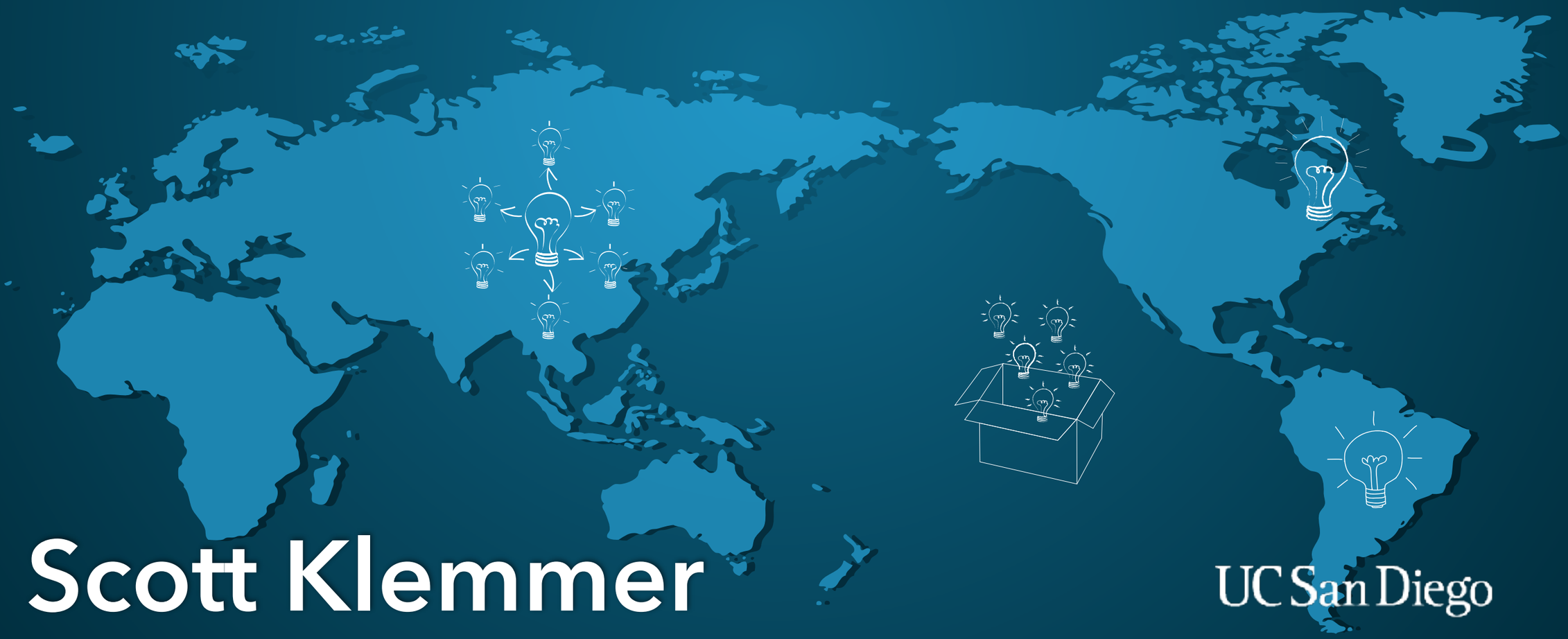
Direct Manipulation



Scott Klemmer

UC San Diego

A4 Example

Cheng-Lin Lin, Chiao Fu,
Ping-Tsung Hsu

youtube.com/watch?v=ITRpSB3uOvE

Henry Mao, Qixin Ding, Xiangyu Zhao

youtube.com/watch?v=3vAVqqnbqL0

Key to good design:

- What makes an interface easy, hard, or “natural”?

How might we improve the measuring cup?

Alex Lee, OXO, Gel 2008 http://vimeo.com/3200945

Henry Ford,
Innovation, and that
“Faster Horse”

Patrick Vlaskovits blogs.hbr.org/cs/2011/08/henry_ford_never_said_the_fast.html

The Simpsons, *Homer Designs a Car*

Measure Cups & Automobiles

What We Learned

The Execution Gap: How do you *do*?

