As a violinist, Einstein noted: "If . . . I were not a physicist, I would probably be a musician. I often think in music." The fact that he was often "thinking in music" (the most highly abstract of all art forms) implies that an intuitive approach to problem solving played an important role in his scientific work. If more scientists engaged in the deeper philosophical questions of art while practicing the scientific method, they might bring even wider-ranging insight to their complex and demanding work.



Sara Mast, *Black (W)hole*, 2013. Installation view, animation and video, size variable.

VARIATIONS ON A THEME

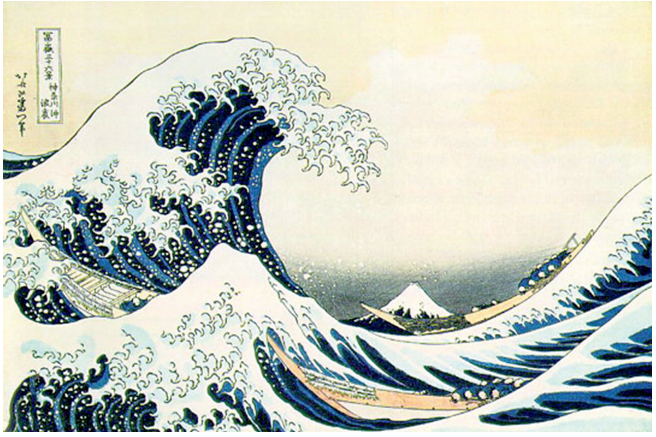
Both *Lexicon* and Sara Mast's collaborative installations developed gradually. As a project evolves, we can reveal new possibilities that explore ideas and go well beyond our initial intentions. By pursuing these implications, we can exceed our original expectations. Just as the landscape appears to expand when we climb a mountain, so an idea can expand as our understanding increases.

One way to get more mileage out of an idea is through variations on a theme. Professional artists rarely complete just one painting or sculpture from a given idea; most do many variations before moving to a new subject.

Thirty-Six Views of Mount Fuji is one example. Japanese printmaker Katsushika Hokusai was 70 years old when he began this series. The revered and beautiful Mount Fuji appeared in each of the designs in some way. Variations in the time of year and the size of the mountain helped Hokusai produce dramatically different variations on the same theme (6.4A–C).

Variations on a theme can also help us explore our own ideas. For figures 6.5 A, B, and C, Elizabeth

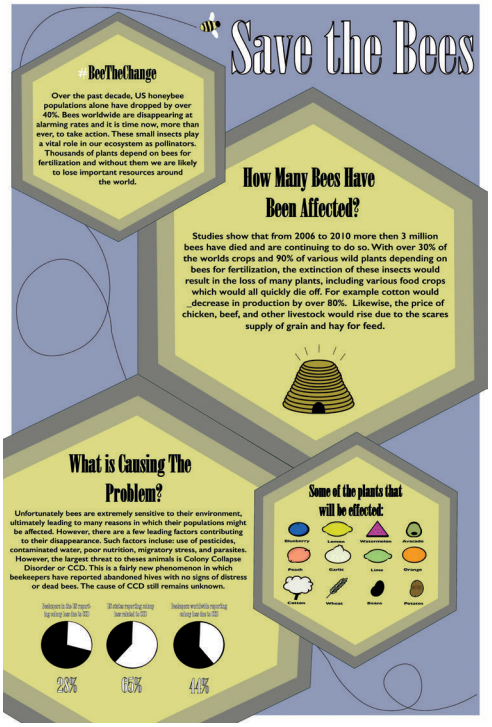
6.4A Katsushika Hokusai, *Thirty-Six Views of Mount Fuji: Under the Mannen Bridge at Fukagawa*, Edo period, c. 1830. Color woodblock print, 10 1/16 × 14 11/16 in. (25.7 × 37.5 cm).
Open access, courtesy of the British Library



