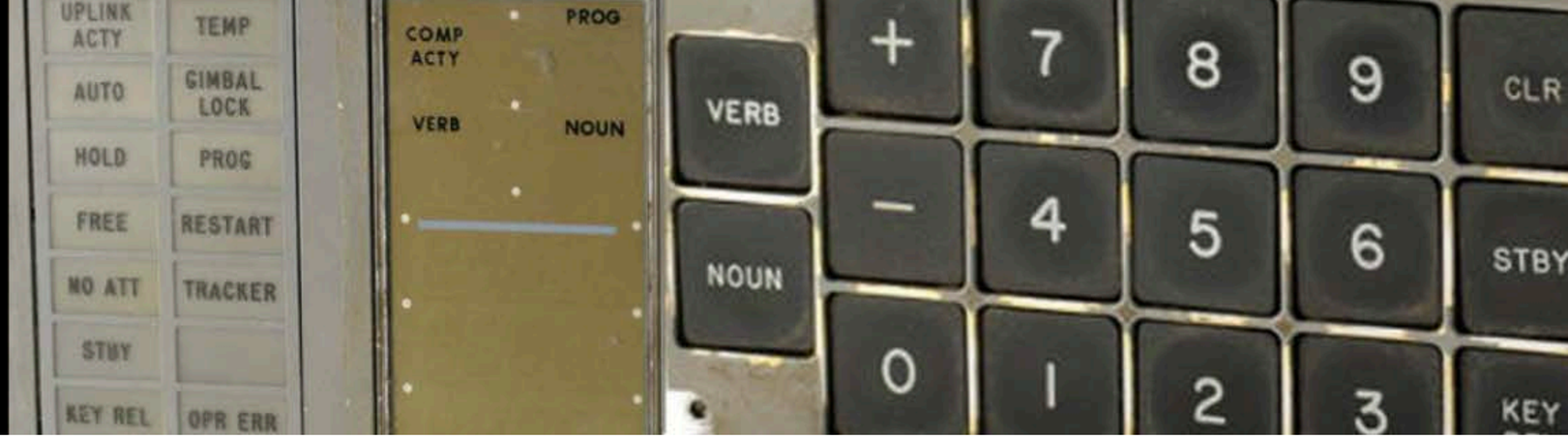
CS160

USER INTERFACE DESIGN

FALL 2020



AFFORDANCE, CONTEXTUAL INQUIRY, AND CONCEPTUAL MODELS

16 SEPT 2020

ERIC PAULOS
www.paulos.net

UNIVERSITY OF CALIFORNIA Berkeley

ANNOUNCEMENTS

Drop Deadline **TODAY**

FEED 01 — Due Monday (Also need Time Zone Info)

Guess Lecture — 21 SEP

GROUPS ASSIGNED NEXT WEEK

Zoom login for Monday 28 Sept — Please attend!

Only 1 RR next week (Wed)

PROG 02 Next week

New groups for Video Responses and more time

DESIGN 02 Reflection/Response

11:59 deadline

Dr. Pierce Gordon

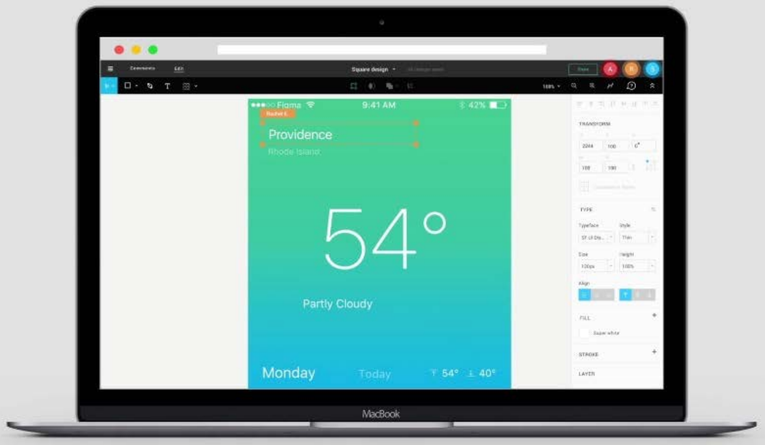
21 Sept in Class

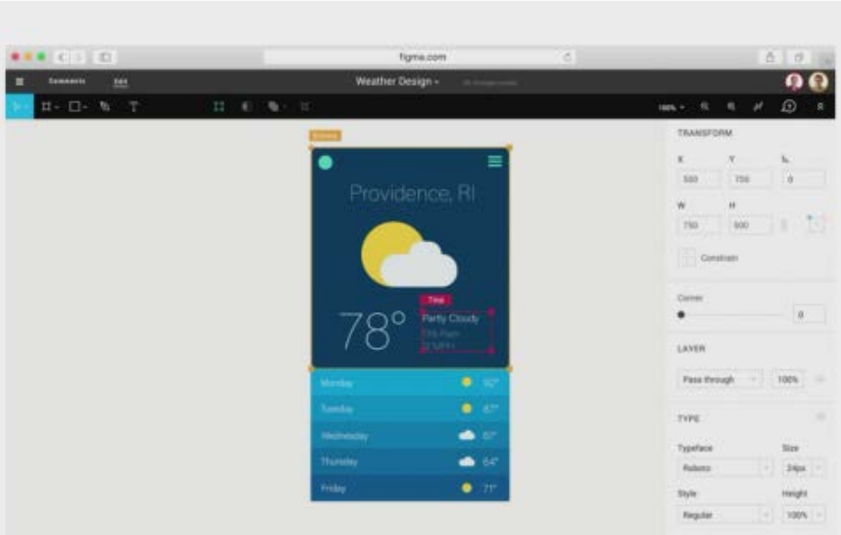
FIGMA

Figma Aims To Be A GitHub For Designers

Figma is the first professional-grade, online tool created specifically for interface design. Built entirely in the browser, Figma enables the entire team’s design process to happen in one online tool

FIGMA IS AN ONLINE COLLABORATIVE TOOL FOR INTERFACE DESIGNERS

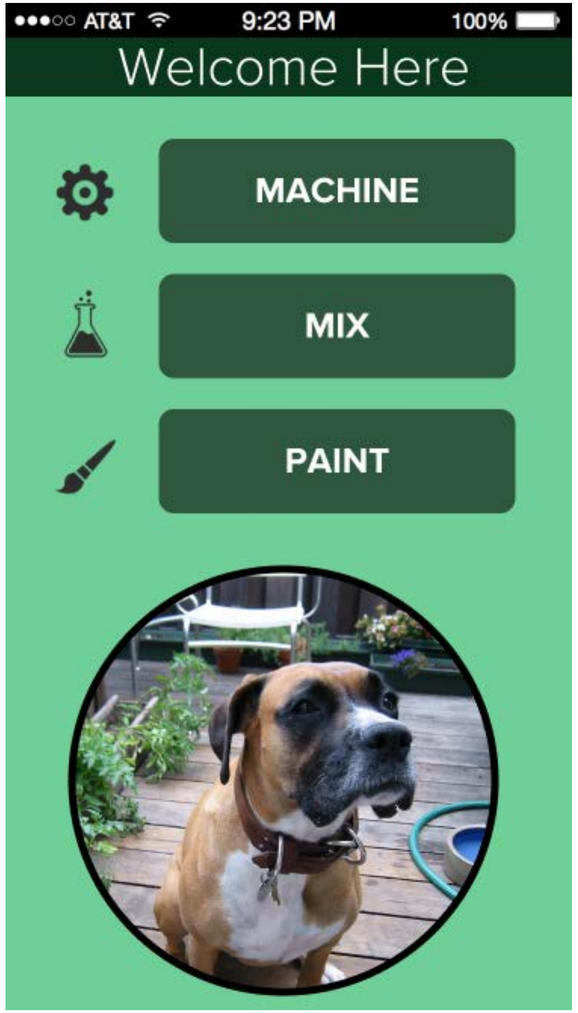




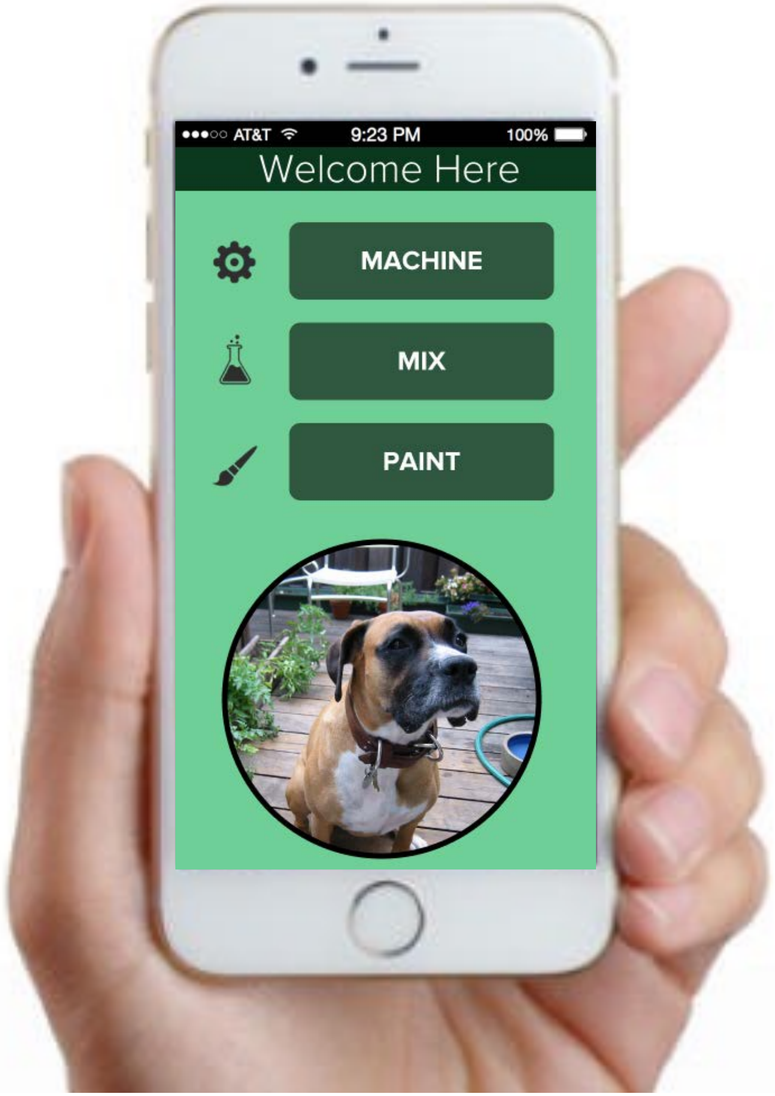
FIGMA

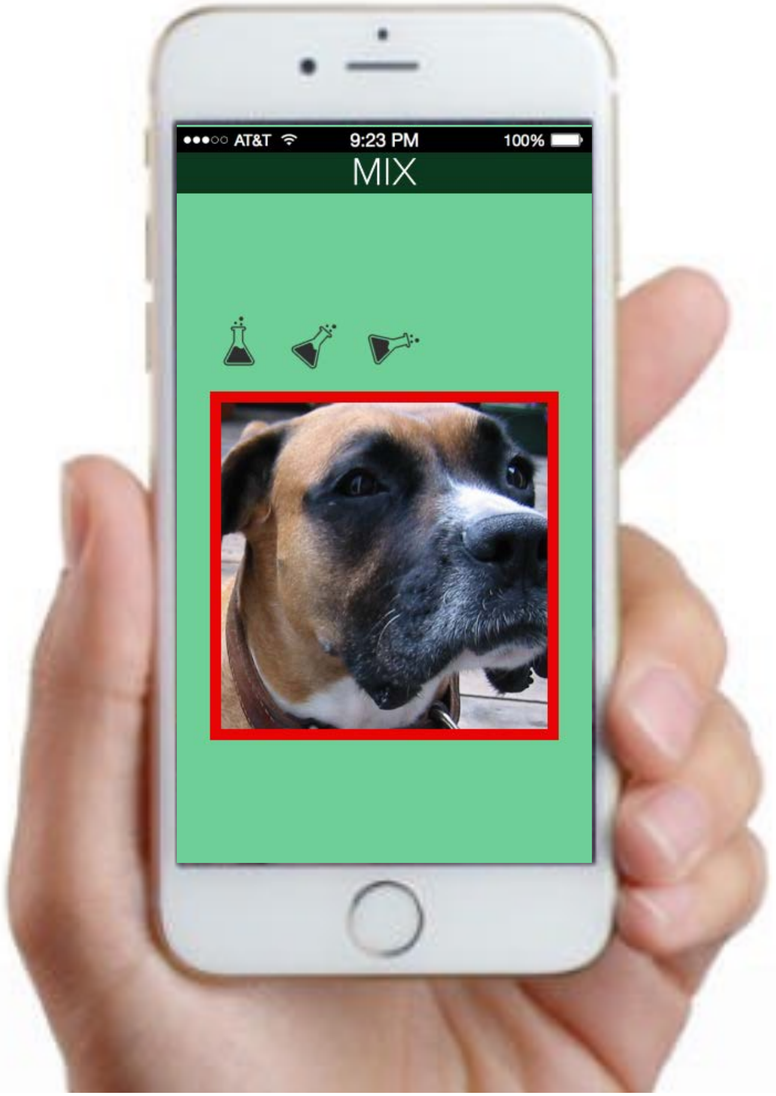
Figma is a collaborative interface design tool. The goal of Figma is to combine the power of legacy programs like Illustrator with the collaborative flexibility of web apps like Google Docs. You can do vector-based UI design, editing, commenting, sharing, and storing all in one place -- in the browser. When you connect Figma to Slack, you are able to create a shared team space and maintain a directory of team files that is constantly up-to-date, with version history for every file.

FIGMA WIREFRAMES

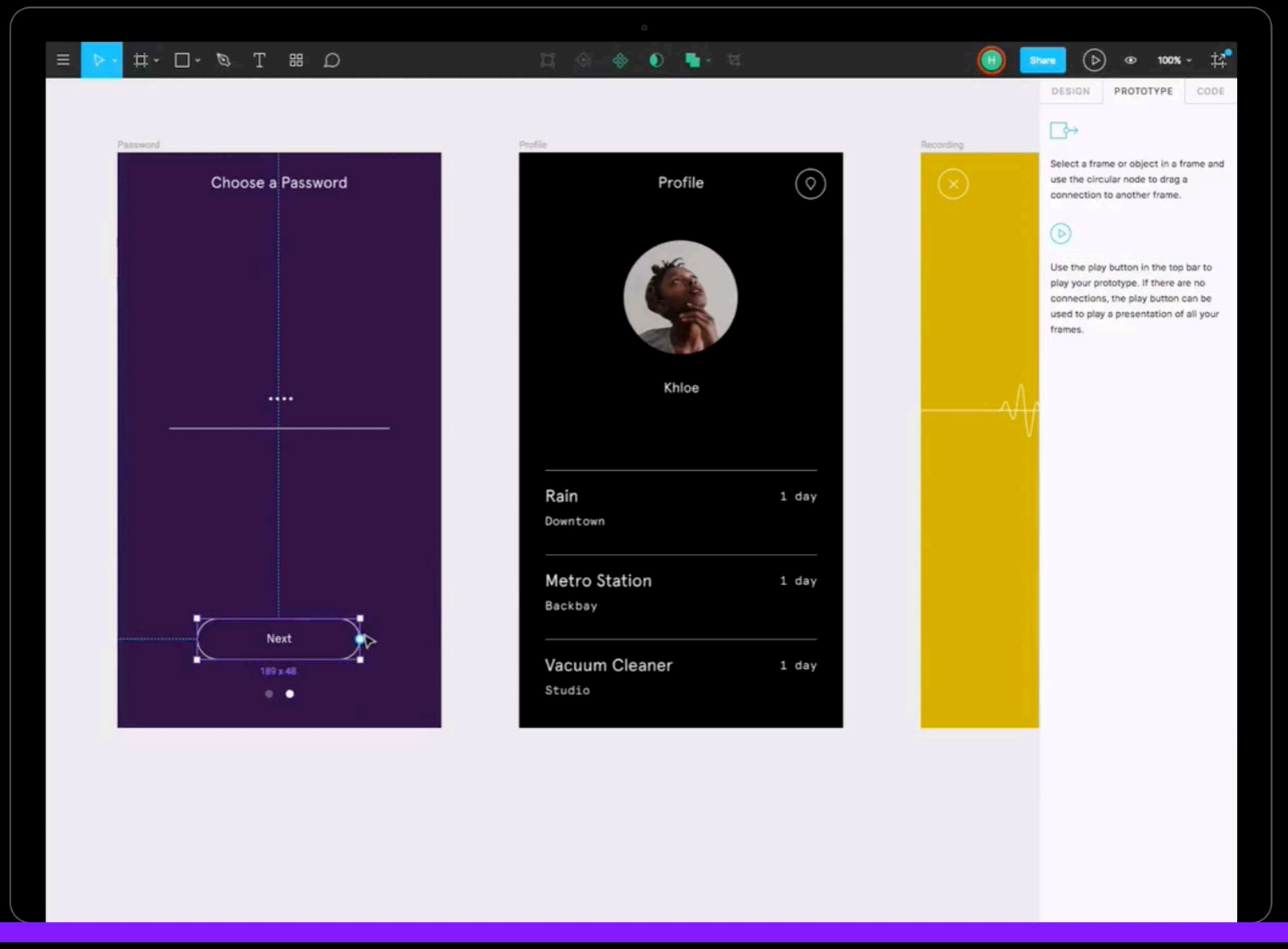


FIGMA MOCKUPS

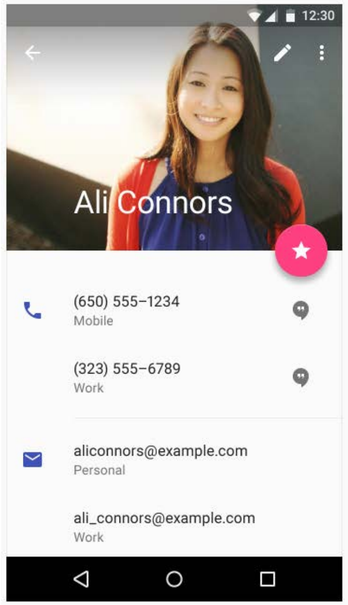


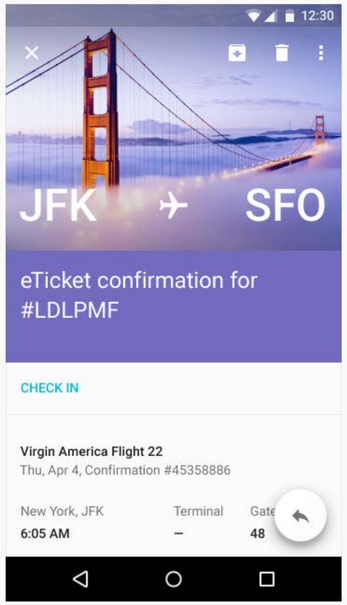


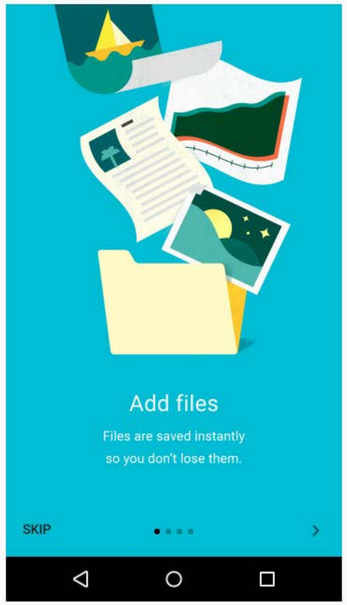
FIGMA

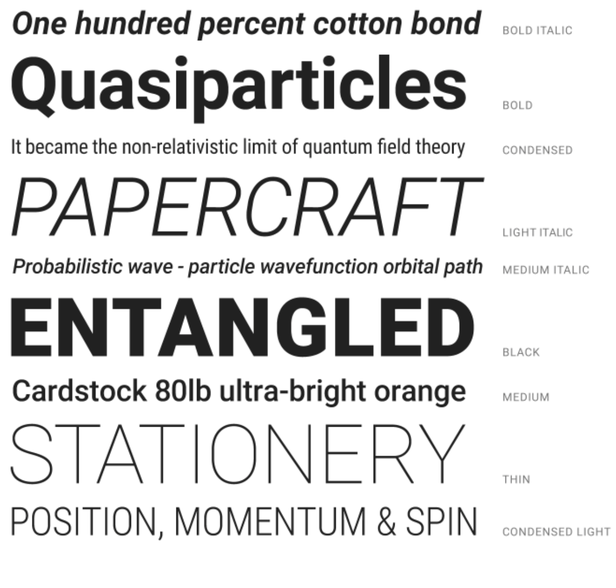

Share
100%
DESIGN
PROTOTYPE
CODE
Password
Choose a Password
Next
189 x 48
Profile
Profile
Khloe
Rain
1 day
Downtown
Metro Station
1 day
Backbay
Vacuum Cleaner
1 day
Studio
Recording
Select a frame or object in a frame and use the circular node to drag a connection to another frame.
Use the play button in the top bar to play your prototype. If there are no connections, the play button can be used to play a presentation of all your frames.

