

# Design for living complexities

An experiment in teaching  
critical thinking about design

Peter J. Taylor

Science in a Changing World program  
University of Massachusetts Boston

[bit.ly/4S17Taylor](http://bit.ly/4S17Taylor)

for sources, contact info, and follow up  
*incl. compilation of plus-delta feedback*

## Problems in Design *and* Design:

1. **Course on design:** *principles of critical thinking about design?*

2. **Design a course:** *principles informing the course design?*

3. **Implement** -> elaborated principles of critical thinking about design

4. **Take stock** -> revised principles informing the course design

# Problems in Design and Design:

1. **Course on design:** principles of critical thinking about design *in general*
2. **Design a course:** principles informing the course design?
3. **Implement** -> elaborated principles of critical thinking about design
4. **Take stock**  
evaluations like “the course has permeated all of the boundaries of my life and enabled me to take real control”  
-> *revised principles informing the course design*

# 1. critical thinking about design *in general*

## Design

intentionality in construction

*involves*

- range of materials
- sequence of steps
- principles that inform the choice of material and the steps

## Design

- putting people as well as materials into place
- working with the known properties of the people and materials
- trying out new arrangements, or
- working around their constraints

# 1. critical thinking about design *in general*

## *Critical thinking*

understanding ideas and practices better  
when

we examine them in relation to alternatives

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**design** cannot proceed without the idea that  
there are alternatives to the current way of  
doing things

# 1. critical thinking about design *in general*

## alternative

Universal Principles of Design, Revised and Updated:  
125 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better  
Design Decisions, and Teach through Design

by William Lidwell, Kritina Holden and Jill Butler

# 80/20 Rule

A high percentage of effects in any large system are caused by a low percentage of variables.<sup>1</sup>

The 80/20 rule asserts that approximately 80 percent of the effects generated by any large system are caused by 20 percent of the variables in that system. The 80/20 rule is observed in all large systems, including those in economics, management, user interface design, quality control, and engineering, to name a few. The specific percentages are not important, as measures of actual systems indicate that the proportion of critical variables varies between 10 percent and 30 percent. The universality of the 80/20 rule suggests a link to normally distributed systems, which limits its application to variables that are influenced by many small and unrelated effects—e.g., systems that are used by large numbers of people in a variety of ways. A few examples of the 80/20 rule include:<sup>2</sup>

- 80 percent of a product's usage involves 20 percent of its features.
- 80 percent of a town's traffic is on 20 percent of its roads.
- 80 percent of a company's revenue comes from 20 percent of its products.
- 80 percent of innovation comes from 20 percent of the people.
- 80 percent of progress comes from 20 percent of the effort.
- 80 percent of errors are caused by 20 percent of the components.

The 80/20 rule is useful for focusing resources and, in turn, realizing greater efficiencies in design. For example, if the critical 20 percent of a product's features are used 80 percent of the time, design and testing resources should focus primarily on those features. The remaining 80 percent of the features should be reevaluated to verify their value in the design. Similarly, when redesigning systems to make them more efficient, focusing on aspects of the system beyond the critical 20 percent quickly yields diminishing returns; improvements beyond the critical 20 percent will result in less substantial gains that are often offset by the introduction of errors or new problems into the system.

All elements in a design are not created equal. Use the 80/20 rule to assess the value of elements, target areas of redesign and optimization, and focus resources in an efficient manner. Noncritical functions that are part of the less-important 80 percent should be minimized or removed altogether from the design. When time and resources are limited, resist efforts to correct and optimize designs beyond the critical 20 percent, as such efforts yield diminishing returns. Generally, limit the application of the 80/20 rule to variables in a system that are influenced by many small and unrelated effects.

See also Cost-Benefit, Form Follows Function, Highlighting, Most Advanced Yet Acceptable, and Normal Distribution.

<sup>1</sup> Also known as *Pareto's Principle*, *Juran's Principle*, and *Vital Few and Trivial Many Rule*.

<sup>2</sup> The first recognition of the 80/20 rule is attributed to Vilfredo Pareto, an Italian economist who observed that 20 percent of the Italian people possessed 80 percent of the wealth. The seminal work on the 80/20 rule is *Quality Control Handbook* by Joseph M. Juran (Ed.), McGraw-Hill, 1951.