6.4B Katsushika Hokusai, *Thirty-Six Views of Mount Fuji: The Great Wave off Kanagawa*, Edo period, c. 1830. Color woodblock print, 10 3/16 × 14 15/16 in. (25.9 × 37.5 cm).
Open access, courtesy of the British Library

6.4C Katsushika Hokusai, *Thirty-Six Views of Mount Fuji: Near Umezawa in Sagami Province*, Edo period, c. 1830. Color woodblock print, 10 1/16 × 14 7/8 in. (25.6 × 37.8 cm).
Open access, courtesy of the British Library

A



C

6.5A–C Elizabeth Kelly, *#Save the Bees* poster and T-shirt series.
© Elizabeth Kelly

B

Kelly selected the topic of "Save the Bees" and created a series of posters about the importance of bees to our environment through a combination of text and graphics. And she even created a T-shirt.

Similarly, figure 6.6 shows many variations on a cube. Submitted by beginning architecture students at Auburn University, they further demonstrate one advantage of studying art and design in a classroom

6.6 Cubes from above, study models from Auburn University School of Architecture.
Courtesy of Rusty Smith, Auburn University School of Architecture

setting. The cube created by each class member provides another possible solution to the problem set.

ACTIVELY SEEK SUCCESS

Personal initiative is powerful. Indeed, a highly motivated person with average ability can surpass an unmotivated genius. Consider these final success strategies.

Habits of Mind

Dr. Arthur L. Costa and Dr. Bena Kallick have identified 16 "habits of mind" essential to success. Four attributes that are especially important in art and design follow.

Flexibility

Convergent, divergent, and collaborative problem-solving strategies present distinct advantages and disadvantages. Limiting yourself to just one approach reduces your ability to solve a wide range of problems. Flexibility, on the other hand, allows you to question existing assumptions, adopt new ideas, and shift strategies as needed.

Analytical Thinking

In general, designers are hired to solve a client's problem. Complications arise when time is limited and expenses increase. An analytical mindset helps the designer continue to focus on the real problem rather than wasting time on an imagined one.

Capacity for Synthesis

We can define *synthesis* as the capacity to combine separate parts to create a coherent whole. Two aspects of synthesis are particularly important for artists and designers. First, they must be able to combine visual elements to create unified designs. Second, they must be able to apply past knowledge to new situations. You can accumulate a vast storehouse of knowledge by simply remembering past solutions to similar problems.

Responsible Risk Taking

Risk takers are willing to risk failure to achieve success. They view setbacks as opportunities for growth rather than occasions for despair. Irresponsible risk takers leap before they look. Responsible risk takers weigh benefits and hazards, gather their energy, and then leap.

Habits of Work

To provide beginners with a realistic checklist, Professor Rusty Smith and his colleagues at the School of Architecture at Auburn University have developed the following "habits of work."

Self-Reliance

Essentially, self-reliance creates an active approach to work. Rather than waiting for directions or blaming others for delays, each person actively generates possibilities, weighs options, and makes choices. To a substantial degree, self-reliant students drive their own learning process.

Organized Persistence

Beating your head against a brick wall is an example of mindless persistence. It is impressive but ineffective. Chiseling away at the mortar between the bricks until the wall falls apart is an example of organized persistence. Organized persistence gives us the ability to prevail, even when we are faced with the most daunting task.

Daily Practice

Momentum is extremely powerful when you are working on a difficult problem. Daily practice helps maintain momentum. Working an hour a day on a project is sometimes better than working for eight hours in a single day.

Appropriate Speed

Some tasks are best completed quickly, with brisk decision making and decisive action. Slowing down to reframe a question and weigh alternative solutions is necessary in other cases.

Incremental Excellence

Most art and design problems are best developed in a series of stages. Ideas evolve, skills improve, and compositions are distilled. Rather than trying for the "perfect solution" on the first day of work, it is better to start with a "funky junky" draft.