Image Courtesy Bill Verplank

The Evaluation Gap: How do you *know*?

Image Courtesy Bill Verplank

Finding gaps: questions?

- Function: What is this thing?
- Actions: What can this thing do?
- Mapping: Can I figure out how to do it?
- Performance: Can I do it?
- Feedback: Did I do it?
- Meaning: What is the system telling me?

To reduce the gaps, provide...

- Visibility (perceived affordances or signifiers)
- Feedback
- Consistency (also known as standards)
- Non-destructive operations (hence the importance of undo)
- Discoverability: All operations can be discovered by systematic exploration of menus
- Reliability. Operations should work. Period. And events should not happen randomly.

Source: Donald A. Norman and Jakob Nielsen, ACM Interactions, 2010

Courtesy Bill Moggridge, IDEO

COMMAND LINE v. GUI

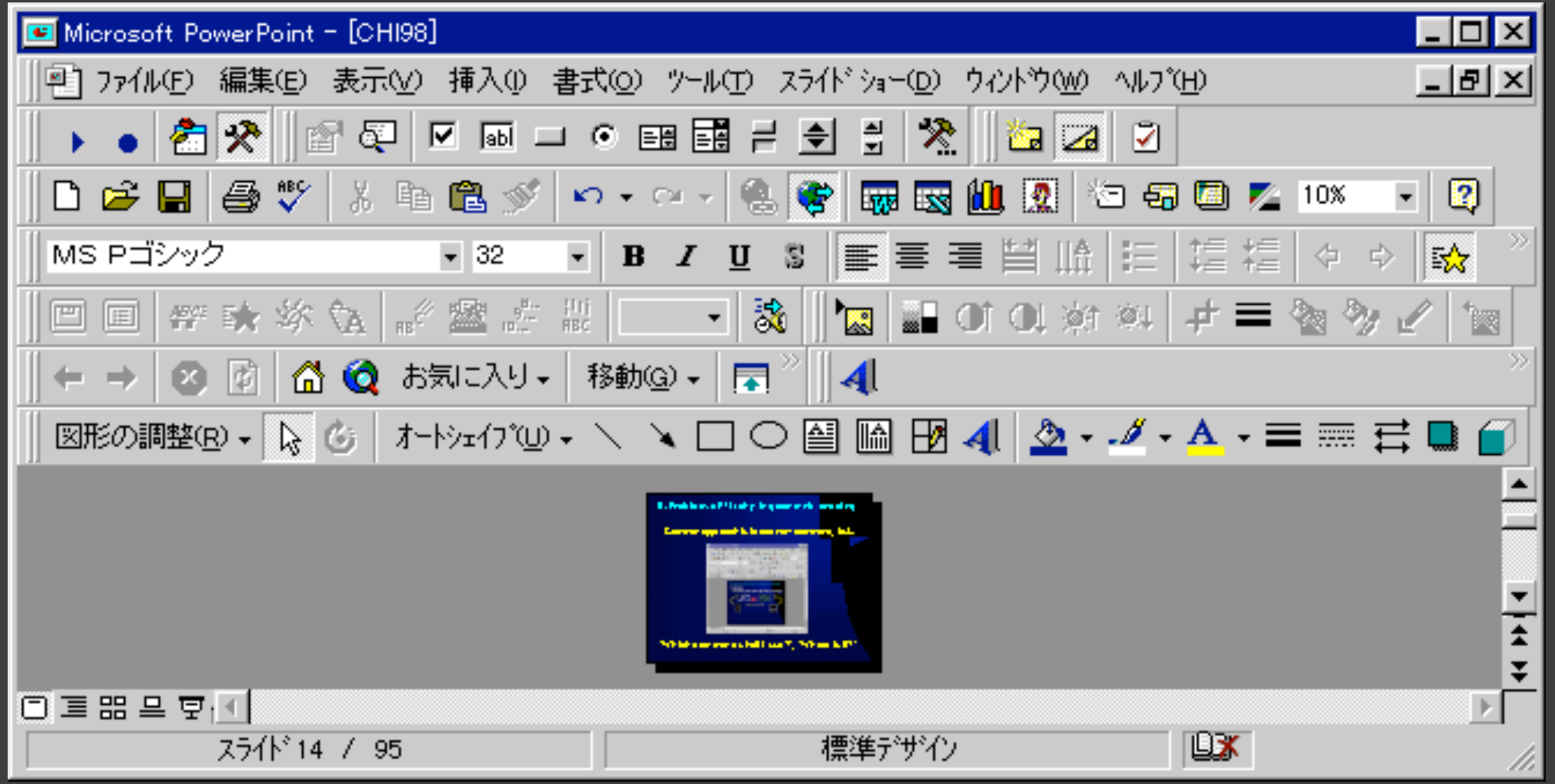
Direct Manipulation

- Immediate feedback on actions
- Continuous representations of objects
- Leverage metaphor

Shneiderman, B., "Direct Manipulation: A Step Beyond Programming Languages." IEEE Computer, 1983.

Principle	Command Line	GUI
Visibility		
Feedback		
Consistency		
Non-destructive		
Discoverability		
Reliability		

Successful Indirection?



Courtesy of Takeo Igarashi

Eye to the Future: Gestures

- The solution to menu creep?
- Even more direct?

The Oranges Puzzle

goal Order the oranges by size: largest-to-smallest, left-to-right

rule 1 Only one orange can be transferred at a time

rule 2 An orange can only be transferred to a plate on which it will be the largest