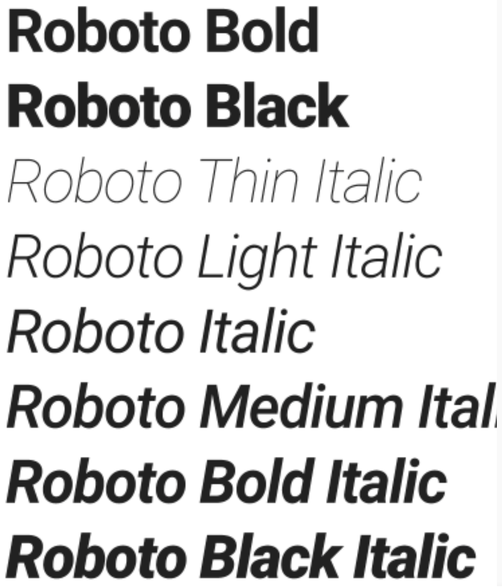
GOOGLE MATERIAL DESIGN

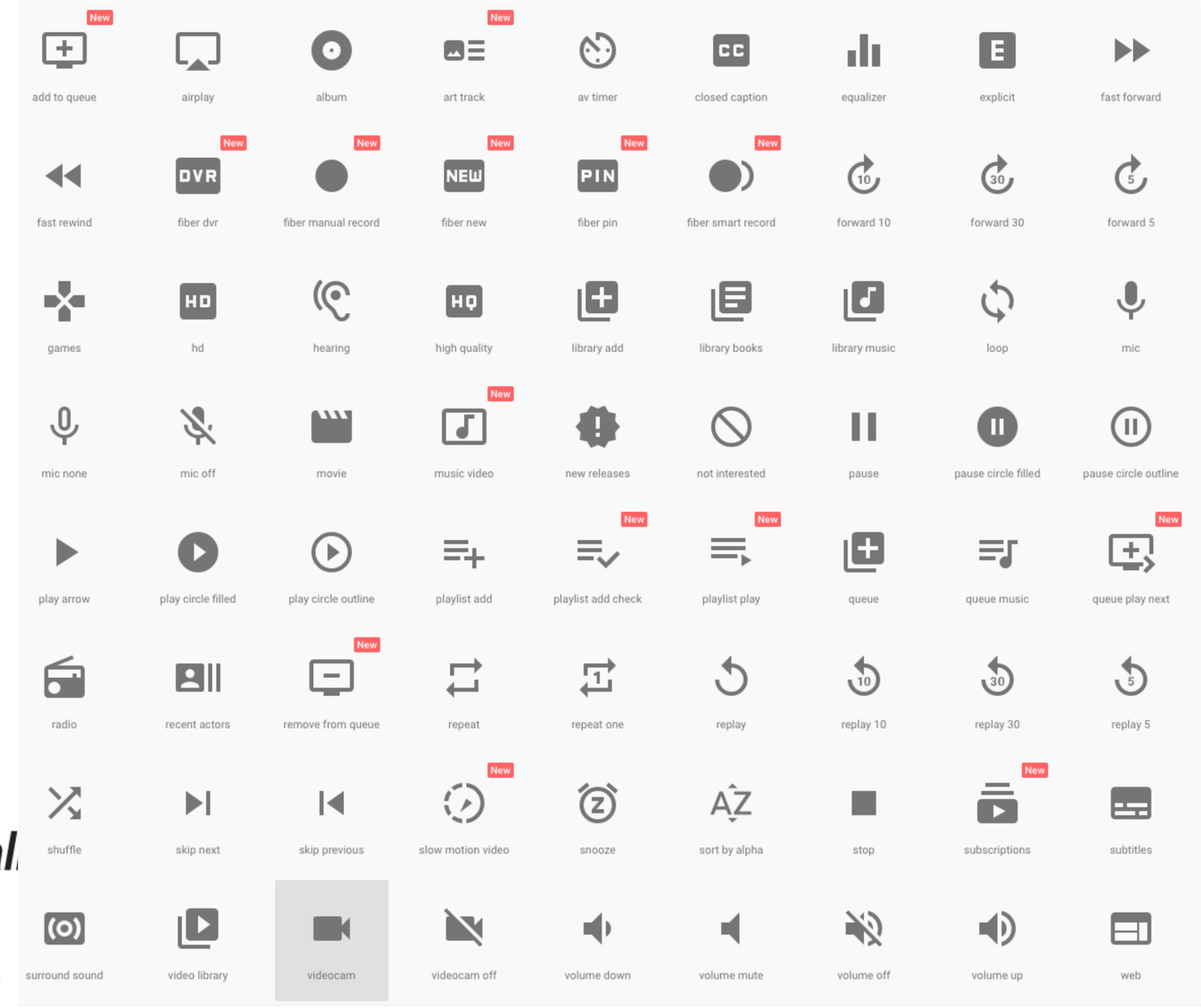












CONTEXTUAL INQUIRY

GOALS

Method:

“Go where the customer works, observe the customer as she works, and talk to the customer about their work” – Karen Holtzblatt

Goals:

Get inside the user’s head

See their tasks the way they do

A middle ground between pure observation and pure interview

GUIDELINE: MASTER-APPRENTICE MODEL

Allows user to teach us what they do

- Skill knowledge is usually tacit (can't put it in books)
- Sometimes literal apprenticeship is best

PRINCIPLES OF CONTEXTUAL INQUIRY

Context

Partnership

Interpretation

Focus

PRINCIPLES: CONTEXT

Go where the work is

Conduct inquiry in a normal work environment

People summarize, but we want details

Keep it concrete when people start to abstract

"We usually get reports by email", ask "Can I see one?"

Look for skipped steps, ask user to fill them in.

PRINCIPLES: PARTNERSHIP

Master / Apprentice + intermittent probing

Alternative models (what's wrong with them?)

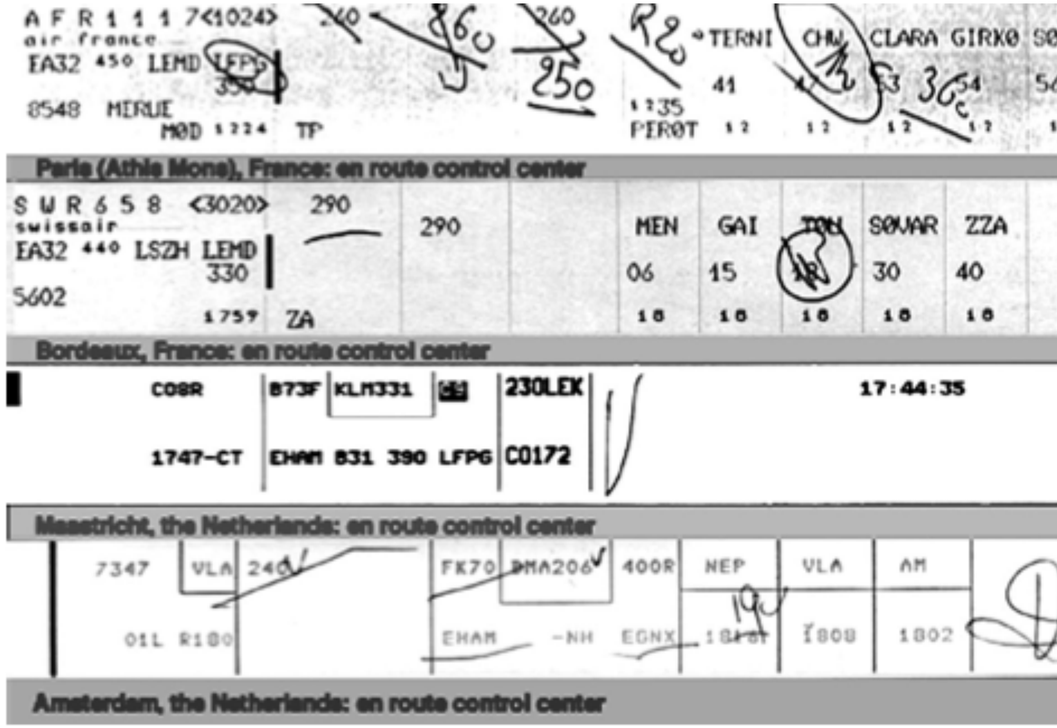
Interviewer / Interviewee

Expert / Novice

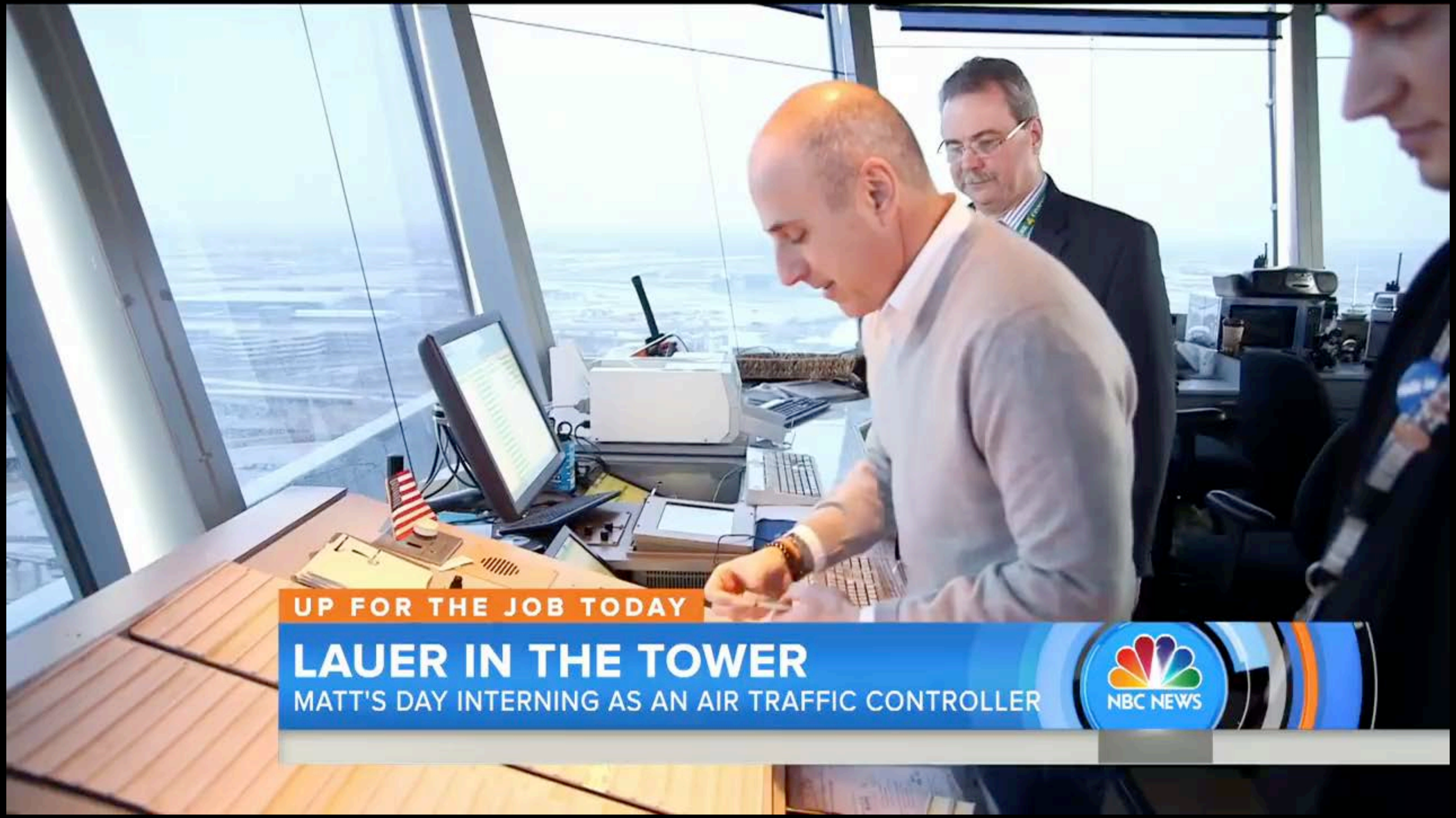
Guest / Host

WHY NOT JUST INTERVIEW FOLKS?

EXAMPLE: PAPER FLIGHT STRIPS



Wendy Mackay
Is Paper Safer? The Role of Paper Flight Strips in Air Traffic Control (1999)


UP FOR THE JOB TODAY
LAUER IN THE TOWER
MATT'S DAY INTERNING AS AN AIR TRAFFIC CONTROLLER
NBC NEWS

PRINCIPLES: PARTNERSHIP

Stick with master-apprentice; avoid other models, i.e.

Avoid interviewer/interviewee

Above all, don't "teach"!

Partnership allows more apprentice interaction

OK to be a designer and interrupt!

... but go back "in role" afterwards.

Alternate watching & probing (withdrawal & return)

PRINCIPLES: FOCUS

You need data about specific tasks

Steer conversation to stay on useful topics

Respect “triggers” and flags to change focus/understanding

“Why would they do that?”

Admit your ignorance

THOUGHTS ON INQUIRIES

Establish rapport before diving in

Use recording technologies

Notebooks, tape recorders, still & video cameras

Master/apprentice can be hard

Staying in role – it’s a lot like acting

Don’t correct! Its not a lesson!

It’s hard not designing on the fly

SUMMARY

Contextual inquiry

Helps answer the task analysis questions

Hybrid between interview and observation

Use **master-apprentice model** to get them to teach you

UPLINK ACTY
TEMP
AUTO
GIMBAL LOCK
HOLD
PROG
FREE
RESTART
NO ATT
TRACKER
STBY
KEY REL
OPR ERR
COMP ACTY
PROG
VERB
NOUN
VERB
NOUN
+
7
8
9
CLR
−
4
5
6
STBY
0
1
2
3
KEY

AFFORDANCE

slide to unlock

AFFORDANCE

"... the term **affordance** refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used."

Some affordances obvious

Knobs afford turning

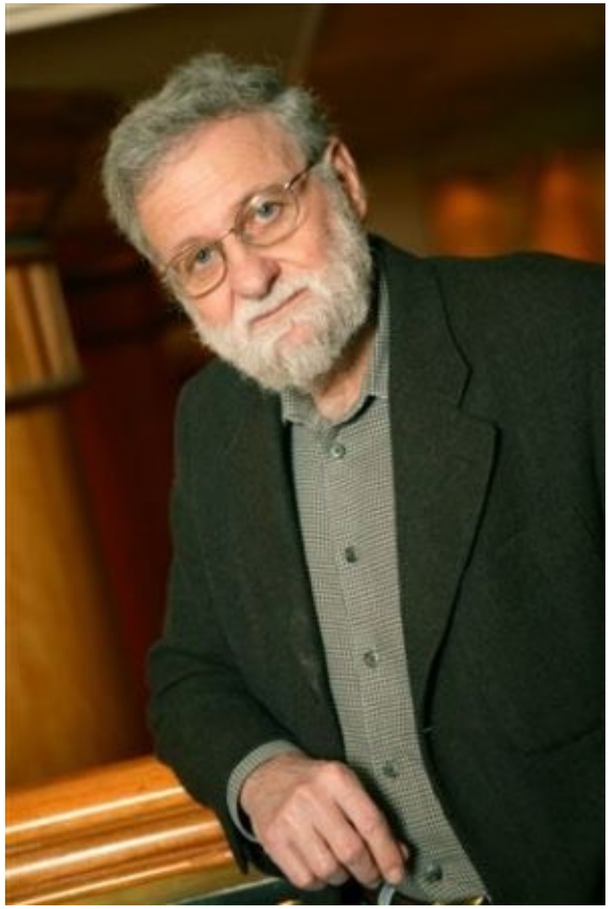
Buttons afford pushing

Glass can be seen through

Some affordances learned

Glass breaks easily

Affordances determine what actions are possible.
Signifiers communicate where the action should take place