Direct Engagement

Talk is cheap. Work is hard. The only way to solve most art and design problems is to get involved. It is impossible to win a race when you are standing on the sidelines.

summary

- Creative people are receptive to new ideas, are curious, have a wide range of interests, are attentive, seek connections, and work with great conviction.
- A combination of rational and intuitive thinking feeds creativity. Although we can use intuition to generate a new idea, we may need logic and objective analysis for its completion.
- Good goals are ambitious yet achievable, compatible, self-directed, and temporary. Intermediate deadlines can help us meet our goals.
- Completing tasks in an appropriate sequence, making the most of each work period, maintaining momentum, and reducing stress are major aspects of time management.
- Collaborative work can help us expand ideas, explore new fields, and pursue projects that are too complex to do alone.
- We can explore ideas more fully using variations on a theme.
- Flexibility, analytical ability, the capacity for syntheses, and responsible risk taking are crucial habits of mind.
- Self-reliance, organized persistence, daily practice, appropriate speed, and direct engagement are crucial habits of work.

Success Story: Jane Parkerson Ferry, Curator of Education

Orlando Museum of Art, Orlando, Florida

© Jane Parkerson Ferry

Jane Parkerson Ferry manages the Education department at the flagship art museum in Central Florida. She and her staff help visitors of all ages to have enriching and engaging experiences with art.

MS: Please describe the work of the Education department.

JPF: Education department programming helps to advance the OMA's mission to inspire creativity, passion, and intellectual curiosity by connecting people with art and new ideas. Our main job is to make art accessible to the widest possible range of visitors and stimulate an interest in lifelong learning by offering programs to complement the museum's collections and temporary exhibitions. We offer tours, lectures, workshops, studio classes, professional development workshops for teachers, family days, outreach programs, art appreciation series, and community access programs.

MS: Contemporary art can be especially challenging to visitors. How have you helped them understand difficult artworks?

JPF: Contemporary art is the art of our time. Never before has there been such a diversity of materials, approaches, and ideas. Learning the stories behind contemporary art can help visitors think about their world, make meaning, and discover why it matters. We always use an inquiry-based approach. To alleviate visitor confusion about unfamiliar artworks, we start by asking open-ended questions such as "What do you see?" If we start with the known and make connections, we can then move beyond to ask the "how" and "why" questions. Building bridges between the known and unknown helps make the art relevant and understandable.

MS: How do the basic skills you developed as an undergraduate at Dickinson College inform your OMA work?

JPF: I use two areas of foundational knowledge every day in my work at OMA. They are:

- **Visual literacy.** How to read works of art, learning the basic vocabulary of the elements of art and principles of design, how to put it all together to make meaning in works of art, helping visitors be visually literate.
- **Creative thinking and problem solving.** Learning to look at different possibilities, learning from multiple viewpoints, recognizing different learning styles, finding the best fit or solution.

MS: What advice would you give to art and design majors starting their education today?

JPF:
- **Know your audience.** Learn expectations and tailor your message appropriately. Just as your professors have different requirements, expectations, and needs, so will your clients and colleagues in the real world.
- **Pay attention to details.** Aim for results,

not perfection, but the way you handle the small details along the way may reflect how you handle the bigger ones.

- **Be flexible and adaptive to changing conditions.** Change is necessary for growth. If things aren't changing, things aren't moving forward. Embrace change and evolve with it!
- **Don't be afraid of failure.** Innovation requires risk taking. Some of the best lessons are those that are learned from mistakes. Be a risk taker!
- **Good communication skills are crucial.** Whether it's verbal, visual, or written, being able to get your message across effectively is vital for success.
- **Be passionate about what you do.** To be successful and happy, you need to truly love your work and believe in it.

Stephen Knapp, *Celebration*, Orlando Museum of Art, 2013.