rule 3 Only the largest orange on a plate can be transferred to another plate

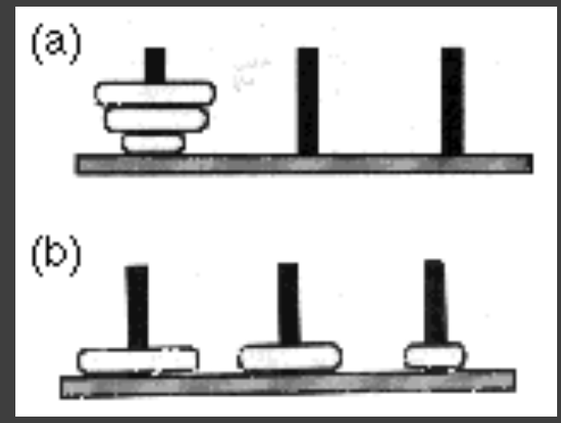
The Bagels Puzzle

goal Order the donuts by size:
largest-to-smallest, left-to-right

rule 1 Only one donut can
be transferred at a time

rule 2 A donut can only be transferred to a peg on which it will be the largest

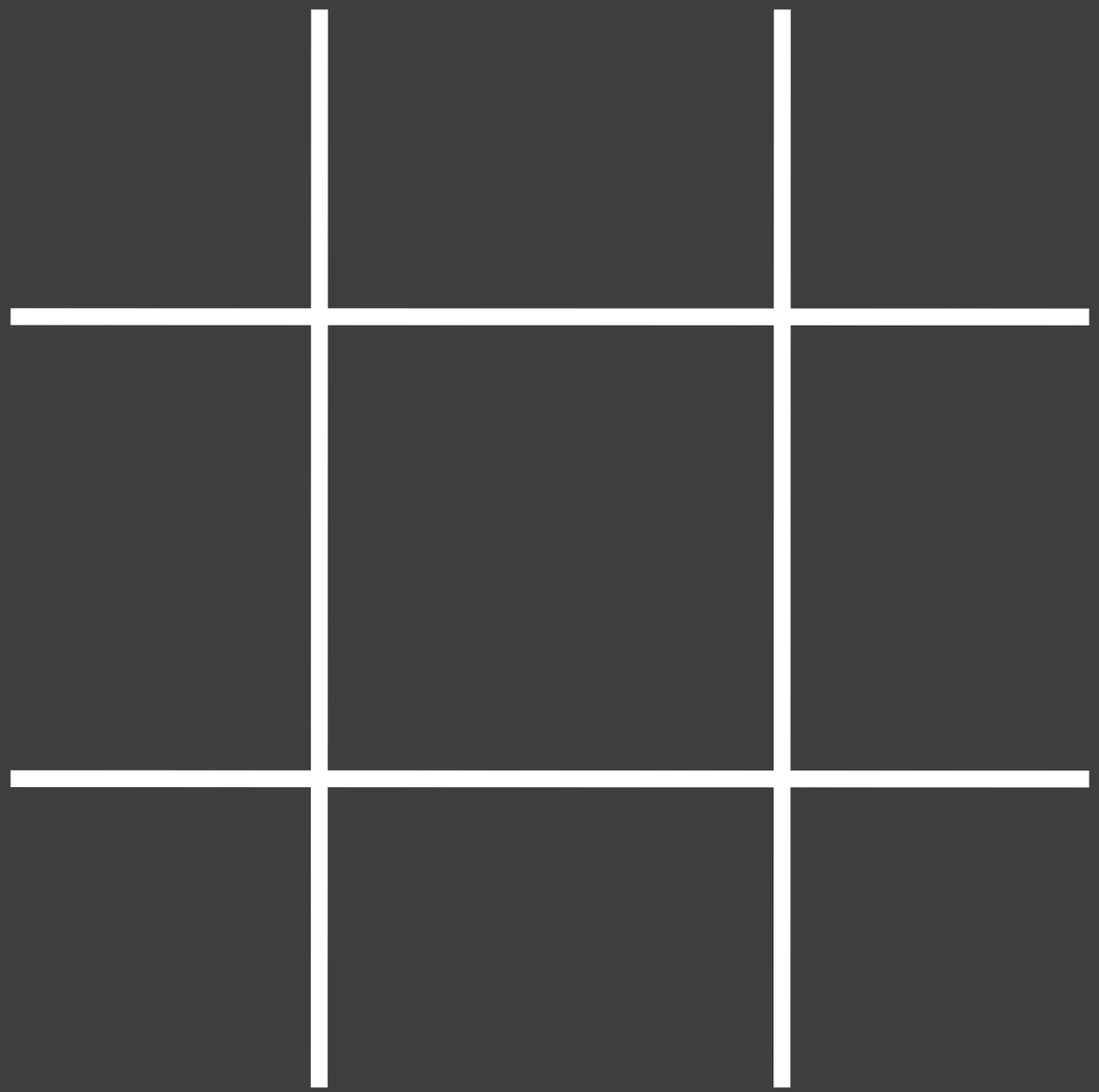
rule 3 Only the largest donut on a peg can be transferred to another peg



Let's play a number game!

- Two players
- Think of the numbers 1 to 9
- Players draw alternately, without replacement
- Objective: make a set of 3 that adds to 15

How about Tic-Tac-Toe?



These games are Isomorphs

Problem Solving as Representation

"Solving a problem simply means representing it so as to make the solution transparent"

—Herbert Simon, The Sciences of the Artificial

Working Memory

Getting Things Done

David Allen

Naturalness

- Cognition is aided when the properties of the **representation** match the properties of the **thing** being represented