The Design of Everyday Things
Don Norman

AFFORDANCE

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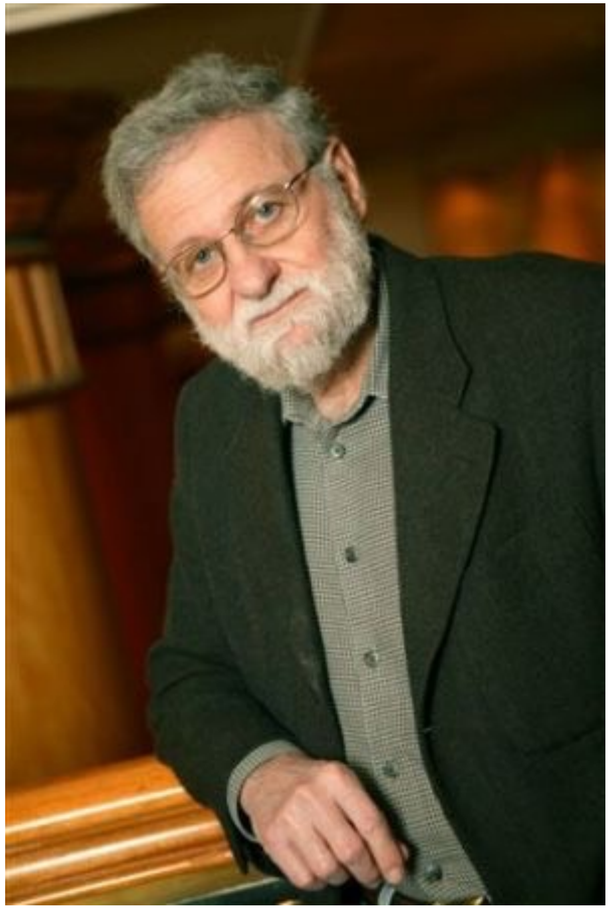


The Design of Everyday Things
Don Norman

AFFORDANCES

Clues about how object/interface works

AFFORDANCES

Clues about how object/interface works

Affordances

holes for insertion of fingers

blades for cutting

Implications clear for how operating parts work

DOOR HANDLES

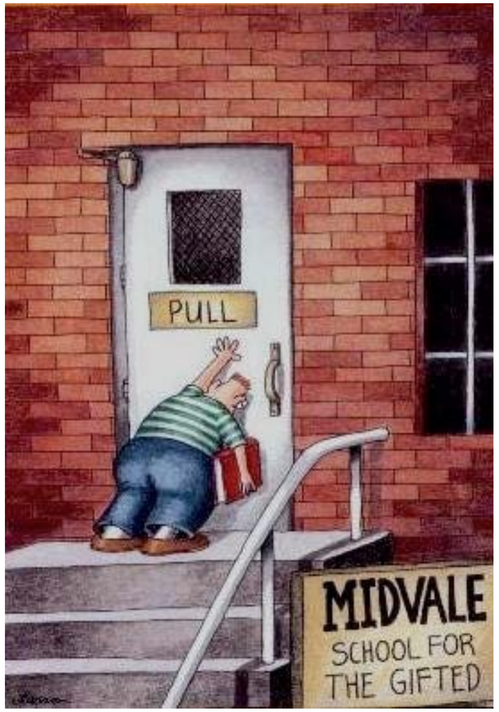
Affordances suggest how to use the object

DOOR HANDLES

Affordances suggest how to use the object

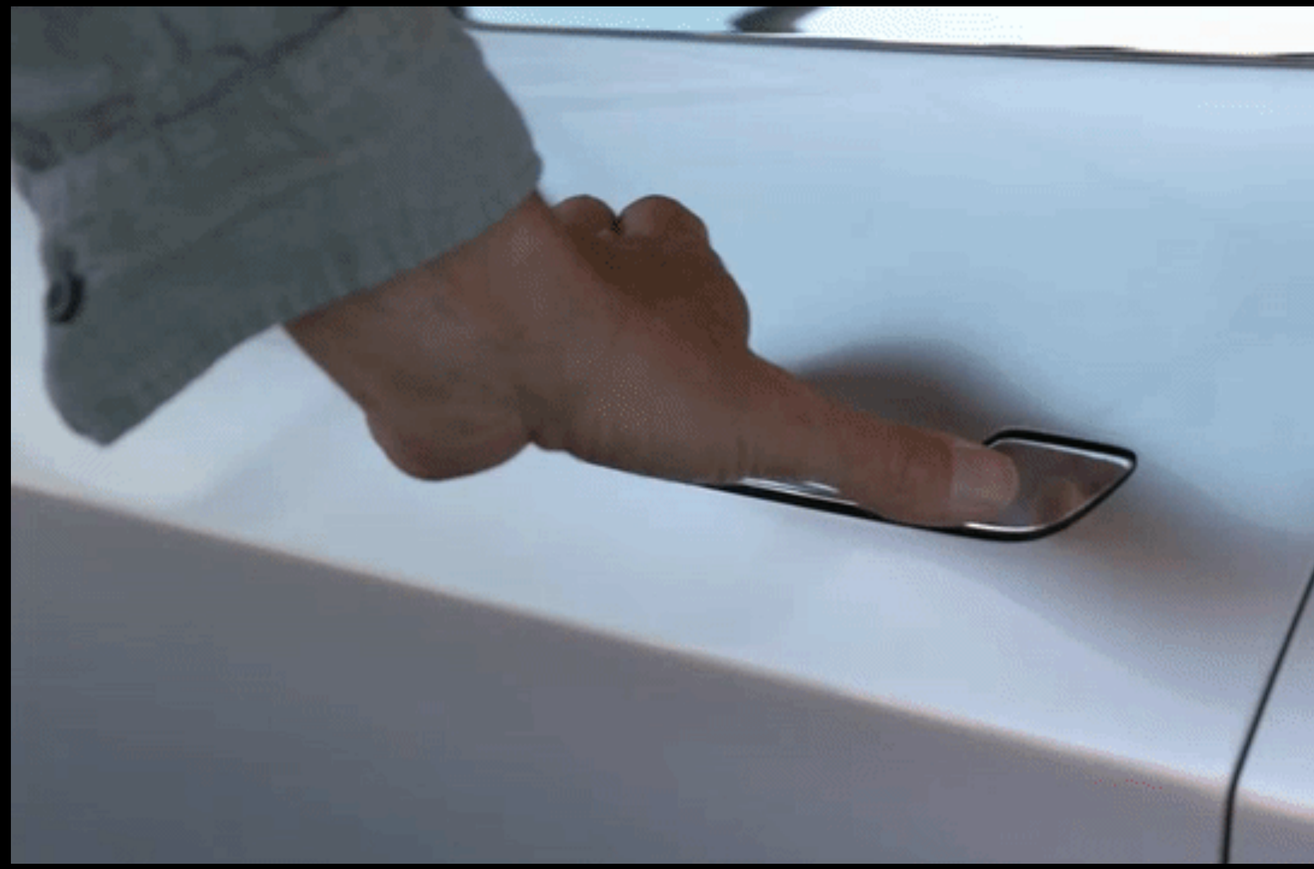
DOOR HANDLES

Affordances suggest how to use the object



There’s

19 hu 11:58:59
KTVU



CULTURAL DEPENDENCIES

Affordances suggest how to use the object

Can be dependent on the

Experience

Knowledge

Culture

Switches (US down=off, UK down=on)

red = danger, green = go

Can make an action easy/difficult

PERCEIVED AFFORDANCES

Affordances suggest how to use the object

Can be dependent on the

Experience

Knowledge

Culture of the actor

Can make an action easy/difficult

Affordances may be *perceived* without actually existing

SCREEN-BASED INTERFACES

Physical affordances

Screen, pointing device, physical buttons, keyboard

These afford touching, pointing, clicking on every pixel

SCREEN-BASED INTERFACES

Physical affordances of screens are often unused

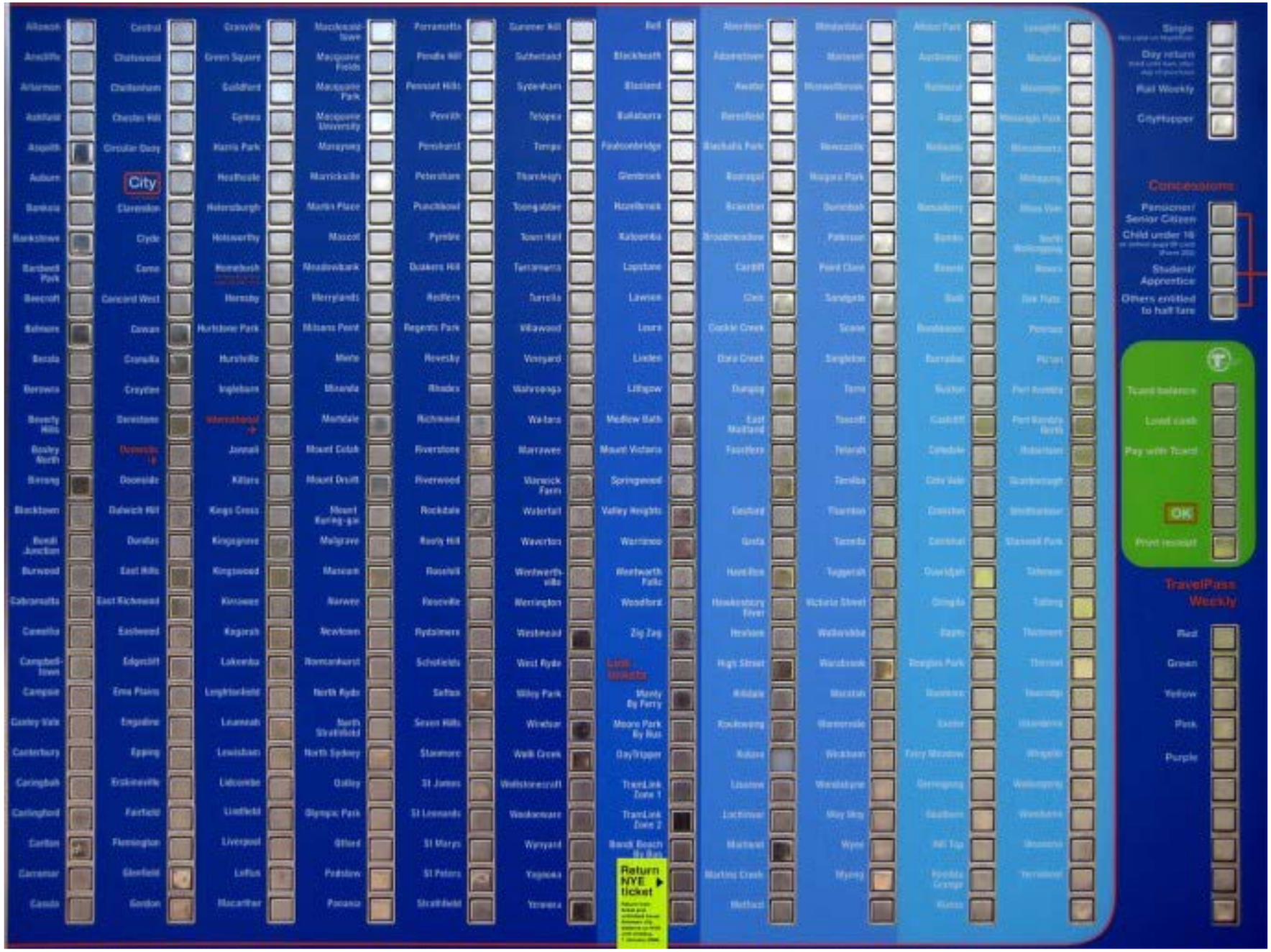
Screen affords touching, but many screens are *not* touch sensitive

2
Purchase BART ticket
12:36 PM
Amount inserted $6.00
Current ticket value $5.35
Change due $0.65
Change ticket value, insert additional cash or old ticket, or select ticket.
Change Ticket Value
Select Ticket Type
Print $5.35 Ticket
Subtract $1
Buy Multiple Tickets
Add 5¢
Buy BART Plus Ticket
Subtract 5¢
Cancel
A
B
C
D
E
F
G
H
CREDIT/ATM
CARD
VISA
MasterCard
INTERLINK
Maestro
DISCOVER
STAR

VISA
1
30
30
1
ОЛИМПИЙСКИЕ
ПЕРЕМЕНЫ
30
приседаний

PASSES/FARECARDS
Find Your Fare Below
Buy Your Fare
Board Your Train
IN SERVICE
SELECT PURCHASE
1
MAXIMUM CHANGE: $5.00
CANCEL
COINS 5,10,25¢
BILLS $1,5,10,20
PUSH TO RETURN
AUDIO
PRESS + TO ADD VALUE
PRESS – TO DEDUCT VALUE
TO PAY WITH BANK OR CREDIT CARD
ENTER PIN
TAKE RECEIPT
INSERT HERE
2
INSERT PAYMENT
SmarTrip TARGET
BILL RETURN
TO INCREASE SmarTrip VALUE
Touch SmarTrip to Target, then use the "A", "B" and "C" keys to make desired selections.
Re-touch SmarTrip to complete trans-action.
TRADE-IN FARECARD
3
TAKE PASS/FARECARDS
COIN RETURN

定期券・きっぷ・Suica(ご購入・チャージ)
Commuter Pass Ticket
Buy a New Suica / Charge
乗車券 Ticket
自由席特急券
チャージ(ご入金)
履歴表示・印字
残額表示

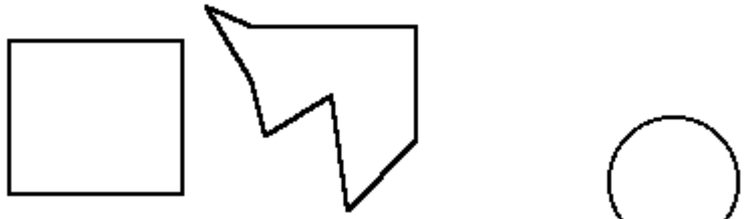

City
Return NYE ticket
Single
Day return
Rail Weekly
GityHopper
Concessions
Pensioner/ Senior Citizen
Child under 16
Student/ Apprentice
Others entitled to half fare
Travel balance
Load cash
Pay with Tcard
OK
Print receipt
TravelPass Weekly
Red
Green
Yellow
Pink
Purple

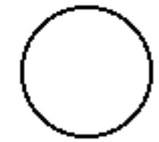
4 5 6 L N Q R
5:22 PM
145th St - Harlem
Depart 145th St - Union Sq

145Th St
12 minutes , 17 stops
Fordham Rd
Bronx Park East
Dyckman St
207 St
191 St
181 St
175 St
168 St
163 St–Amsterdam Av
157 St
145 St
137 St City College
125 St
116 St Columbia University
Cathedral Pkwy (110 St)
103 St
96 St
86 St
79 St
81 St–Museum of Natural History
Tremont Av
174 St
Freeman St
Simpson St
Intervale Av
Prospect Av
Jackson Av
Hunts Point Av
Longwood Av
E 148 St
Parkchester
St Lawrence Av
Morrison Av Soundview
Elder Av
Whitlock Av
Zerega Av
Castle Hill Av
E 180 St

DESIGNER CONTROLS PERCEIVED AFFORDANCES

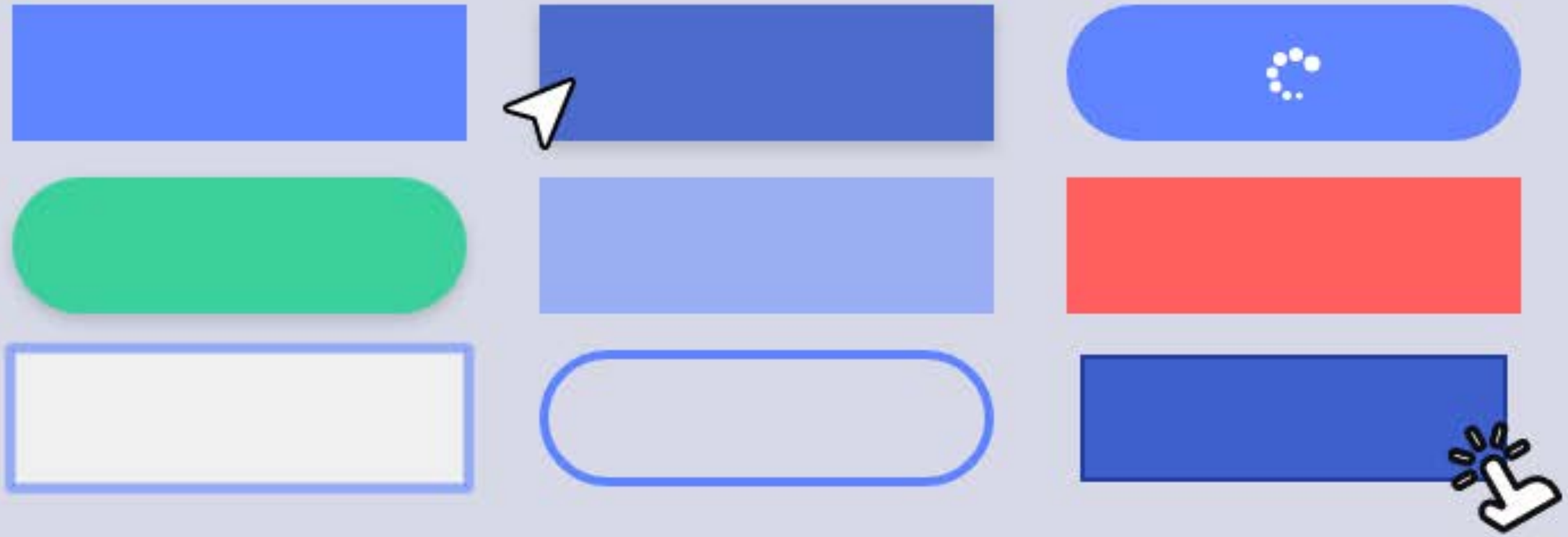
What are the affordances of these graphical objects?