Developing Critical Thinking

Critical thinking challenges us to

- Analyze visual relationships
- Evaluate our conceptual and compositional choices
- Invent alternative solutions

Using critical thinking, we can determine what to keep and what to change in a composition. By enhancing the best aspects of a design and deleting the weak areas, we can dramatically increase both communication and expression.

ESTABLISHING CRITERIA

Let's begin by establishing the criteria on which we will make judgments. For example, craftsmanship is highly valued when we take a technical workshop, while brainstorming is highly valued in a concepts course. More specifically, if we are given a complementary color problem, a black-and-white painting will not meet the criteria, no matter how well it is composed. By determining the major questions in an assignment, we can understand the basis on which judgments will be reached.

So, when starting an assignment, consider the following questions:

- What is the assignment's purpose? What new knowledge can we gain?
- What are the parameters of the assignment? Are there limitations in the size, style, content, or materials?
- When is the assignment due, and in what form must it be presented?

It is important to distinguish between determining assignment criteria and seeking the "right answer." By understanding assignment criteria, we can effectively direct our energy as we begin to work. Just as we can use a magnifying glass to focus sunlight into a powerful beam, so assignment parameters can help to focus creative energy. On the other hand, students who try to determine the "right answer" to a problem may just want to know the instructor's solution. Such knowledge is rarely helpful. The assignment simply sets a learning process in motion: we learn through the work we do.

FORM, SUBJECT, CONTENT

We may define **form** as the physical manifestation of an idea or emotion. We can construct two-dimensional forms using point, line, shape, texture, value, and color. The building blocks of three-dimensional forms are point, line, plane, volume, mass, space, texture, and color. We can combine duration, tempo, intensity, scope, setting, and chronology to create time-based art forms. For example, *Star Wars*, a classic science-fiction movie, appears in the art form that we call film.

The **subject**, or topic, of an artwork is most apparent when it clearly represents a person, an object, an event, or a setting. For example, the war between the rebels and the Empire provides the subject for *Star Wars*.

An artwork's emotional or intellectual message provides its **content**, or underlying theme. The theme of *Star Wars* is the journey into the self. Luke Skywalker's gradual understanding of himself and his acceptance of the villainous Darth Vader as his father provide an essential emotional undercurrent to the entire series.

Each artwork also occurs within a geographical and temporal **context**. This context can substantially affect the artwork's meaning. For example, Mary Lucier's video showing a fragile monarch butterfly's death is astonishing and poignant when we see it in Times Square, the bustling theater district in the heart of New York City (7.1). If we viewed the same event while hiking, we would consider it a normal occurrence rather than a statement about the fragility of life.

STOP, LOOK, LISTEN, LEARN

We typically discuss artworks using a critique process. During a **critique**, our peers and professors analyze our work and offer advice. They identify compositional strengths and weaknesses, and reveal areas that need revision. We can use these insights to improve the current design or to generate possibilities for the next assignment.

Depending on the amount and type of student involvement, critiques can be extremely helpful, extremely destructive, or really boring. Specific recommendations are most helpful. Be sure to substantiate each recommendation you offer so that the rationale is clear.

Whether we are giving or receiving advice, it is important to arrive with our minds open, rather than with our fists closed. A critique is not a combat zone! We must listen carefully to explanations and generously offer our insights to others. Likewise, we must receive suggestions gracefully rather than defensively. Each of us will make the final decision on revisions: thus, if someone gives us bad advice, we can quietly discard it. Because a substantial and supportive critique is the best way to determine the effect our design has on an audience, it is best to speak thoughtfully and weigh every suggestion seriously.

OBJECTIVE AND SUBJECTIVE CRITIQUES

When beginning a critique, it is useful to distinguish between objective and subjective criticism. We use **objective criticism** to assess how well a work of art or design uses the elements and principles of design. Discussion generally focuses on basic compositional concerns, such as:

- The type of balance that the artist used in the composition and its effect
- The spatial depth of a design and its compositional effect
- The degree of unity in a design and how the artist achieved it