80 percent of a product's usage involves 20 percent of its features.

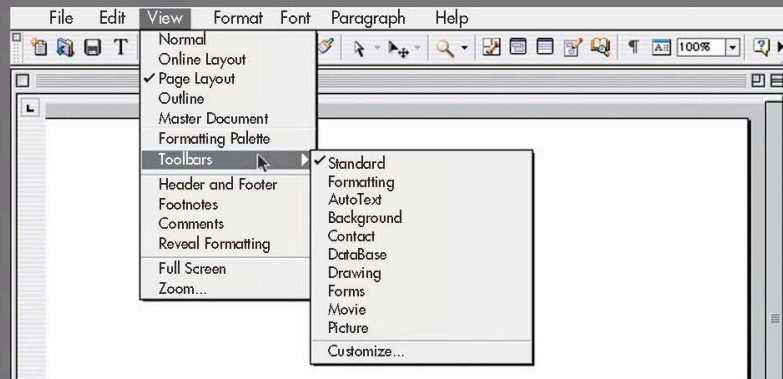
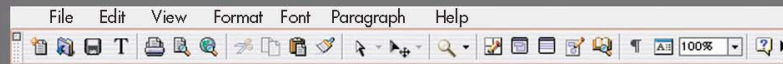
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Graphical user interfaces conceal most of their functions in drop-down menus (bottom image). This reduces the complexity of the display, but also makes frequently used functions more difficult to access. Identifying the critical 20 percent of the functions and making them readily available in toolbars solves the problem (top image).

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# Alignment

The placement of elements such that edges line up along common rows or columns, or their bodies along a common center.

Elements in a design should be aligned with one or more other elements. This creates a sense of unity and cohesion, which contributes to the design's overall aesthetic and perceived stability. Alignment can also be a powerful means of leading a person through a design. For example, the rows and columns of a grid or table make explicit the relatedness of elements sharing those rows and columns, and lead the eyes left-right and top-bottom accordingly. Edges of the design medium (e.g., edge of a page or screen) and the natural positions on the design medium (e.g., centerlines) should also be considered alignment elements.

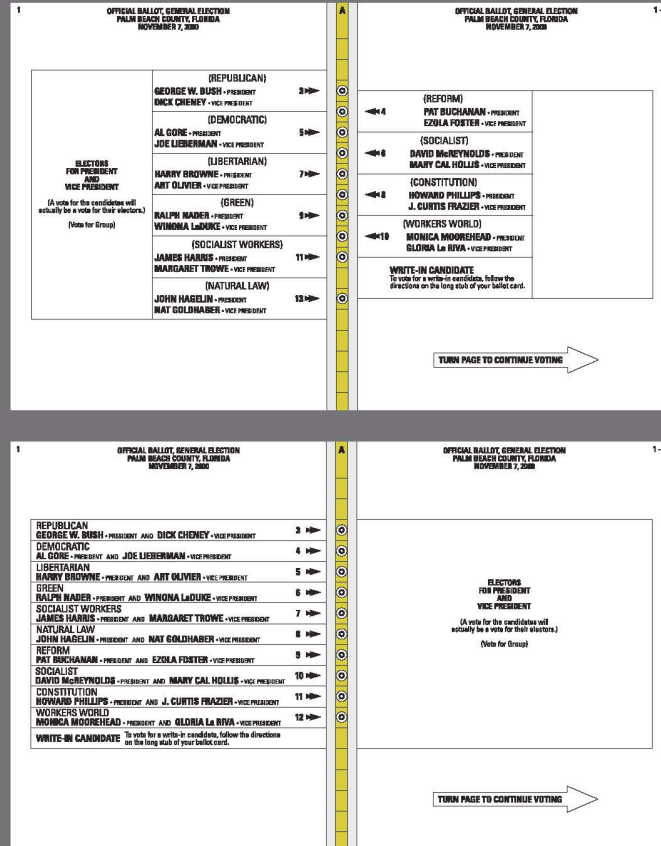
<sup>1</sup> See, for example, *Elements of Graph Design* by Stephen M. Kosslyn, W. H. Freeman and Company, 1994, p. 172.