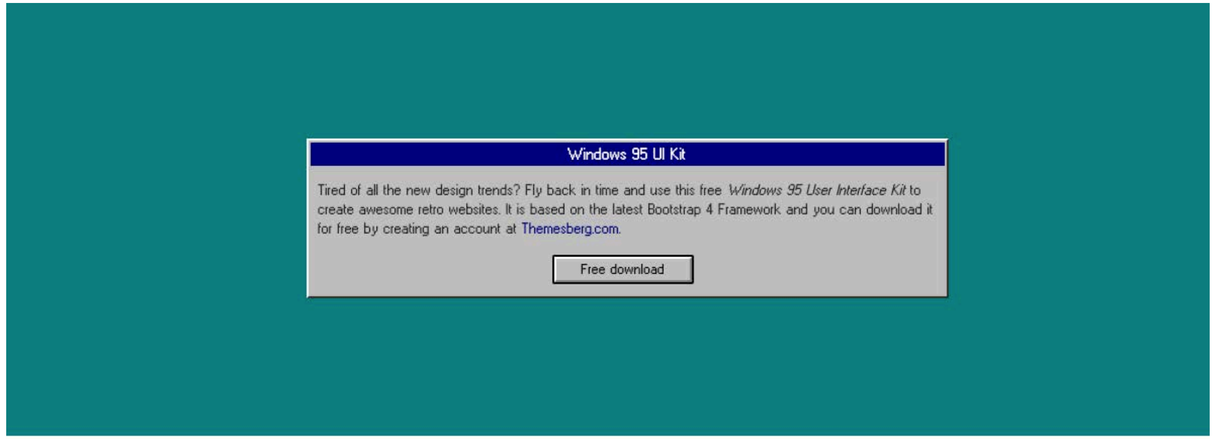




Graphic design emphasizes affordances

Helps user recognize objects as buttons



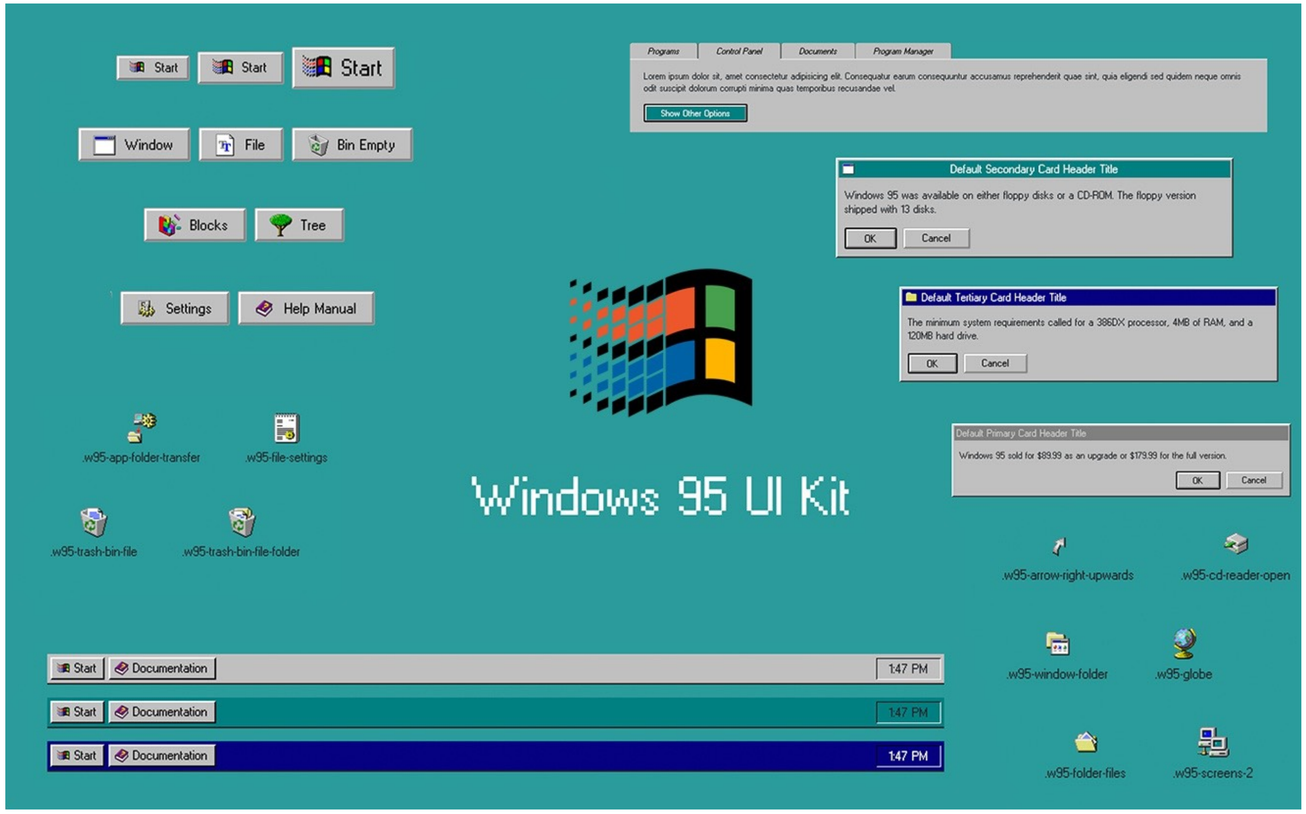


Buttons

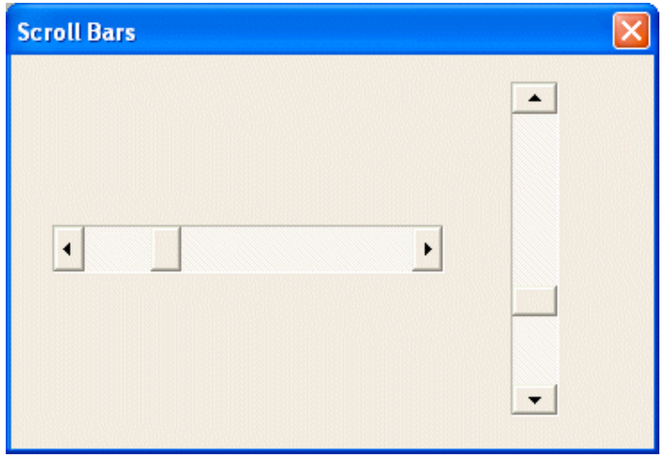
Primary Bordered Bordered 2

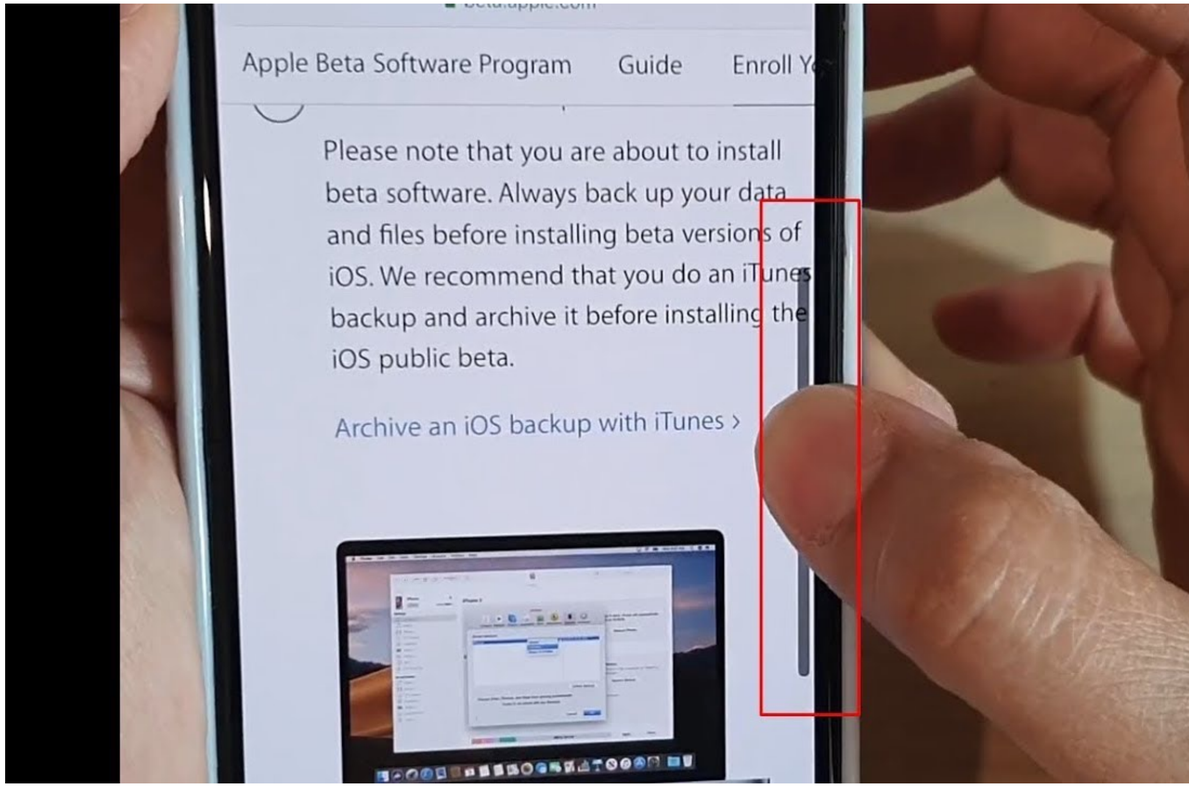
Color Variations

Primary Secondary Tertiary Info Success Warning Danger

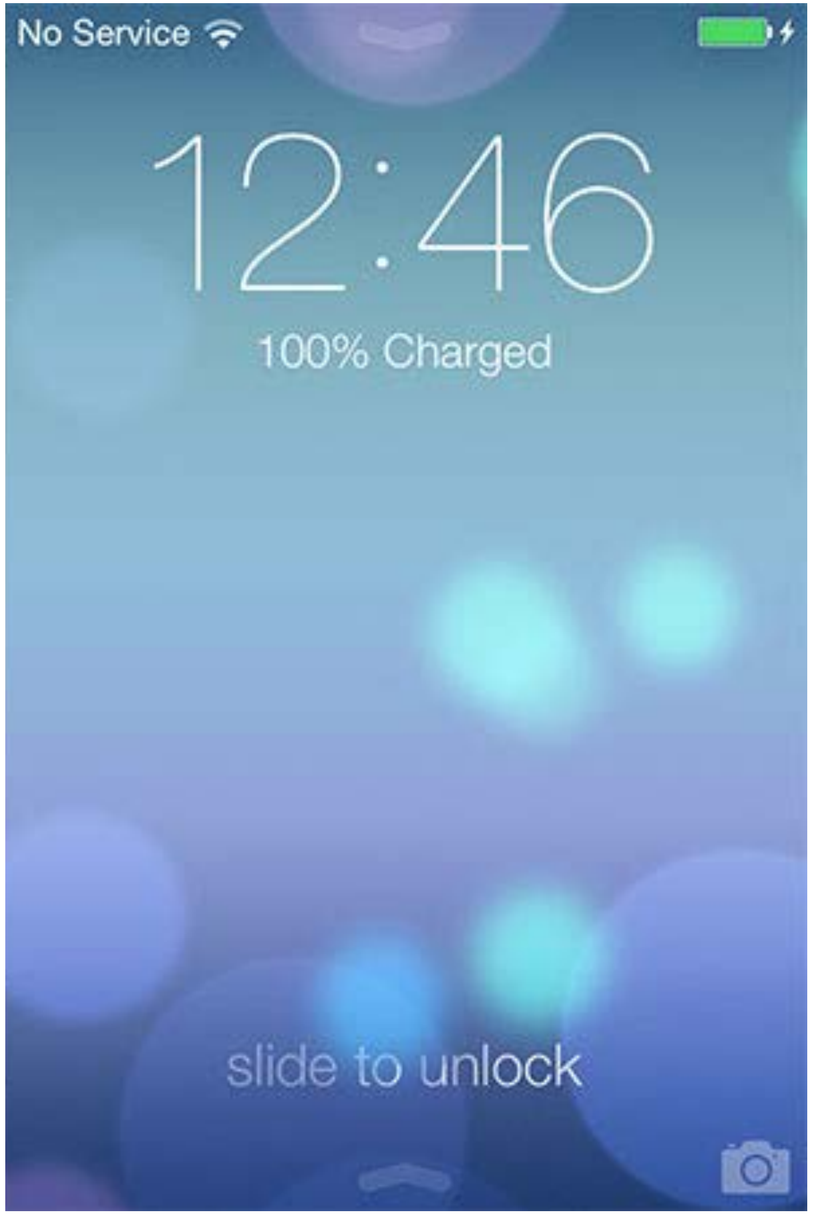


SCROLLBAR AFFORDANCES?





IPHONE LOCK SCREEN 2007 — 2016 — 2019



2 ABC
3 DEF
5 JKL
6 MNO
GHI
TUV
WXYZ
PQRS

Affordance:...

Visibility:...

Mapping:...

Mental Model:...

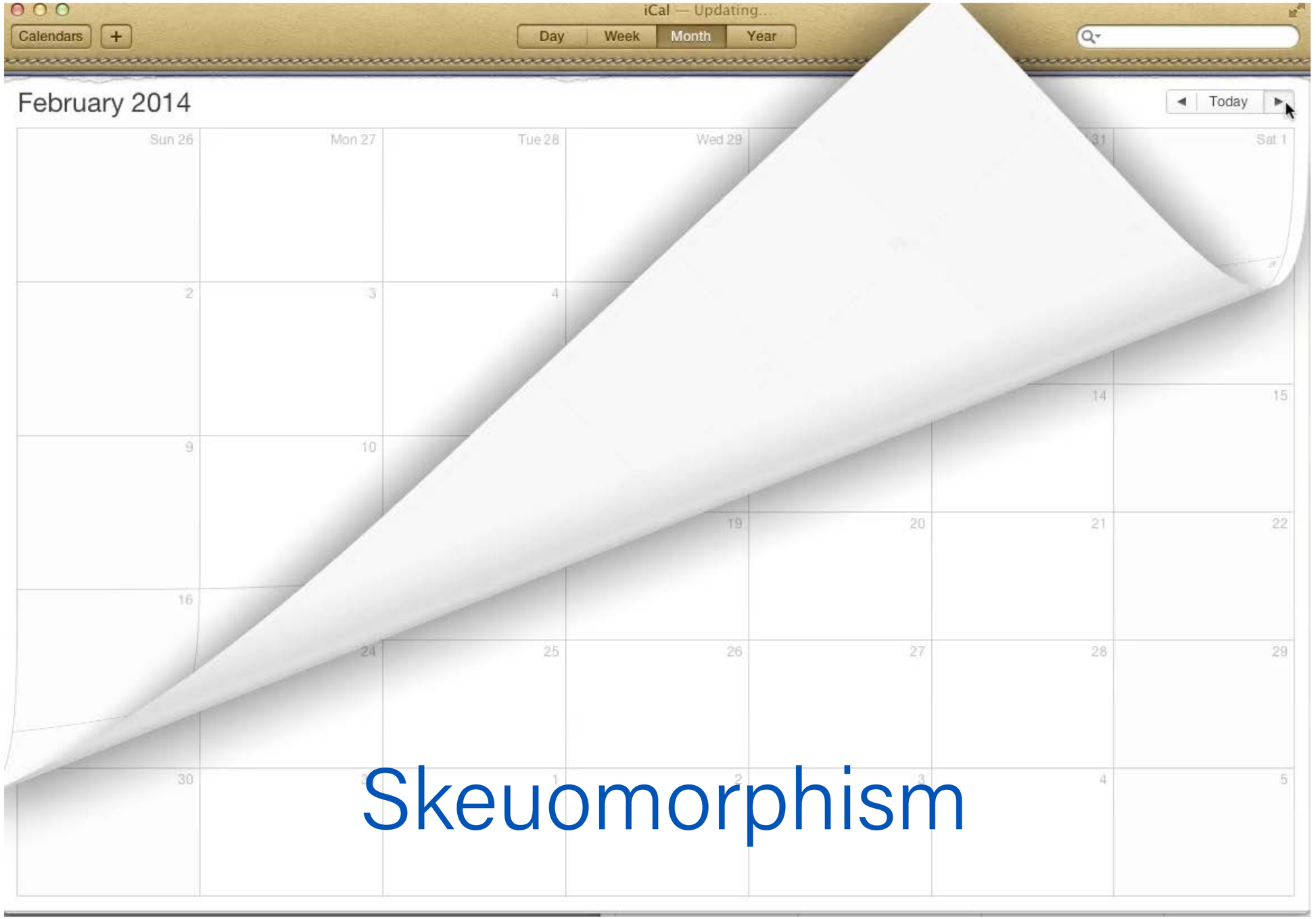
Feedback:...

CUSTOM FUNCTIONS
POPCORN
BEVERAGE
REHEAT
SNACKS
BAKED POTATO
FRESH VEG.
FROZEN VEG.
TIME COOK
TIME DEFROST
AUTO DEFROST
GUIDE BEHIND DOOR
1 EXPRESS COOK
2 EXPRESS COOK
3 EXPRESS COOK
4 EXPRESS COOK
5 EXPRESS COOK
6 EXPRESS COOK
START
7
8
9
0
30 SEC.
CLEAR OFF
POWER LEVEL
TIMER
CLOCK

TV
CABLE
POWER
AUX
Setup
All On
ON DEMAND
REC
My DVR
LIVE
Lock
Day
Page
Page
OK
Select
Guide
Menu
Info
Exit
Last
Help
VOL
CH
Mute
FAV
1
2
3
4
5
6
7
8
9
Input
Enter
TV/VCR
0
HD ZOOM
Picture-in-Picture
On-Off
Swap
Move
PIP CH
comcast

MENU
▶ II

TV
SAT
AUDIO
PC
VCR
DVD
DVR
AUX
1
2
3
4
5
6
7
8
9
-/--
0
AV
FAV.CH
MACRO
RECALL
MENU
GUIDE
INFO
EXIT
PIP
SWAP
R
G
Y
B
TEVION
VOL
OK
CH


iCal — Updating...
Calendars
Day
Week
Month
Year
February 2014
Today
Sun 26
Mon 27
Tue 28
Wed 29
Sat 1
Skeuomorphism

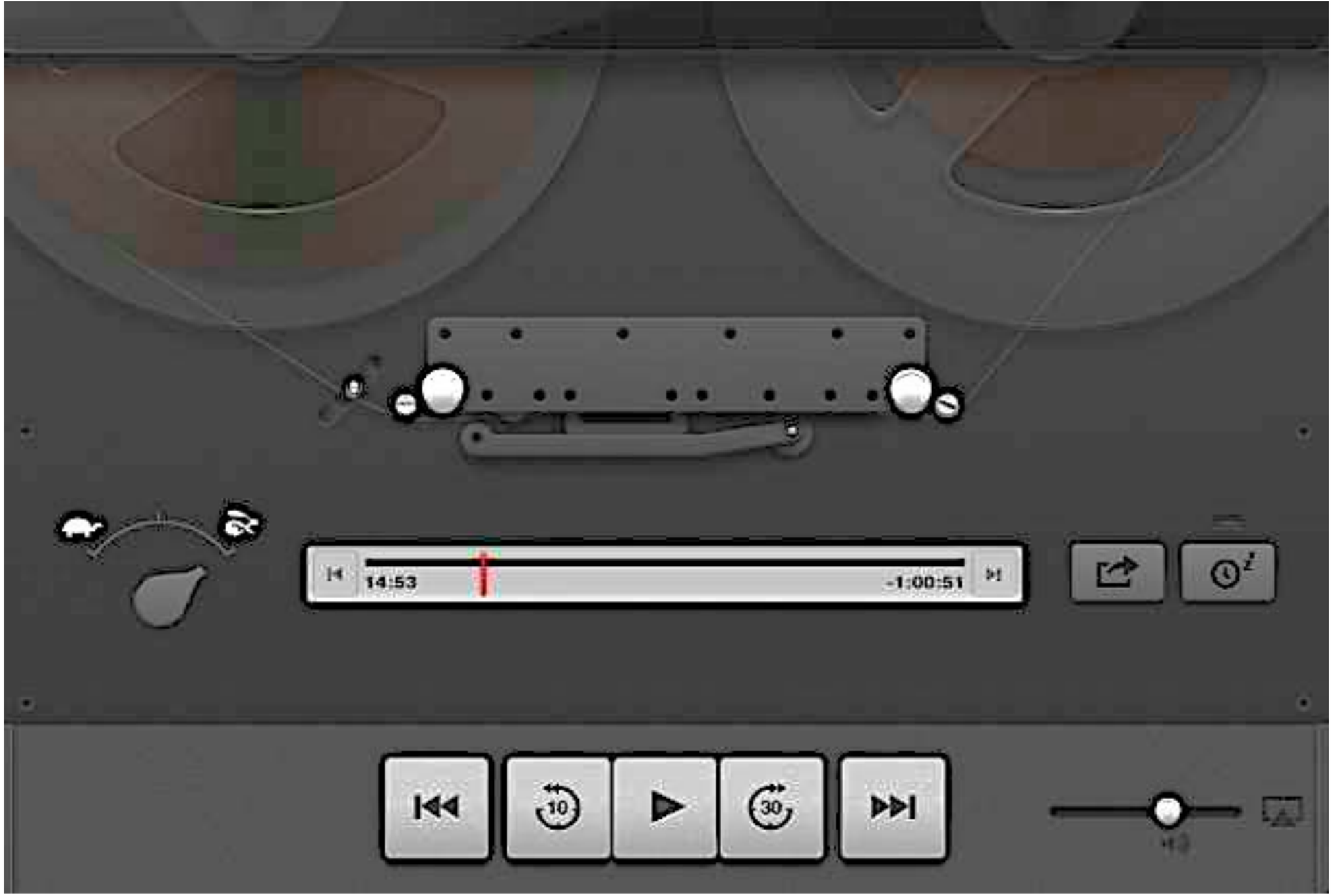
SKEUOMORPHS

A skeuomorph is a physical ornament or design on an object copied from a form of the object when made from another material or by other techniques.

