What is Design?

or

What if ‘How to Make (Almost) Anything’ was a design studio?
Topics

- what is design?
- design education
- the creative process (How to Design (Almost) Anything)
- contemporary design directions
What is design?

A process of thinking and making through which a designer questions a proposal, and its assumptions and constraints, from as many angles\(^1\) as possible, and answers those questions through iterations on the design. Design is always a work in progress.

\(^1\)Design concept, macro to micro (form and detail), material selection, manufacturing processes, social/cultural implications, use scenarios, etc.
Design thinking: How to design a Lota

Eames India Report, 1958
But how would one go about designing a Lota? First one would have to shut out all preconceived ideas on the subject and then begin to consider factor after factor:
The optimum amount of liquid to be fetched, carried, poured and stored in a prescribed set of circumstances.
The size and strength and gender of the hands (if hands) that would manipulate it.
The way it is to be transported – head, hip, hand, basket or cart.
The balance, the center of gravity, when empty, when full, its balance when rotated for pouring.
The fluid dynamics of the problem not only when pouring but when filling and cleaning, and under the complicated motions of head carrying – slow and fast.
Its sculpture as it fits the palm of the hand, the curve of the hip.
Its sculpture as compliment to the rhythmic motion of walking or a static post at the well.
The relation of opening to volume in terms of storage uses – and objects other than liquid.
The size of the opening and inner contour in terms of cleaning.
The texture inside and out in terms of cleaning and feeling.
Heat transfer – can it be grasped if the liquid is hot?
How pleasant does it feel, eyes closed, eyes open?
How pleasant does it sound, when it strikes another vessel, is set down on ground or stone, empty or full – or being poured into?
What is the possible material?
What is its cost in terms of working?
What is its cost in terms of ultimate service?
What kind of an investment does the material provide as product, as salvage?
How will the material affect the contents, etc., etc.?
How will it look as the sun reflects off its surface?
How does it feel to possess it, to sell it, to give it?
Of course, no one man could have possibly designed the Lota. The number of combinations of factors to be considered gets to be astronomical – no one man designed the Lota but many men over many generations. Many individuals represented in their own way through something they may have added or may have removed or through some quality of which they were particularly aware.
Design education

How would ‘How to Make (Almost) Anything’ be different if it was a design studio?
Design education

- Criticism is central to design education
  - the student and instructor must develop a critical dialog that will reveal the strengths of a project, as well as areas where improvements can be made
  - Students must learn not to take criticism personally

- Studio based (learn by doing, repeating)
  - design is taught through the process of designing, and receiving feedback on your design work
  - desk crits - multiple weekly meetings, one-on-one, with a design instructor
  - pinups - periodic presentations to multiple instructors/critics to receive feedback and suggested directions for design
  - reviews - final work is presented to, and evaluated by, a jury of design practitioners
How to Design (Almost) Anything - studio approach

- Approach the weekly assignments from the perspective of how they relate to the final project
  - strive to understand how the tool/assignment can support your central agenda
  - target your assignment on developing skills that will help support work on your final project
  - do not create an assignment that simply expresses your current understanding of why a tool/process is useful
- Schedule time to receive regular feedback on your design work
  - feedback on the “design” of weekly assignments will help you to understand design pedagogy
  - instructors can provide feedback and insights into how weekly assignments can potentially help support a final project agenda
How to Design (Almost) Anything

- Conceptualize
  - design starts with an idea

- Research
  - search for precedents and examples
  - position your project as a response to your research

- Iterate
  - it is important to work iteratively, and to work through multiple iterations quickly
Design begins with a central idea/concept

- The concept will be:
  - a launching point for the design process
  - can be literal or abstract
  - provides something useful to test ideas against during the design process
  - useful tool for explaining your design to others
A central concept is often described with a *parti*

A *parti* can be expressed in several ways but is most often expressed by a diagram depicting the experiential and aesthetic sensibility of a designed object.

This diagram may be drawn or physical, and may deal with material, ergonomics, usage, etc.

An ideal parti is wholly inclusive - it informs every aspect of a design from macro to micro scale.

Use the parti as a set of guidelines while making design decisions. Making a decision that reinforces the central idea of the project also strengthens that decision.
Seattle Public Library

Rem Koolhaas (OMA)
Seattle Public Library

Rem Koolhaas (OMA)
Seattle Public Library

Rem Koolhaas (OMA)
Design decisions should be justified in multiple ways

Dustpan + Sweeper
Bibliothèque Sainte-Geneviève, Paris
UNNC Pavilion
Chinese Food Container
Press-fit Lampshade
Transformable Interior - Lumenhaus
Eames leg splint
How to make a box
Eames design process diagram
Be speedy

- A good designer will iterate quickly
  - don’t allow yourself to get stuck trying to perfect a single idea
  - if the next step is not obvious, quickly test 5, 10, 25, 100 counter-proposals and see if any stick
- Find tools that let you record and communicate ideas quickly
  - sketch with a pencil and paper before committing a drawing to CAD
  - build study models with paper/cardboard and a knife, or mold with clay, before committing to 3D modeling and CNC cutting
- If your concept needs to change, change it!
Edit heavily