In paragraph text, left-aligned and right-aligned text blocks provide more powerful alignment cues than do center-aligned text blocks. The invisible column created by left-aligned and right-aligned text blocks presents a clear, visual cue against which other elements of the design can be aligned. Center-aligned text blocks, conversely, provide more visually ambiguous alignment cues, and can be difficult to connect with other elements. Justified text provides more alignment cues than unjustified text, and should be used in complex compositions with many elements.

Although alignment is generally defined in terms of rows and columns, more complex forms of alignment exist. In aligning elements along diagonals, for example, the relative angles between the invisible alignment paths should be 30 degrees or greater; separation of less than 30 degrees is too subtle and difficult to detect.<sup>1</sup> In spiral or circular alignments, it may be necessary to augment or highlight the alignment paths so that the alignment is perceptible; otherwise the elements can appear disparate, and the design disordered. As with all such principles of this type, there are exceptions (e.g., the misalignment of elements to attract attention or create tension). However, these exceptions are rare, and alignment should be considered the general rule.

For most designs, align elements into rows and columns or along a centerline. When elements are not arranged in a row/column format, consider highlighting the alignment paths. Use left- or right-justified text to create the best alignment cues, and consider justified text for complex compositions.

See also Aesthetic-Usability Effect, Area Alignment, and Good Continuation.



Although there are a number of problems with the design of the butterfly ballot, most of the confusion resulted from the misalignment of the rows and punch-hole lines.

This conclusion is supported by the improbable number of votes for Patrick Buchanan in Palm Beach County, and the number of double votes that occurred for candidates

adjacent on the ballot. A simple adjustment to the ballot design would have dramatically reduced the error rate.

## 2. principles informing the course design

The course exposes & explores alternative designs

### History:

*showing that things have by no means always been the way they are now*

### Archeology of the present:

*shedding light on what might have taken for granted or left as someone else's responsibility/specialty*

### Comparison:

*looking at ways things are arranged in different organizations & cultures*

### Ill-defined problems:

*in cases of real-world "living complexity"*

## 2. principles informing the course design

### Session topics

1. Waste
2. Play
3. Gathering into community
4. Enabling
5. Design-thinking education
6. Craft, improvisation, innovation and uptake
7. Standards, Conventions, Modularity, Infrastructure
8. Local particularity
9. Spanning distance
10. Integration of diverse social and material worlds
11. Keeping track
12. Improving by taking stock

## 2. principles informing the course design

### Format of sessions

#### A. Topic theme

for critical thinking about design

#### B. Presentation

different angles on topic, illustrated with videos etc. + refined or additional themes

#### C. Case/ scenario

in-class work, homework -> design sketch, presentation + peer commentary, revision + additions to set of principles for critical thinking in design

1. critical thinking about design
2. principles informing the course design

## Topics & theme

### 1: Waste

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*Byproducts are products*

### 2: Play

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*A yin and yang of design is intentional planning and play, to the extent that play involves ongoing experimenting and adjustment in putting people as well as materials into place.*

### 3: Gathering into community

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*Putting people into place—as designers, users, co-designer-user—may happen by working with what you know about people, facilitating new arrangements, or working around their constraints.*



#### 4: Enabling

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*All disabilities can be reframed as opportunities to a) enable others and b) learn from those who are differently abled*

#### 5: Design thinking (making such thinking available to all)

*Imagine that you don't say "it's not my problem" or "this seems too hard for me to solve," and imagine instead that, whatever your age or background, you can rise to the challenge and contribute, through a series of steps, to a prototype to be tested in the real world.*

#### 6: Craft, improvisation, innovation and uptake (design thinking in professional and commercial practice)

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*Craft, innovation, improvisation and uptake are well-managed learning.*

## 7: Standards, Modularity and Infrastructure

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*“All invention is borrowing” (D. Pye, furniture designer); infrastructure already in place, standards & modularity enable the designer to know the properties of borrowed materials and have some sense of the possibilities and limits of adaptation into new arrangements. Indeed, Pye’s dictum reminds us to build on what is already in place, not assume that new is better.*

## 8: Local particularity

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*“All design is local” (to paraphrase Tip O’Neill)—ultimately what is designed has to work for particular people using the materials that can be made available in their particular setting.*