Don Norman, *Things that Make Us Smart*

Proteus Ingestible Networked Pill

Images courtesy of Proteus Biomedical

QUARTER

. . . . .	Axess opens for course enrollment.
. . . . .	M.D. students, first day of instruction.
ER	
.m.)	Course enrollment deadline to receive stipend or refund check on first day of term.
. . . . .	New undergraduates arrive; Convocation.
. . . . .	First day of quarter; instruction begins.
p.m.)	Preliminary Study List deadline Students must be "at status"; i.e., students must have a study list with sufficient units to meet requirements for their status, whether full-time, 8–9–10 units (graduate students only), or approved Special Registration Status.
p.m.)	Deadline to submit Leave of Absence for full refund. A full refund schedule is available here.
. . . . .	Conferral of degrees, Summer Quarter.
. . . . .	Yom Kippur (classes held: some students will be observing Yom Kippur and are not expected to attend classes; some faculty will not be holding classes).
n.)	Final Study List deadline. Last day to add or drop a class; last day to adjust units on a variable-unit course. Students may withdraw from a course until the Course Withdrawal deadline and a 'W' notation will appear on the transcript.
R	
.m.)	Term withdrawal deadline; last day to submit Leave of Absence to withdraw from the University with a partial refund. A full refund schedule is available here.
.m)	Change of grading basis deadline.

SPRING QUARTER

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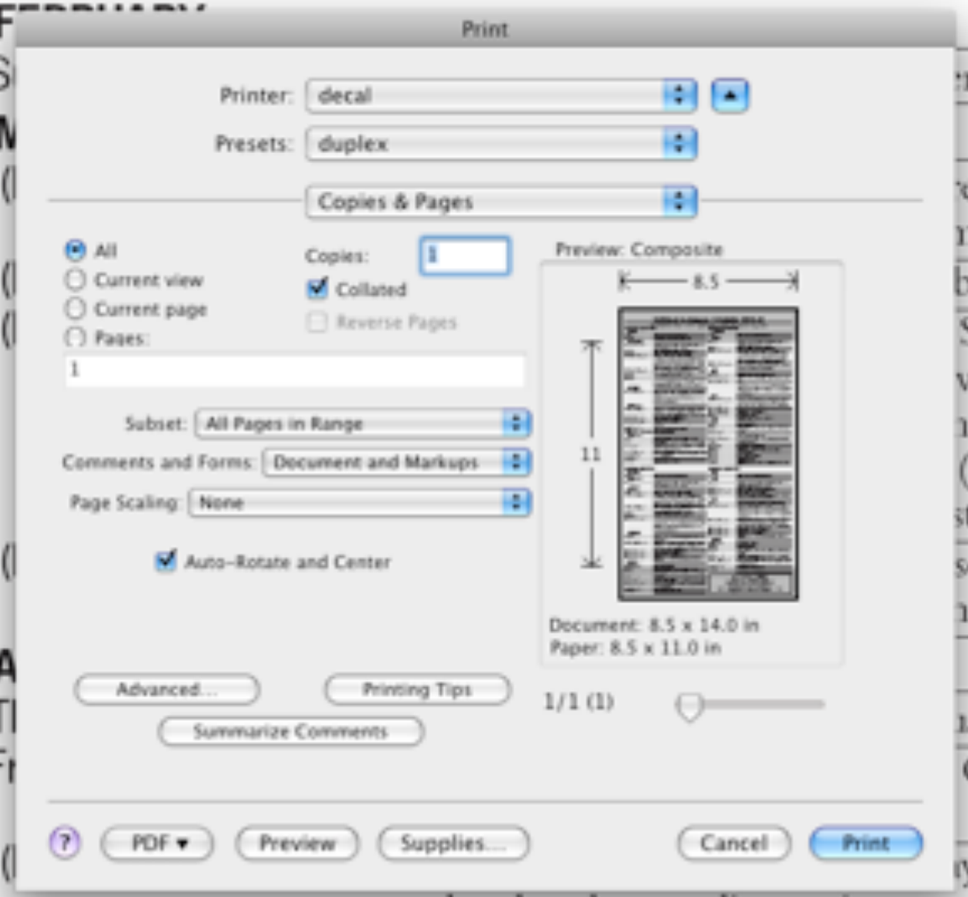

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Students must be
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Quarter degree con-

y to add or drop a class; last day to adjust units on a variable-unit course. Students may withdraw from a course until the Course Withdrawal deadline and a "W" notation will appear on the transcript.