Skeuomorphs are deliberately employed to make the new look comfortably old and familiar, or are simply habits too deeply ingrained to wash away.

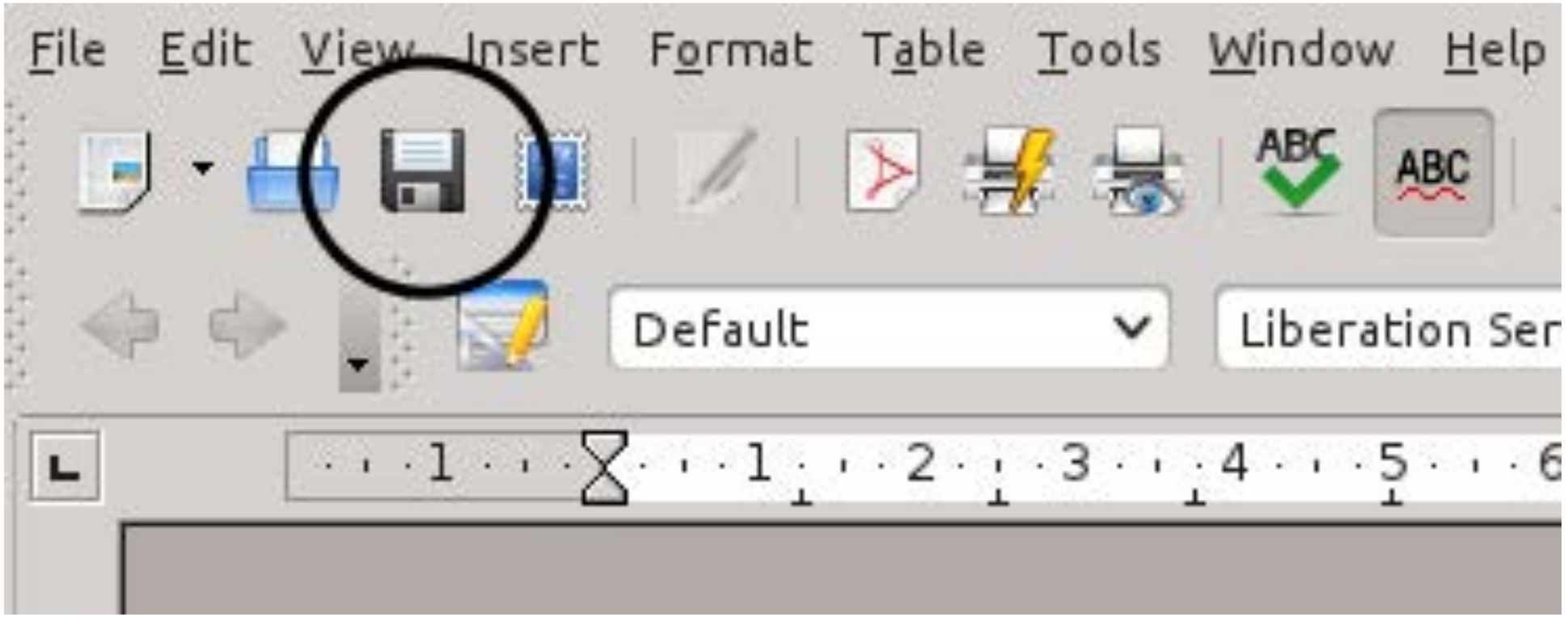
LHT 4G
Back
noteONE
Enjoy the way you take notes...
...noteONE is the right way!
Clear all
Save
Calendar
Date picker
November 2012
SUN MON TUE WED THU FRI SAT
1 2 3
4 5 6 7 8 9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30

Hanx Writer (2014)



Apple Podcast application

BASF

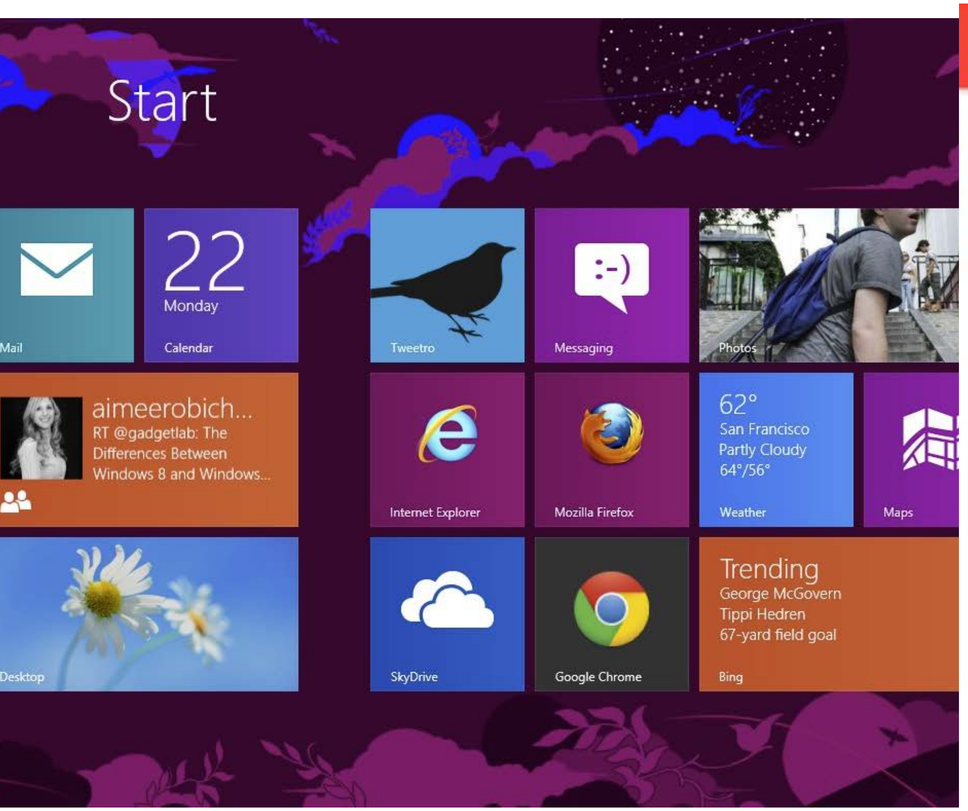

File Edit View Insert Format Table Tools Window Help
ABC
ABC
Default
Liberation Ser
1 1 2 3 4 5 6

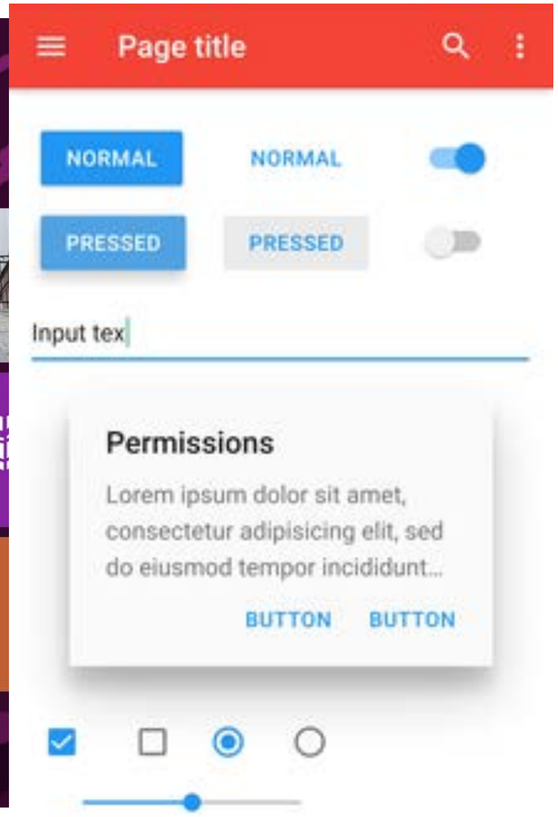
Examples
of Skeuomorphic
UIs
Definition
History
Types
in
Web
Design
Anti-
innovation
Cons
UI Aberration
Pros
Familiarity
Monster TV
Lack of Universality

iPad
11:31 PM
Not Charging
Store
iBooks
Edit
INFINITE JEST
CHRISTOS TSIOLKAS
THE SLAP
NEAL STEPHENSON
SNOW CRASH
TERRY PRATCHETT
THE TRUTH
ELMORE LEONARD
CATCH-22
JOSEPH HELLER
The GREAT GATSBY
F SCOTT FITZGERALD
LITTLE BROTHER
CORY DOCTOROW
iPad User Guide
CHRONIC CITY
JONATHAN LETHEM
Sense and Sensibility
Jane Austen

iPad
09:24
97%
Settings
Game Center
Camera
Photo Booth
FaceTime
2
Newsstand
Store
seattle
best shopping finds
Monde diplomatique
New
Literary Review
Congleton Chronicle
Legal hold-up stalls revamp of town centre
New
Seattle Business
GAMING THE SYSTEM
Moneywise
The great train robbery
Europe's wrecking crew
politics
FitnessFirst

FLAT UI DESIGN





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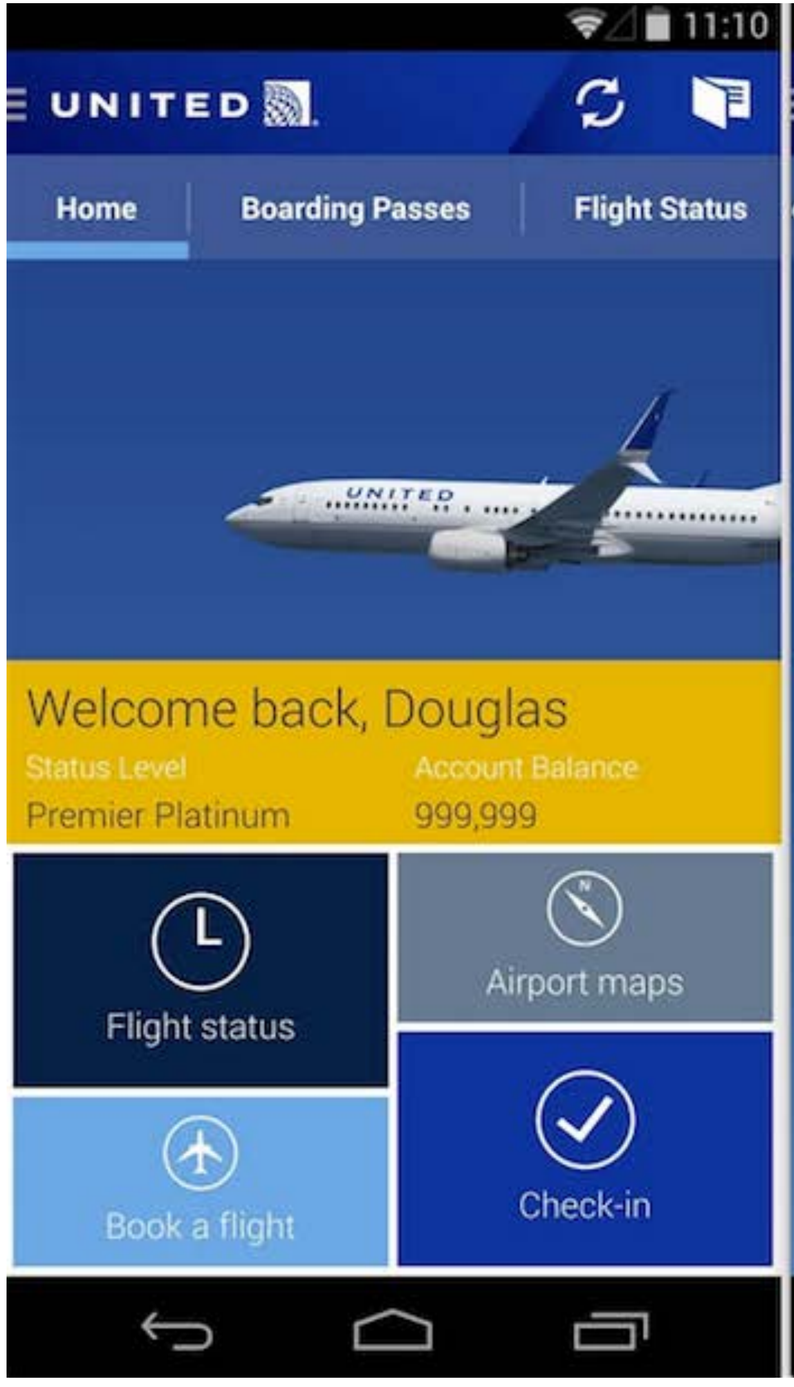
Boeing 787 Dreamliner – U.S.A.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UNITED
Home
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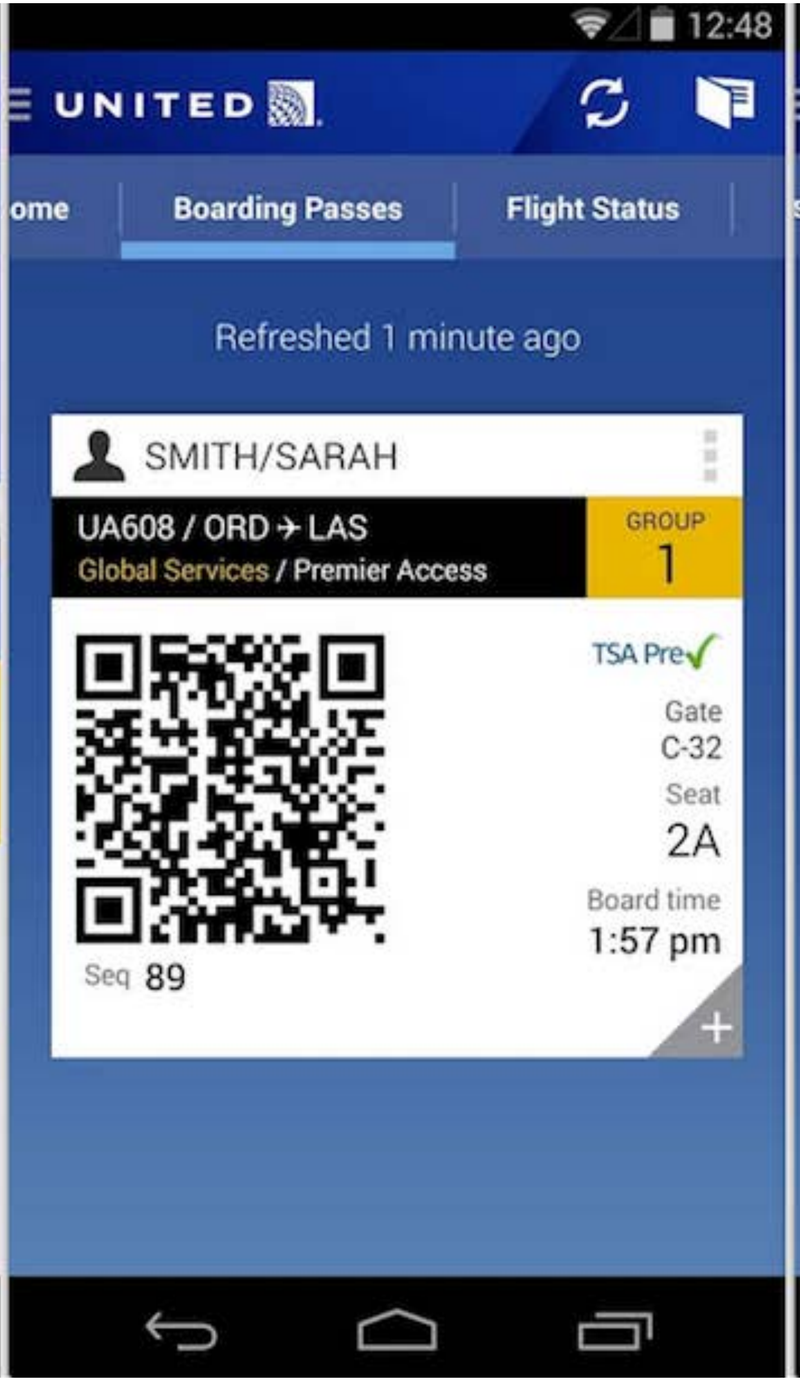
Welcome back, Douglas
Status Level
Premier Platinum
Account Balance
999,999
Flight status
Airport maps
Book a flight
Check-in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UNITED
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Boarding Passes
Flight Status
Refreshed 1 minute ago
SMITH/SARAH
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Global Services / Premier Access
GROUP
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TSA Pre
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C-32
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2A
Board time
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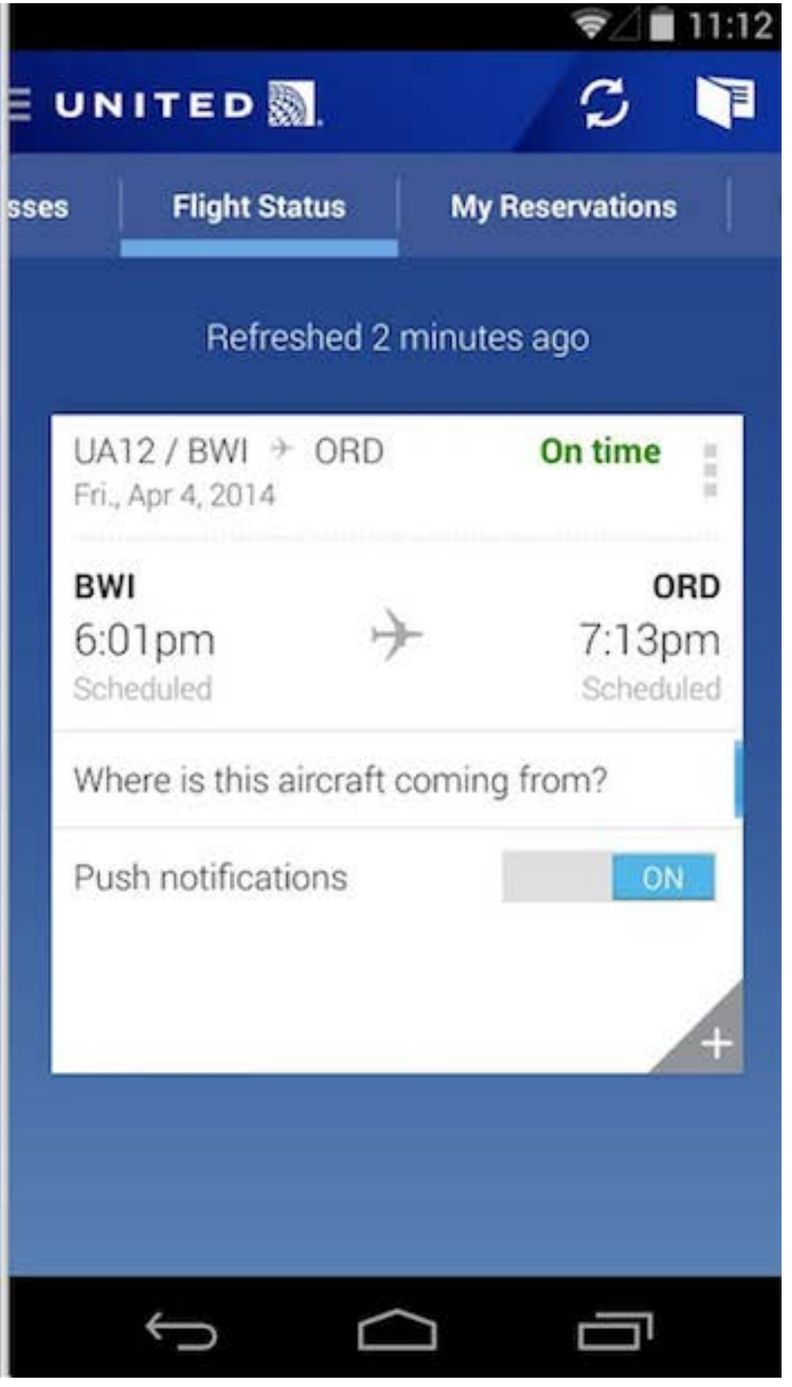
Seq 89