*To that end, a) the knowledge of the people most affected by the given issue needs to be brought into play and b) participation needs to be facilitated in ways that ensure that the full range of participants are invested in collaborating to bring the resulting design to fruition [see Gathering into community)*

*A corollary is for designers not to rely on early adopters of innovations, but to*

*pay attention to users who, while prepared to adopt innovations, need them to be integrated with their own practical day-to-day concerns and specific situations [see innovation and uptake].*

*Finally, a corollary of all that is to acknowledge local distinctiveness or vernacular is to demand that the new keeps places worked in, lived in, not standardized, maintains employment etc.*

## **9: Spanning distance**

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*People distant in space can have their cultures profoundly shifted by mediated connections, especially those made around new technologies and the commodities they give rise to.*

## 10: Integration of diverse social and material worlds

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*Instead of dividing real world complexities into many local situations (as if they were well-bounded systems with other processes pushed into the background or hidden for the time being), we can examine “intersecting processes” that cut across scales, involve heterogeneous components, and develop over time.*

*There is always a tension between, on one hand, local knowledge and solidarities forged through working and living together in particular places and, on the other hand, application of trans-local perspectives, abstractions, or other resources—or withholding such resources.*

*Within the intersecting processes, there are multiple potential points of engagement, which need to be linked together “transversally” in a manner that is intentional and explicit. In other words, if sustained engagement in local situations is desired to ensure that design is not a “solution.. for the problems that people don’t have” (Myles Horton), what else is needed to mitigate the consequences of decisions made in governments and corporations operating on a larger spatial and temporal arena?*

## 11: Keeping track

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*Possibilities for surveillance are an unavoidable by-product of standards and of keeping track of the effects of one's design.*

## 12: Improving by taking stock (from design to adoption & adaption by others)

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*Making space to reflect, using various tools or processes, before proceeding either from one phase to another or on from an activity or event, makes it more difficult to simply continue along previous lines, opening up possibilities of alternative paths to proceed.*

# Example

## *1. Waste*

*Design principle: Byproducts are products*

Four laws of ecology popularized by Barry Commoner recast as four design principles:

- 1) Everything is connected to everything else.
- 2) Everything must go somewhere.
- 3) Nature knows best.
- 4) There is no such thing as a free lunch.

Commoner's Principle 2

Commoner's Principles 1 & 2 leading into the design principle that "byproducts are products." For example,

Unexpected products (aka by-products) can be made good use of: Music;  
Drugs

Other undesired or unintended products: useable?; truly unexpected?

Discard Studies is an effort to be systematic about the undesired products.

## Case

"How to respond to ways of subverting an ideal scheme of emissions tax and tariffs"

Broad Steps: Read & understand ideal system, imagine ways it is or could be or should be subverted, design a response to counter that subversion.

Ideal scheme = <http://wp.me/pPWGi-vR>

Subversion might include counter-arguments, schemes based on different principles, ignoring it, adopting it in name but not spirit, un/anticipated by-products, media misrepresentation (as evident in Discard Studies account of Occupy)

Response = *that's what you have to design!*

(Remember, with each design sketch, you add to or revise a growing set of principles for critical thinking in design.)

### 3. Implement -> elaborated principles of critical thinking about design

e.g.

“Address the tension between a) trusting the good will and access to full intelligence of participants and b) drawing them in gradually through experiences that reconnect them with their kindness and creativity.”



## 4. Take stock

evaluations like

“the course has permeated all of the boundaries of my life and enabled me to take real control”

-> *revised principles informing the course design*

## 12 topics themes

form 5 groups

alternate b/w stretching out & focusing in. (Ditto: within any topic)

- A. Everything is connected to everything else (topic 1 on by-products as products)  
*this sets the scene for the subsequent alternation*
- B. Open out: Creativity is a process in context (topics 2-4 on play, gathering into community, and enabling)
- C. Focus in: Well-managed learning (topics 5-7 starting with Design thinking education)
- D. Open out: Transversality (topics 8-10 from local to integration of diverse scales)
- E. Focus in: Refractive practice (topics 11-12 on keeping track and taking stock)