MAY

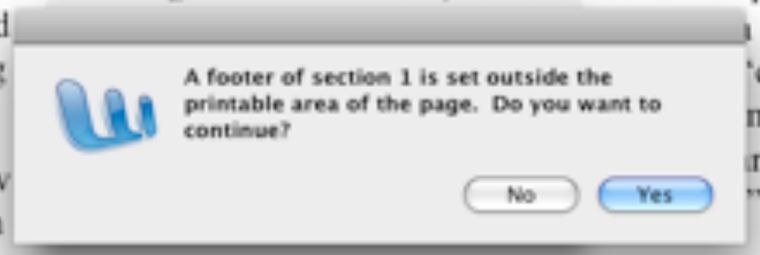
12 (Wed, 5:00 p.m.)	Term withdrawal deadline; last day to submit Leave of Absence to withdraw from the University with a partial refund. A full refund schedule is available here.
21 (Fri, 5:00 p.m.)	Change of grading basis deadline.
21 (Fri, 5:00 p.m.)	Course withdrawal deadline.
28-June 3 (Fri-Thu).	End-Quarter Period.
31 (Mon)	Memorial Day (holiday, no classes) .

Keywords: Design by example.

INTRODUCTION

Many users learn web design by viewing and modifying the source code from other pages on the web. For its ability to scaffold learning, the "view source" option in web browsers is a pinnacle of interface design. Leveraging examples of previous work is an established technique in design [3, 32]. Many design education programs teach students to think like experts by exposing them—and encouraging them to draw upon—examples of previous work. Merging and adapting past solutions to fit the current context can facilitates creativity in new situations [20, 21]. Design compendiums such as *The Big Book of Logos* [5] serve as valuable resources for inspiration, and the advent of prolific, searchable Web content has provided ready access to a broad array of work created by other designers. When appropriate, example designs can offer pragmatic value as well as inspirational value. Starting with an existing design and modifying it can provide a lower barrier to entry than starting with a blank slate. Amateurs, prototypers, and
create a new design quickly find reusing
cially valuable [2, 17, 27].

Designers' current practices for working w
largely informal and ad hoc [19, 28]. Can



examine the specific context of Web page design, the intuitions this work draws upon—most notably, the importance of analogy in creative cognition [13, 40]—suggests these findings likely have broader import.

The Existing and Potential Role of Examples

While it sometimes seems like ideas arise out of thin air, creativity is necessarily the result of applying existing knowledge [1]. Our prior experiences provide the scaffold upon which we create new ideas [13, 30, 36], and copying someone else's successful actions is more efficient than reinventing them from scratch. As Gick and Holyoak succinctly put it, "analogy pervades thought" [16]. Despite the centrality of experience to creativity and insight, people often neglect to draw on relevant knowledge, even when encouraged to do so through summarizing the relevant experience, stating the principle it embodies, or creating a diagram [15, 16]. People are much more likely to draw on analogous experiences and infer the underlying principle when provided with multiple examples, or when presented
case, and asked to compare them
comparison processes can reveal
mbine partial structures and thus
rly in learning when neither ex-
" [14]. The benefits of principle-

Thanks for Your Midterm Feedback

“I like”

Lecture

- *lectures are engaging and helpful for learning the design process*
- *‘each lecture is like a keynote’*

Labs

- labs are *fun, interactive, and insightful*
- practicality of the labs

Studio

- *exposing us to presenting often*

“I like”

Overall

- demonstration of design process
- responsiveness of teaching staff
- learning about heuristics — *it puts terms to everything I’ve thought about in products*
- team collaboration and interaction with classmates

“I wish”

Assignments

- manage workload better
- *make the requirements for assignments clear*

Labs

- more time to complete labs
- more depth on concepts, less copy-paste

Quiz

- make quizzes less ambiguous

“I wish”

Overall

- *consistency across Piazza, course website*
- Piazza overload

Assignment 5