11:12
UNITED
sses
Flight Status
My Reservations
Refreshed 2 minutes ago
UA12 / BWI → ORD
Fri., Apr 4, 2014
On time
BWI
6:01pm
Scheduled
ORD
7:13pm
Scheduled
Where is this aircraft coming from?
Push notifications
ON

CONCEPTUAL MODELS

MENTAL REPRESENTATIONS

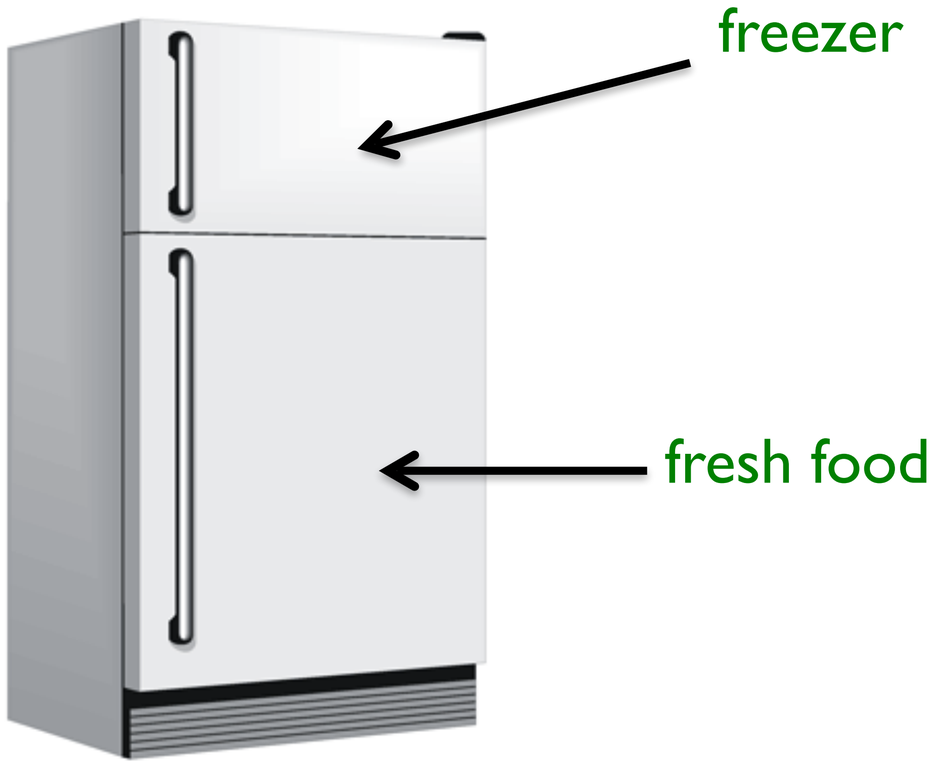
Users' understanding of how interface works

People have preconceived models

Online help / documentation useful (but shouldn't be necessary)

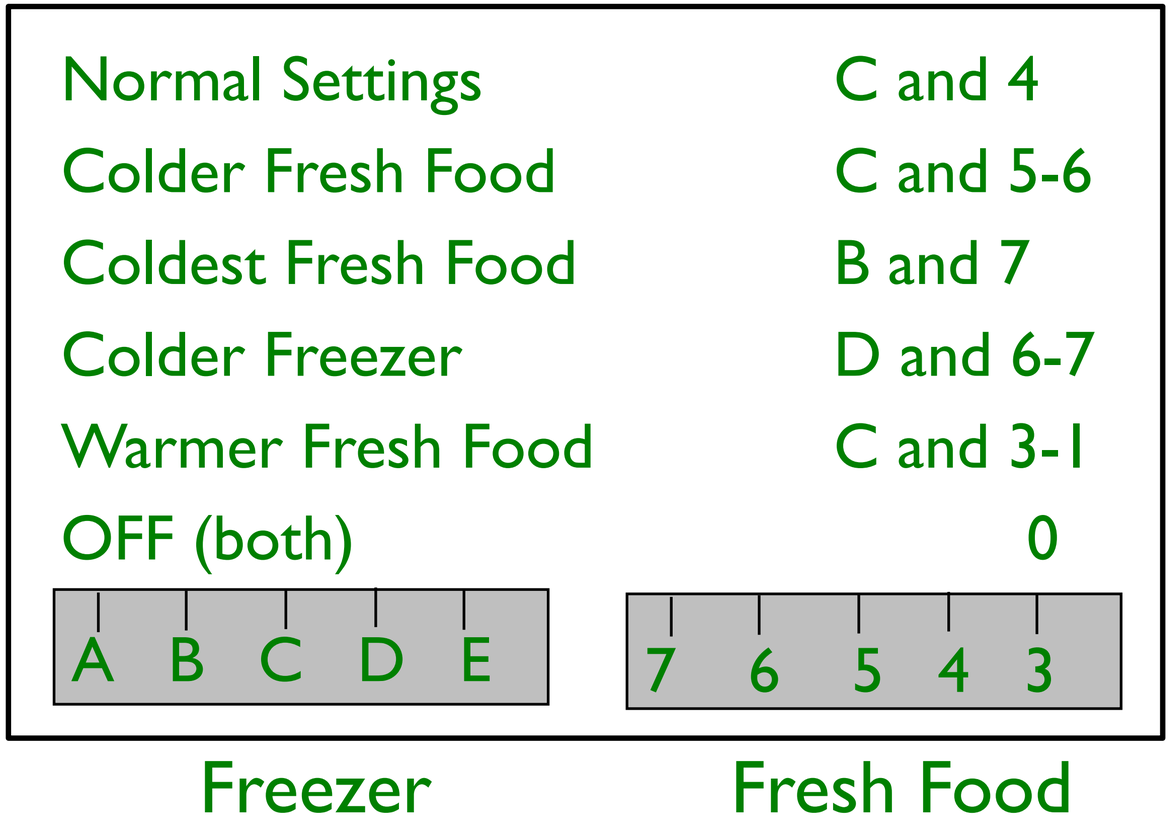
Interfaces Must Communicate Model

REFRIGERATOR



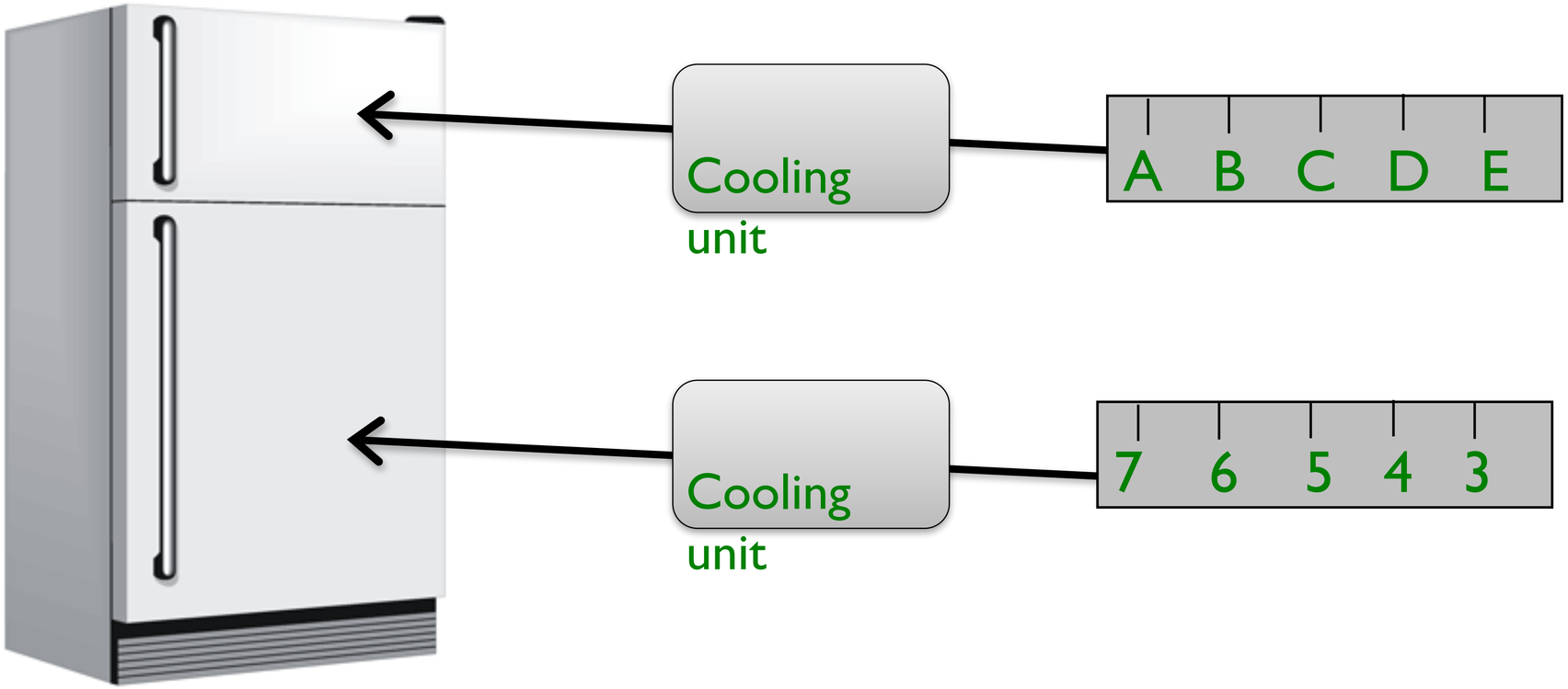
Problem: freezer too cold, but fresh food just right

REFRIGERATOR CONTROLS



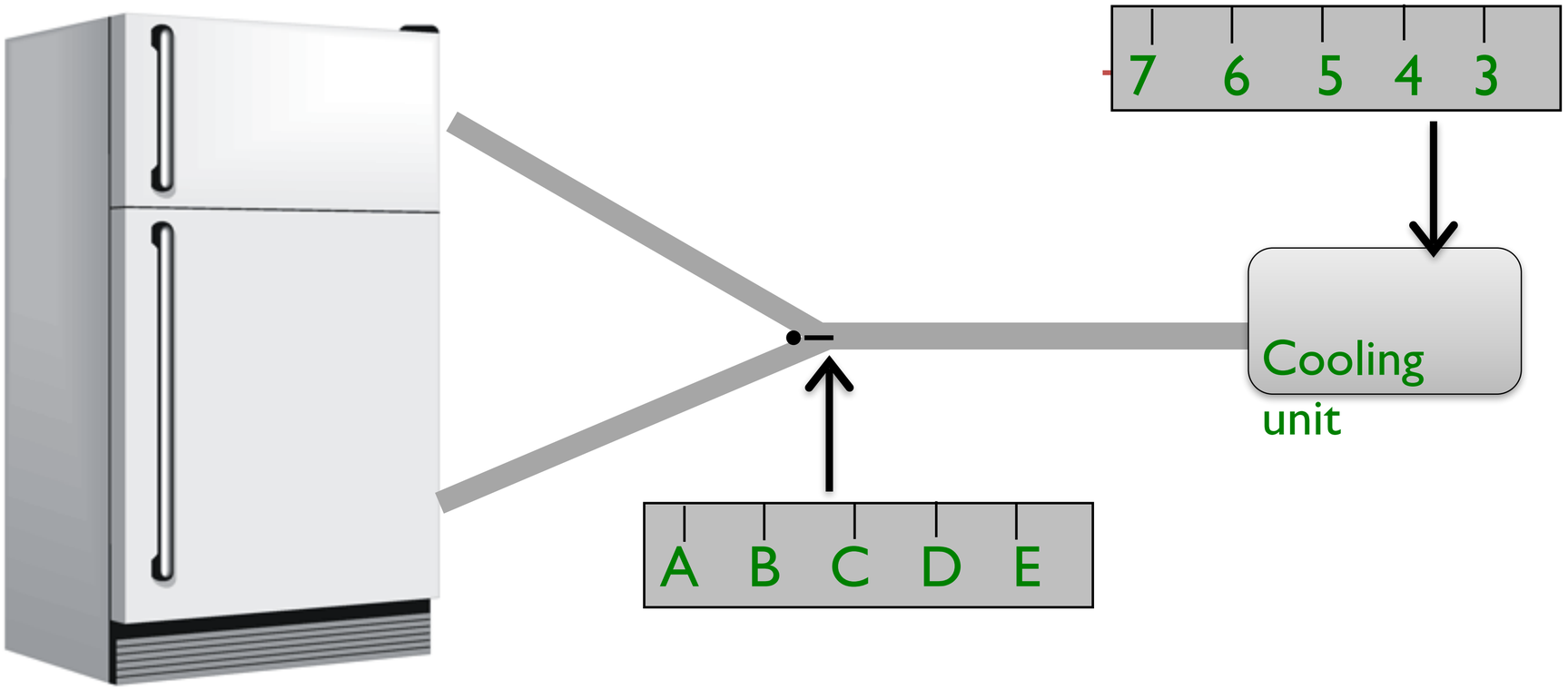
What is your conceptual model?

MOST LIKELY CONCEPTUAL MODEL



Independent controls

CORRECT CONCEPTUAL MODEL

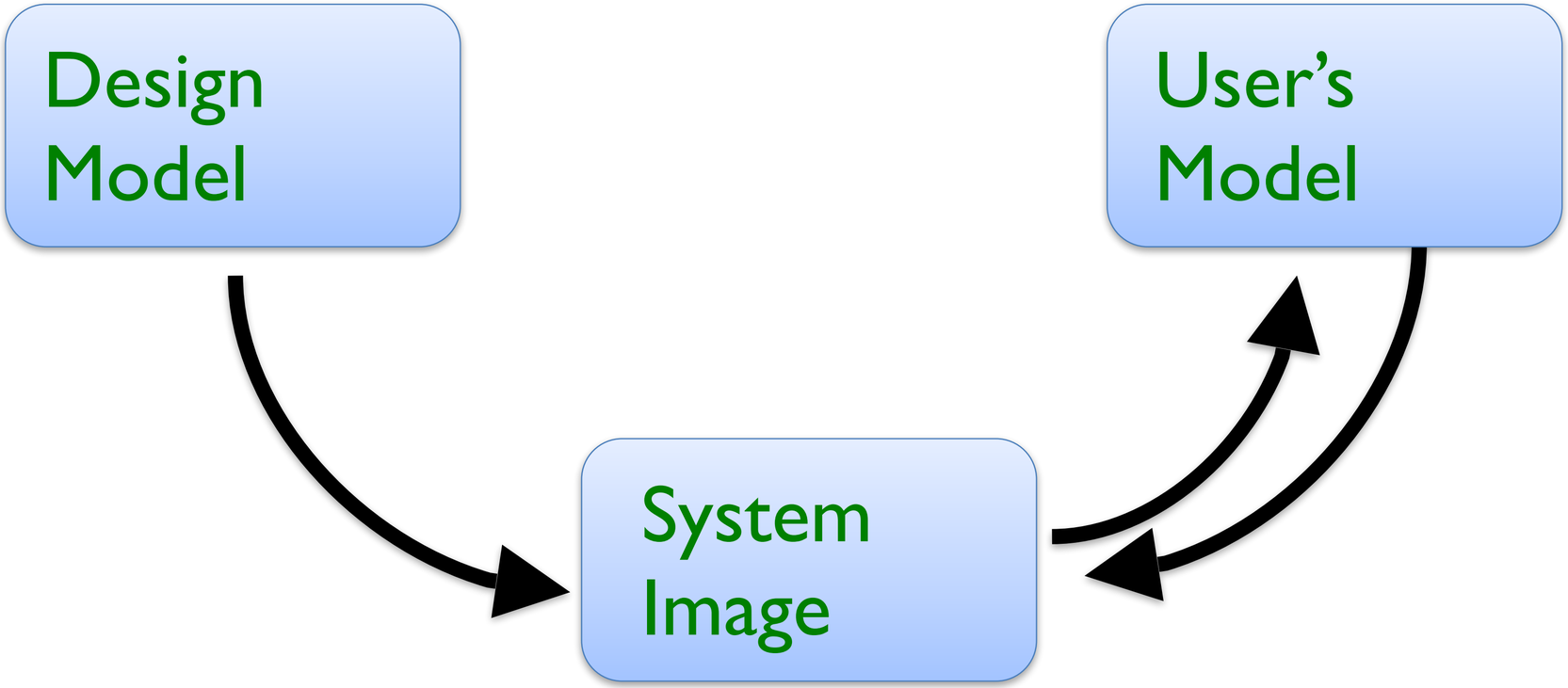


Possible solutions:

Make controls map to user's model

Make controls map to actual system

CONCEPTUAL MODELS

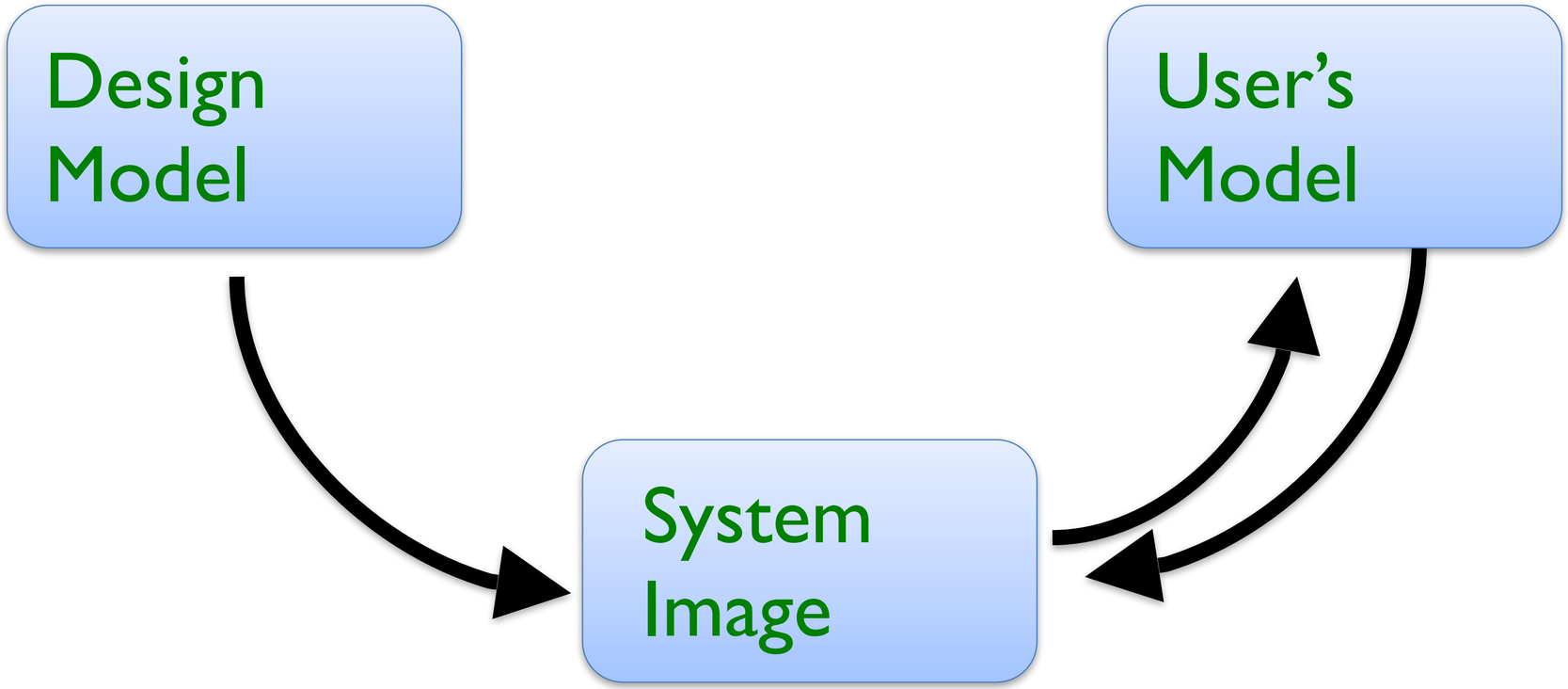


CONCEPTUAL MODELS

Designers model may not match user's model

Users get model from experience & usage

Users only work with system image, not with designer



PRECONCEIVED MODELS

People have preconceived models of how things work

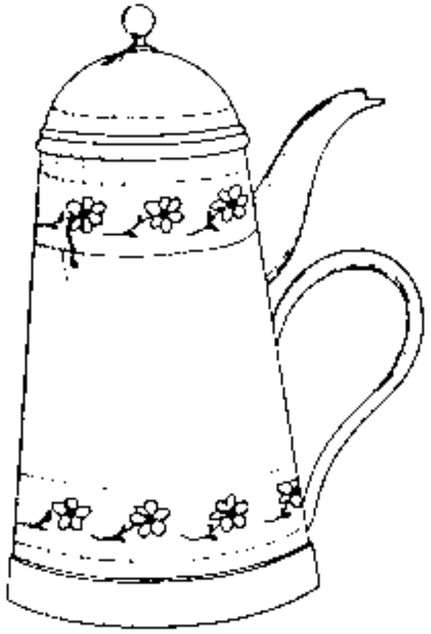
how does your car start?

how does an ATM machine work?

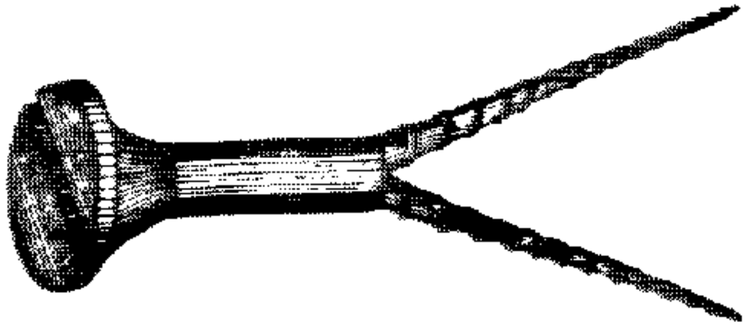
how does your computer boot?

Allow us to predict how things will work or not work

PRECONCEIVED MODELS



Teapot



Screw

PRECONCEIVED MODELS OFTEN WRONG!

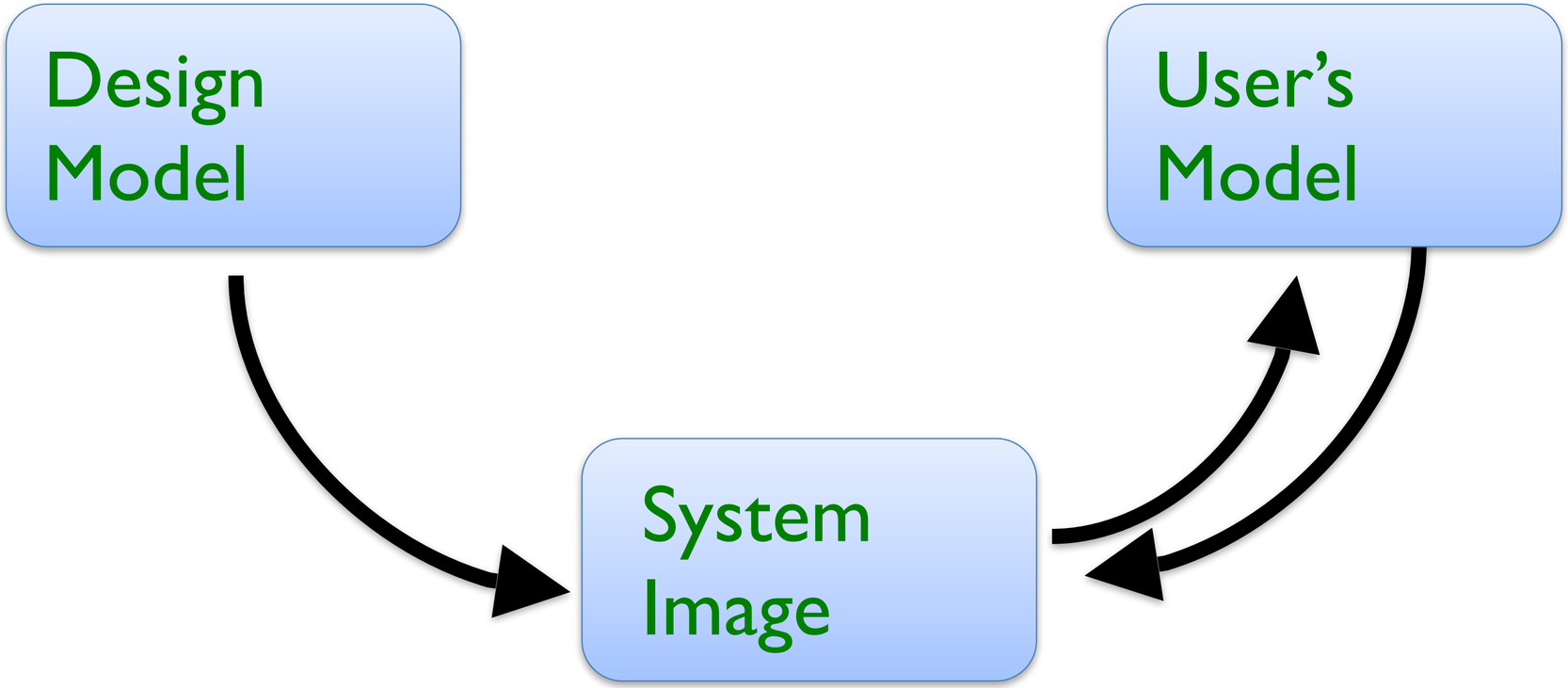
Extracted from fragmentary evidence

People find ways to explain things

Certain you’re driving on the correct road

THE ACTION CYCLE

CONCEPTUAL MODELS



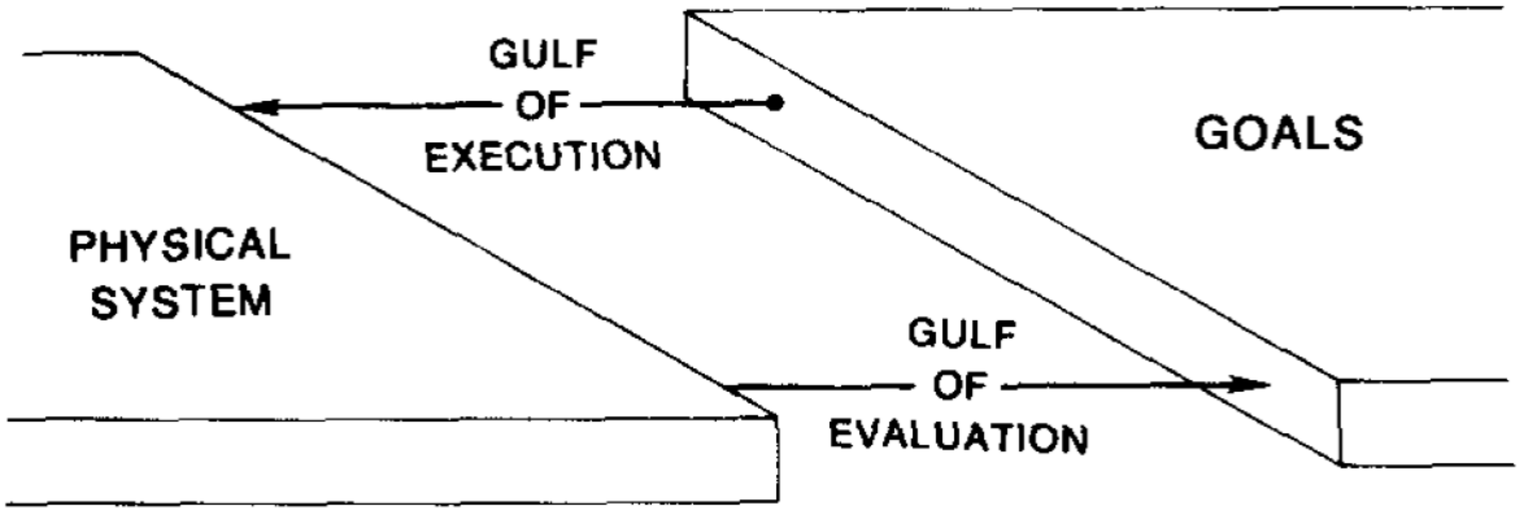
GULFS OF EXECUTION & EVALUATION

interface

affordances

feed-forward

Mental Model



feedback

Real World

GULF OF EXECUTION

Real world

Gulf

Mental model:

Draw a rectangle

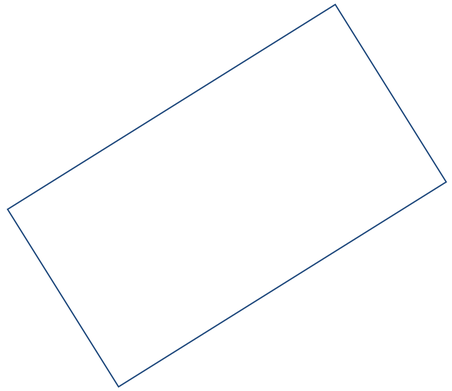
Execution

Move 90 30

Rotate 35

Pen down

…

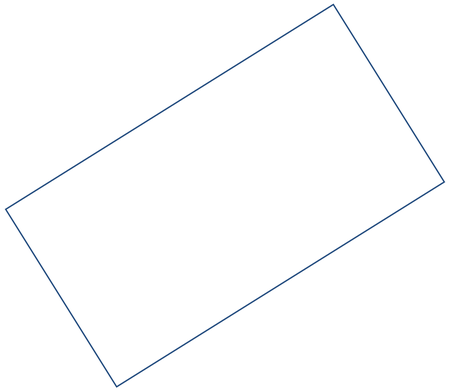


GULF OF EXECUTION

Real world

1. Draw a rectangle

2. Rotate the shape

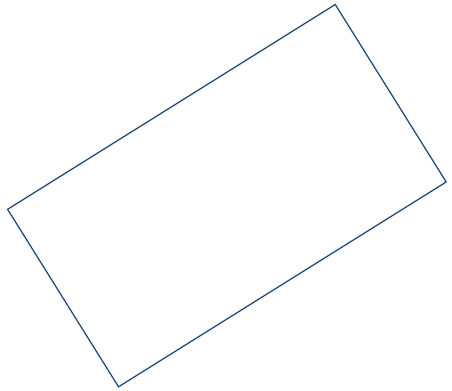


Gulf

Execution

Mental model:

Draw a rectangle



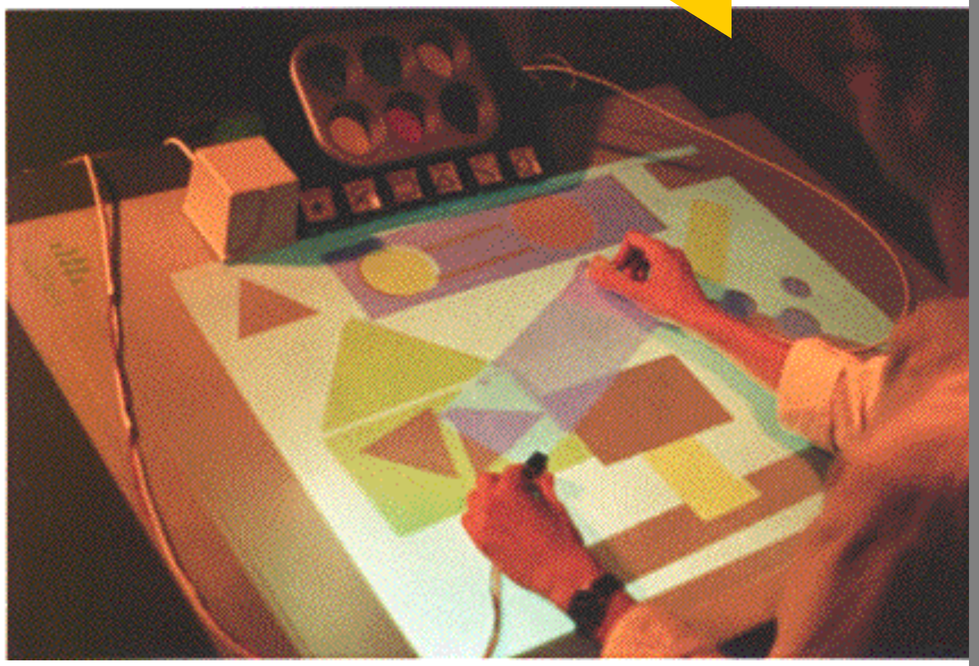
GULF OF EXECUTION

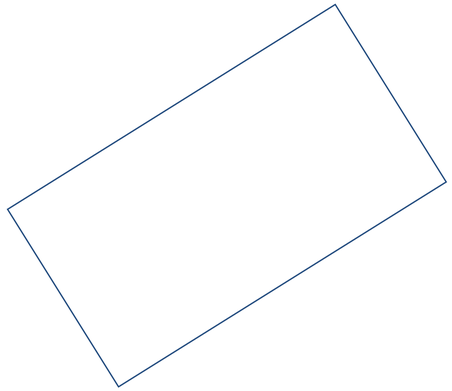
Real world

Gulf

Mental model:
Draw a rectangle

Execution



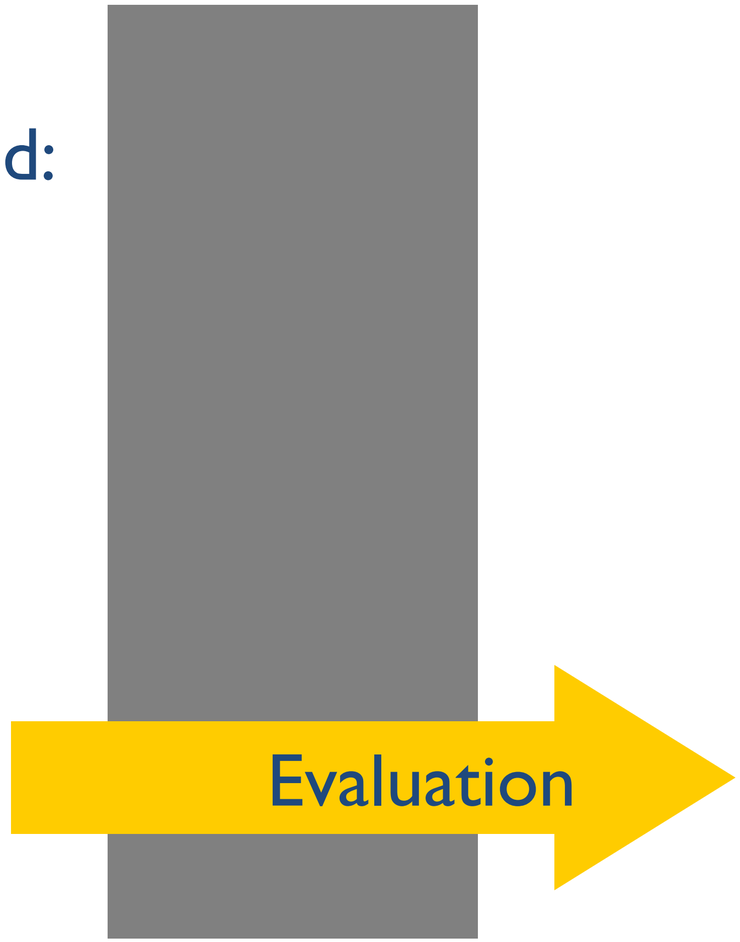


GULF OF EVALUATION

Gulf

Real world:

X	Y
0.67	0.79
0.32	0.63
0.39	0.72
0.27	0.85
0.71	0.43
0.63	0.09
0.03	0.03
0.20	0.54
0.51	0.38
0.11	0.33
0.46	0.46

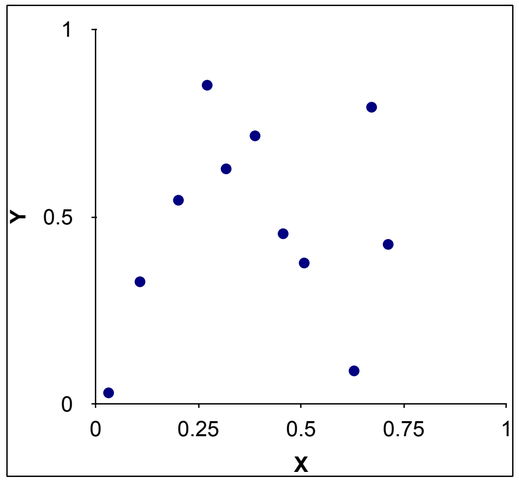


Mental model:
x,y correlated?