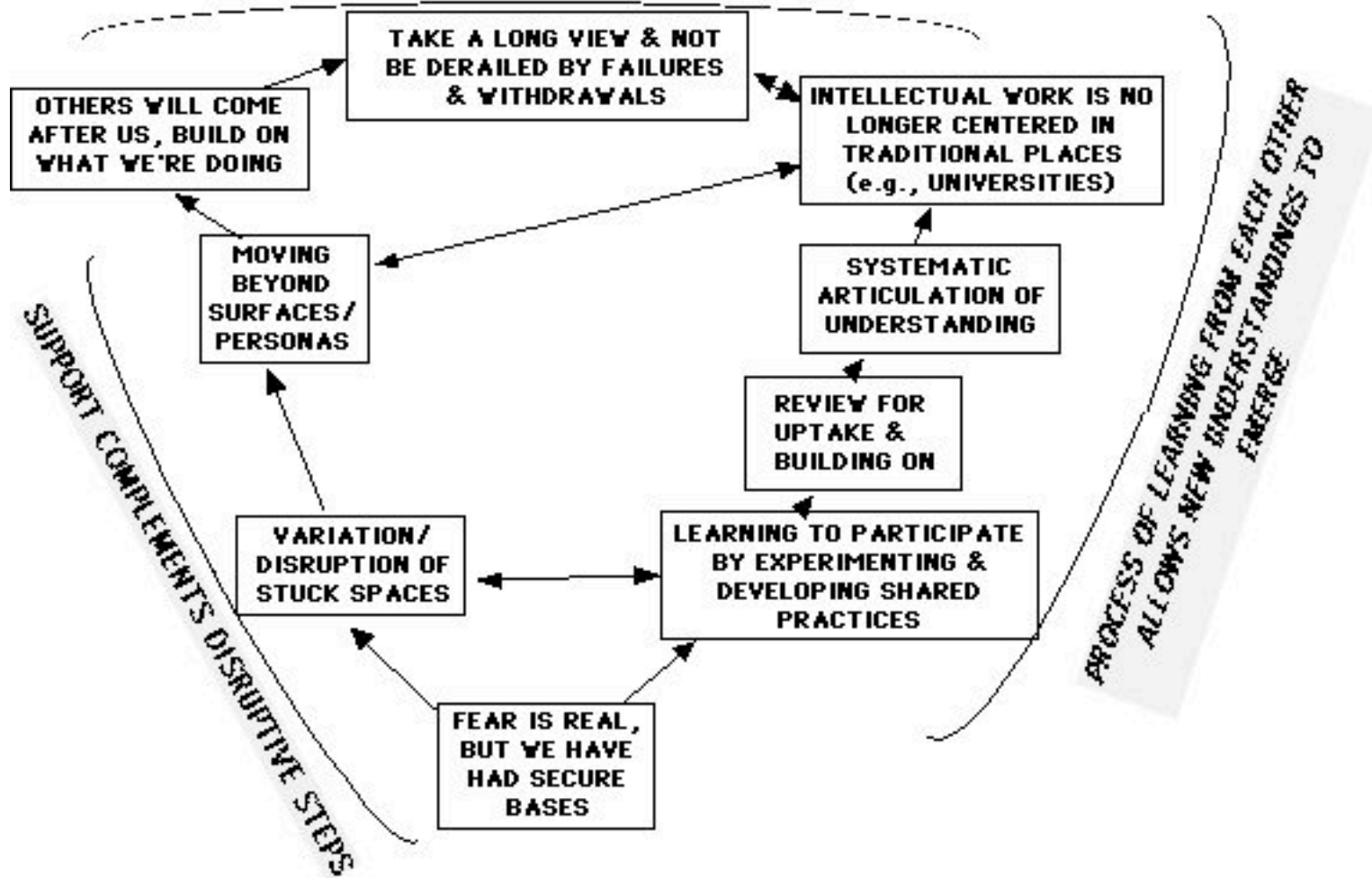
## Premise

lifelong learners

iteratively coming to appreciate scaffolding

**DISRUPTION OF WHAT/WHERE WE CAME IN WITH/FROM CAN,  
WITH ATTENTION TO SUPPORT,  
RESULT IN SOMETHING ENDURING & EXTENDING BEYOND US**

*STRETCHING & CONSOLIDATING BEYOND OUR TIME & PLACE*



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