- Do not be afraid to discard a good idea
  - sometimes multiple design ideas are all good, but in conflict. Keep the best one and discard the rest
  - save the discarded ideas for future projects

- Seek complexity, avoid complication
  - complex things can be simply constructed
  - make sure that things that are complicated to construct add value through their complication

- Make every move mean something
  - be prepared to rationalize and explain every decision you made
Be process-oriented

- Focus on the design process in each exercise
  - develop your own feedback mechanism to understand how a physical/material process can inform design
  - focus on the potential value of a given process to the larger context of a design problem
  - learn the tool so that you can use it to solve a future problem
  - do not let the assignment dictate your understanding of a tool and its value to you
Improve your process

- Do not do each exercise in isolation, focus taking skills from a previous exercise and applying/refining them in subsequent exercises
NuVu Studio
Cucumber has to be able to separate from the basket.

$1$ Roll it off.

$2$ Keep blade on 1 side of the basket.
NuVu Studio
Design at multiple scales

A successful design must work when viewed/experienced from multiple scales/distances

A simple example is the graphic design of a poster. What text is legible when viewed from 10 meters away? 5 meters? 1 meter?

“Always design a thing by considering it in its next larger context - a chair in a room, a room in a house, a house in an environment, and environment in a city plan.” - Eliel Saarinen
Presenting a project

- Move from the general to the specific
  - state the problem/proposal
  - describe your concept and motivations
  - show your design process
  - illustrate the parti
  - walk through the details of the project
  - perform some self-criticism
Ceramic Futures

Research Associate
Design Robotics Group
2010-2011

I worked as a research associate for the Design Robotics Group at the Harvard Graduate School of Design after graduation. The research project was called Ceramic Futures; the project investigated potential for an automated design to manufacturing workflow for an environmentally optimized solar ceramic shading system. I was responsible for designing and prototyping custom robotic tooling, as well as detailing and preparing manufacturing files for a structural frame for the proposed installation. I was also involved in prototyping and testing ceramic shading elements.
Ceramic Futures: Robotic Extruder

This is an end-effector I designed and fabricated for automated robotic extrusion to support the Ceramic Futures project. I was requested to build a simple, plunger-based extruder but was primarily responsible for specification of components, mechanical and electrical design, machining, and assembly.
Ceramic Futures:
Variable Mold

The variable mold uses movable pins that can be manipulated robotically to form an approximation of a surface. An interpolative material is then placed over the mold, allowing material deposition processes to occur on the mold, creating custom shapes without the waste of disposable molds.

I performed specification, mechanical design, and fabrication of mold components. The initial idea for the mechanism that allows the pins to slide while being set, then locks them in place for use, was developed by members of the research team. I designed the rotating cam mechanism that actuates the locking plate.
Let it go.

Accessing the full potential of your design process requires losing control. Design has no predetermined outcomes or right or wrong answers. In a genuinely creative process, you do not have a clear idea of where you are going. The more comfortable you can become with this state of unknowing, the better.

The design process is best approached with patience and an open mind. Be skeptical of accounts of “lightbulb” moments. People, no matter how creative they might seem to be, rarely experience this. When it does happen, it’s often while they’re in the midst of creating something else.
Constraints foster creativity

The limitations or constraints of a design task are often the spark of a central concept or *parti*. Limitations might include dimensional restrictions (height, weight, volume), budget, extreme environment, material constraints, physical handicap, or contradictory requests from the client.

In other words, can the obstacle become an enabler? Can the bug become a feature?
Stop thinking, start *doing*

A common misconception is that design ideas are first conceived, then executed in physical media. This is rarely the case - instead, design concepts usually evolve through a back-and-forth between making and thinking.

If you’re feeling stuck on a design problem, try distancing yourself from preconceptions and working with the drawings or physical model without thinking too much about the repercussions. It’s likely you’ll stumble upon a solution.
Contemporary Design Trends

- Modernism (still contemporary?)
- Postmodernism
- Formalism
- Biomimicry / Bio-inspiration
- Data-driven design
- Democratized design
Modernism

Less is more.

-Ludwig Mies van der Rohe
Postmodernism

Less is bore.

- Robert Venturi
Formalism
Biomimicry / Bioinspiration

The Beijing National Aquatics Center is based on a solution to a problem posed more than a century ago by the physicist Lord Kelvin: how to make the most efficient foam, that is, partition space into cells of equal volume with the least surface area.

Kelvin conjectured that his solution, which used 14-sided polyhedrons, was the best possible. But in 1993, two physicists found a more efficient solution using 12- and 14-sided polyhedrons.

To design the building, a computer model of the Weaire-Phelan structure was sliced at an angle to give the exterior a more random appearance, then sliced again to create exterior walls.

Sources: Arup; John M. Sullivan, Berlin Institute of Technology
MIKA GRÖNDAL/The New York Times
Biomimicry / Bioinspiration
Data-Driven Design

Andy Payne
Data-Driven Design
Data-Driven Design
Democratized Design
Why spend extra time on your design?

You are investing a huge amount of personal time and resources anyway

“Personal Fabrication” vs maker-to-market

Design helps you reach a broader audience

A well-designed piece seems closer to market, more convincing
Design is never finished.

Stefan Sagmeister