GULF OF EVALUATION

Gulf

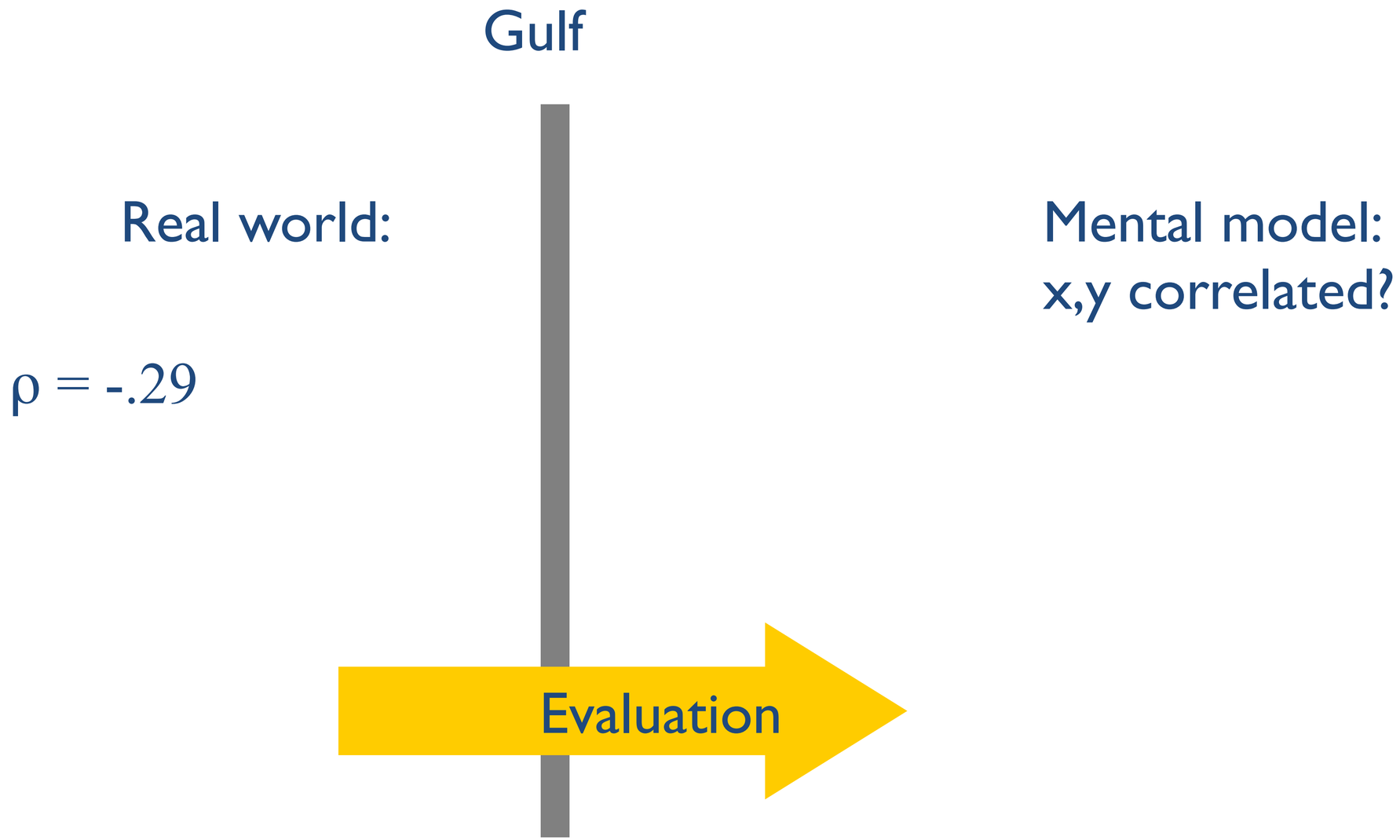
Real world:



Mental model:
x,y correlated?

Evaluation

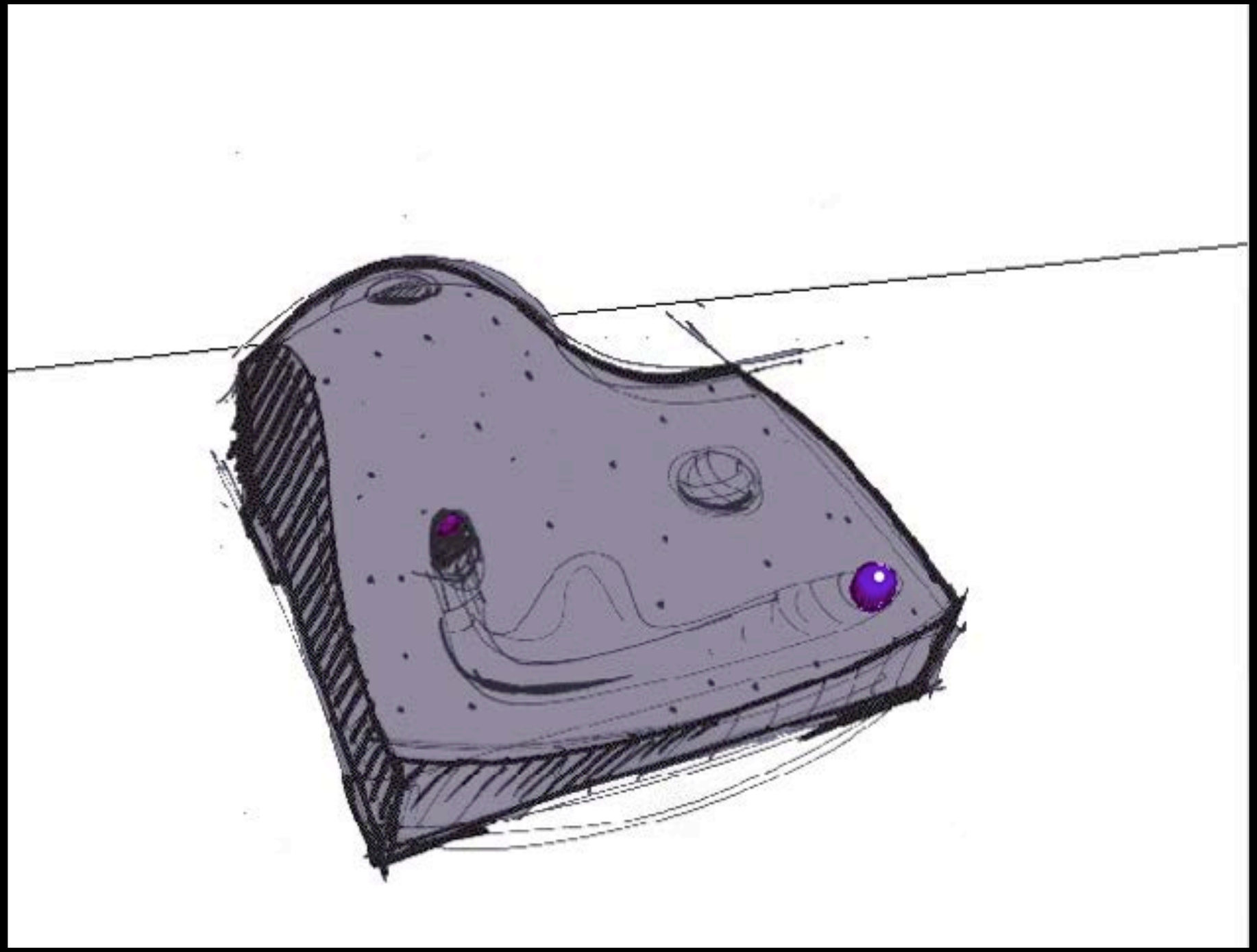
GULF OF EVALUATION



ACTION CYCLE

ACTION CYCLE

DIRECT MANIPULATION



DIRECT MANIPULATION

An interface that behaves as though the interaction was with a real-world object rather than with an abstract system

Central ideas

Visibility of the objects of interest

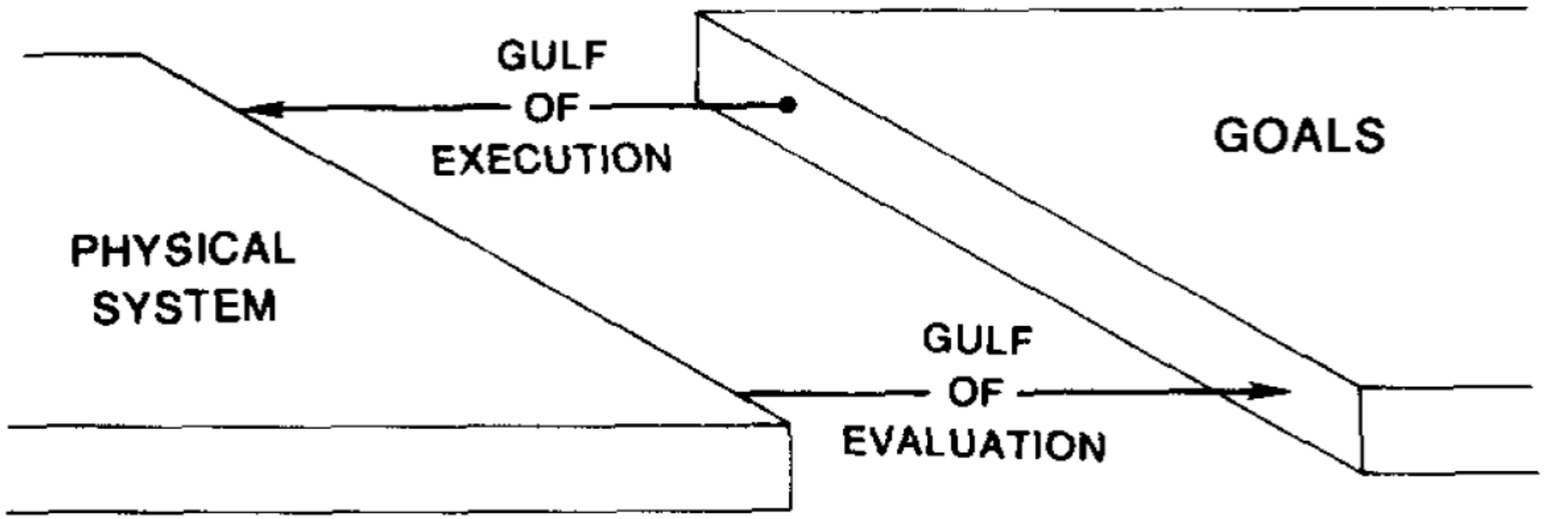
Rapid, reversible, incremental actions

Manipulation by pointing and moving

Immediate and continuous display of results

REDUCE DISTANCE

Decrease gulfs



THE METAPHOR

Computer objects as visible, moveable objects

Consequences

Items represented as icons

Items can be “picked up” and “moved” on a surface

Items can be “thrown out”

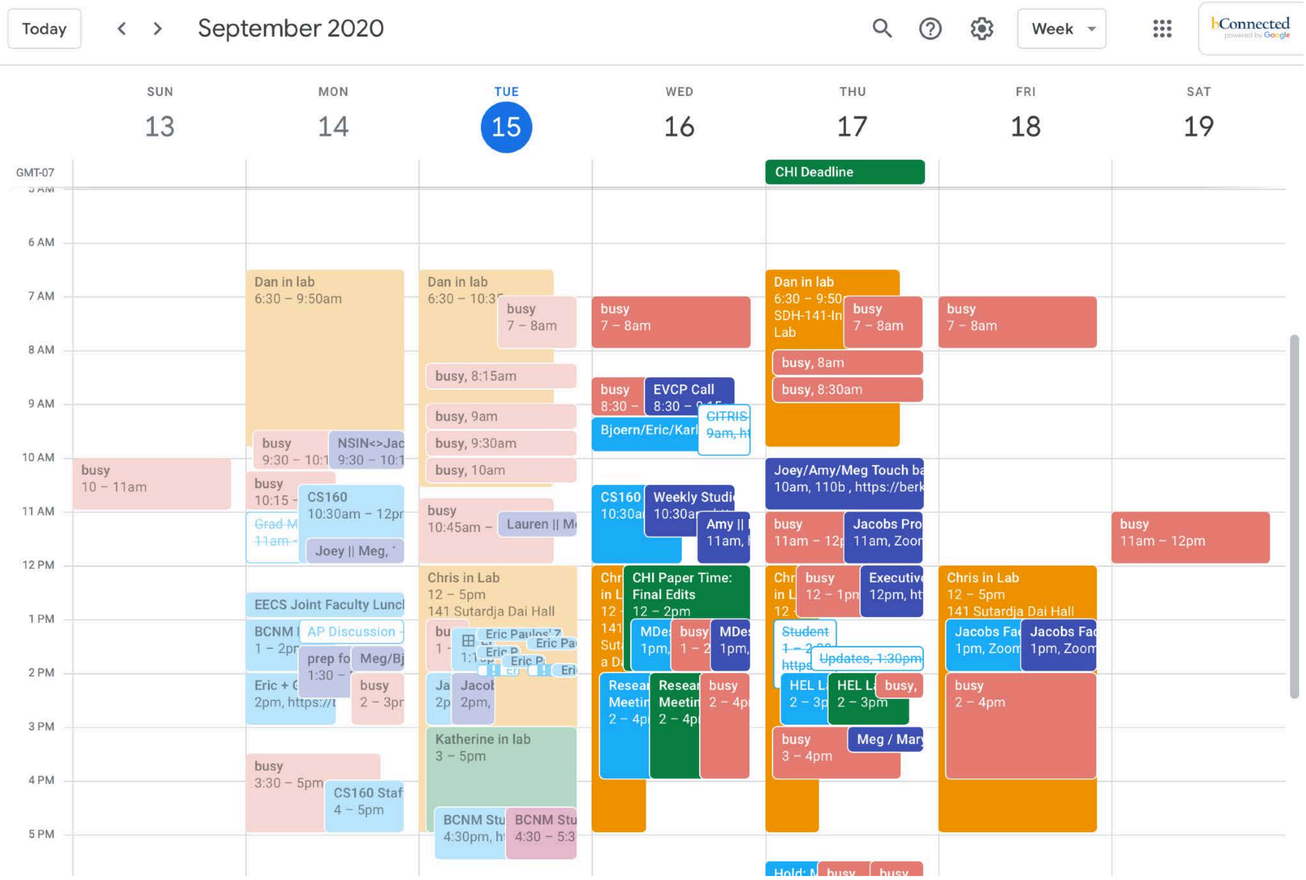
Items can be “copied”

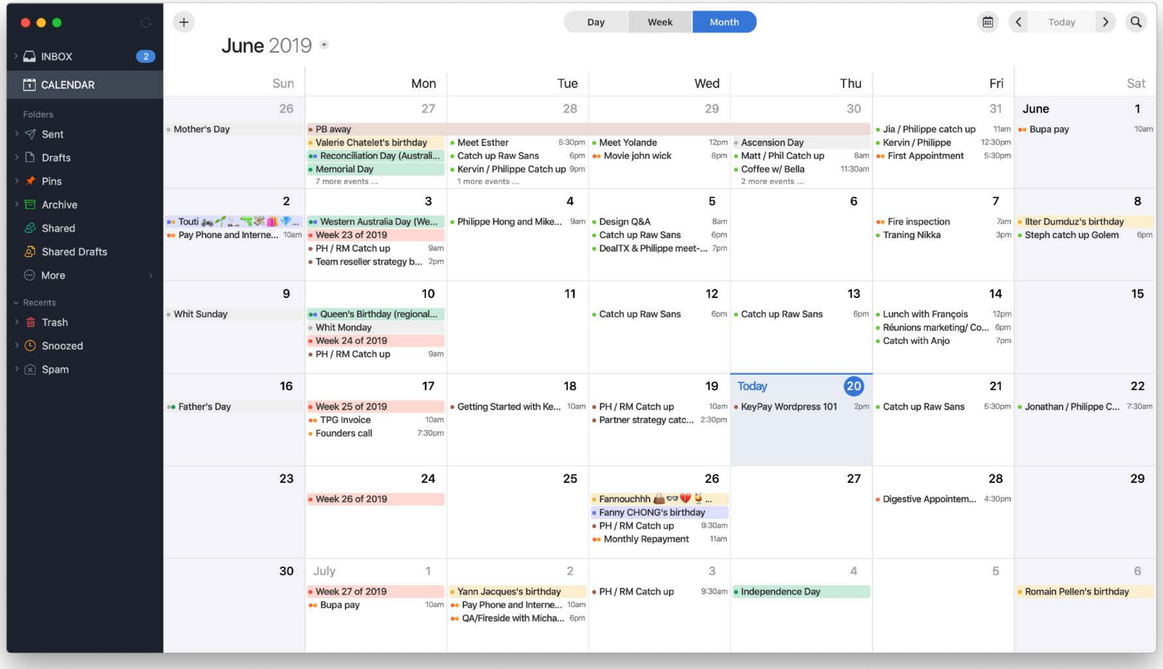
Do we really want to have to drag them to a photocopier?

How much is too much?

VISUAL REPRESENTATION

To manipulate an object it must be visible





ISSUES

Some Disadvantages

Repetitive operations (may still be best via script)

Tasks that require high accuracy (positioning)

Ill-suited for abstract operations

- Spell-checker?
- Search database by scrolling or by query?
  May desire to trade off directness for generality

Solution: Combine direct manipulation & abstractions

Word processor:

- WYSIWYG document (direct manipulation)
- Buttons, menus, dialog boxes (abstractions, but direct manipulation “in the small”)

If we only restrict ourselves to direct manipulation we miss the most exciting potential of new technology – to enable new ways to think and interact

SUMMARY

Conceptual model is the user's mental model of how the interface works

Perceived affordances help users form this model

Designers must provide clues in system to make conceptual model clear

Make controls visible
Make sure mapping is clear
Provide feedback

Gulfs of Execution and Evaluation

Action cycle involves bridging gulfs between user & system

If we only restrict ourselves to direct manipulation we miss the most exciting potential of new technology – to enable new ways to think and interact

BREATHE