# USER INTERFACE DESIGN



**CS160** 

T1

1

ON

OFF

### **HEURISTIC EVALUATION**

#### 17 SEP 2018



www.paulos.net



UNIVERSITY OF CALIFORNIA





ANNOUNCEMENTS PROG 02A — Due 19 SEP PROG 02B — Due 5 OCT Required Class – 24 SEP **GROUPS ASSIGNED THIS WEEK** SECTION: APIs + Heuristic Evaluation DESIGN 02 - Heuristic Evaluation (Due SEP 26)



### **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**

Normal Settings Colder Fresh For Coldest Fresh For Colder Freezer Warmer Fresh For OFF (both)

Freezer

What is your conceptual model?

			Ca	and	4
od			Ca	and	5-6
bod			Ва	nd	7
			Da	and	6-7
ood			Ca	and	<b>3-</b> I
					0
	7	6	5	4	3

Fresh Food

## **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**



#### **Real World**

# **GULF OF EXECUTION**

Real world



Move 90 30 Rotate 35 Pen down

• • •



### Mental model: Draw a rectangle

# **GULF OF EXECUTION**

Real world

1. Draw a rectangle



#### 2. Rotate the shape





# **GULF OF EXECUTION**







# **GULF OF EVALUATION**

#### 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

### Gulf

### Mental model: x,y correlated?



# **GULF OF EVALUATION**

#### Real world:





### Gulf

#### Mental model: x,y correlated?



# **GULF OF EVALUATION**

#### Real world:

 $\rho = -.29$ 





### Gulf

### Mental model: x,y correlated?

#### Evaluation

# ACTION CYCLE



#### **Execution**





#### **Evaluation**

# ACTION CYCLE





### **DIRECT MANIPULATION**

# **DIRECT MANIPULATION**

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

# An interface that behaves as though the interaction was with a real-

# **REDUCE DISTANCE**Decrease gulfs



# **KEY POINTS**

#### Direct Engagement The feeling of working directly on the task

#### **Direct Manipulation**

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

Almost always based on a metaphor Mapped onto some facet of the real world task semantics

#### An interface that behaves as though the interaction was with a real-world object rather

# 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

September 2018						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	31	Sep 1
Molly out of t Help Jill Mov	Kids Start Sc CS160 4 more	<ul> <li>Kevin in Boston</li> <li>Onboarding b</li> <li>15 more</li> </ul>	<ul> <li>CS160</li> <li>10 more</li> </ul>	<ul> <li>Eric Lab Rese</li> <li>4 more</li> </ul>	<ul> <li>Argo orthodo</li> <li>3 more</li> </ul>	<ul> <li>Jill studio</li> </ul>
2	3	4	5	6	7	8
Kevin in Bost	SCULPT Full     CHI Reading	Camille     Invention Lab	CITRIS Leade     CS160	Leave for Air     Critical Practi	Eric in OC to visit Mom	
	• On Redding	10 more	11 more	6 more	Visit Worr Socar	2 more
9	10	11	12	13	14	15
Eric in OC to visit Mom		Barnaby nails	Drop Deadline	Scott Carter	Youtong	SCULPT Full
<ul> <li>Visit Mom So</li> <li>Workshop @</li> </ul>	<ul> <li>SCULPT Full</li> <li>9 more</li> </ul>	<ul> <li>Invention Lab</li> <li>5 more</li> </ul>	9 more	Darlene Robe 12 more	<ul> <li>Lunch Meetin</li> <li>4 more</li> </ul>	<ul> <li>Cal Football v</li> </ul>
16	17	18	19	20	21	22
Paxton Haircut	King Picture	• Yali + Lab eve	• CS160	Eric Lab Rese	Miracullum fa	<ul> <li>jill and eric pa</li> </ul>
<ul> <li>SCULPT Full</li> <li>Workshop @</li> </ul>	7 more	<ul> <li>Yall's Grand</li> <li>8 more</li> </ul>	<ul> <li>Hybrid Ecolo</li> <li>4 more</li> </ul>	<ul> <li>Eric Lab Rese</li> <li>3 more</li> </ul>	<ul> <li>CHI Deadline</li> <li>3 more</li> </ul>	
23	24	25	26	27	28	29
Jill's bday	• CS160	NSF Due to	<ul> <li>CS160</li> </ul>	• Eric Lab Rese	<ul> <li>Art Faculty M</li> </ul>	<ul> <li>Trackers (Pax</li> </ul>
<ul> <li>Workshop @</li> <li>Meet Jimmy f</li> </ul>	<ul> <li>EECS Faculty</li> <li>Field Notes</li> </ul>	Jill Miller's 35 5 more	<ul> <li>Vedant prese</li> <li>7 more</li> </ul>	<ul> <li>Eric Lab Rese</li> <li>4 more</li> </ul>	<ul> <li>Eric Dentist</li> <li>Niloufar Sale</li> </ul>	
30	Oct 1	2	3	4	5	6
Google Facul	• CS160	Molly out of town (Missouri)				
<ul> <li>Workshop @</li> <li>Post-CHI visit</li> </ul>	<ul> <li>EECS Faculty</li> <li>6 more</li> </ul>	NSF Medium 7 more	TEI Reviews 7 more	<ul> <li>Eric Lab Rese</li> <li>5 more</li> </ul>	<ul> <li>Highlights Yol</li> <li>Shankar + Cl</li> </ul>	Fleet week b

#### **September 17,** 2018

Monday

all-day	King Picture Day	
	IMWUT Reviews Due	
10 AM		
	10:30 AM	
11 AM	CS160	
Noon		
	12 PM	12 PM
	EECS Faculty Lunch	Welcome lunch for Robe
1 PM	1.04	
	BCNM	
2 PM		
1	2:30 PM	2:30 PM
3 PM	CHI Paper	HeeSoo
4 PM		
	4 PM	
	Field Notes	
5 PM	5 DM	
	Janet L? (King)	
6 PM		
7 PM		
8 PM		
	0.45 DM	
	8:15 PM Meet Bradley Smith	
9 PM	meet bradley Smith	



# 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



### **DESIGN PRINCIPLES**

# **1. MAKE CONTROLS VISIBLE**



# POOR VISIBILITY (BMW'S IDRIVE)






## How do you put someone on hold?

### How do you set the alarm?

POSITIONING SYSTEM



11.11 A. 11.11 A. 11.11







# **TOO MUCH VISIBILITY?** 6 remote controls for "modest" home theater



## 2. MAKE SURE MAPPING IS CLEAR

Mapping: Relationship between controls and their result







## Which way will the sound be moved when you turn this knob?













30-inch Gas Cooktop with two 12,500 BTU Power™ Burners

Model #: W5CG3024XS

Whirlpool

Products Owners Every day, care.®

Whirlpool Brand U.S.A. | Kitchen Appliances | Cooking Appliances | Cooktops | 4 Burner Cooktops | W5CG3024XS





https://www.whirlpool.com/kitchen/cooking/cooktops/4-burner-elements/p.30-inch-gas-cooktop-with-two-12,500-btu-power-burners.w5cg3024xs.html



些 U.S.A.

Contact Us Chat Account ~













24 possibilities, requires:

visible labels memory

paired



- 2 possibilities per side
- =4 total possibilities

## full mapping







# MAPPING



# MAPPING



# **TRANSFER EXPECTATIONS**

## From known objects to similar new ones

Positive: previous experience applies to new situation Negative: previous experience conflicts with new situation





What happens when disk is dragged onto trash can?

# Having



## Crown in Apple Watch

# **3. PROVIDE FEEDBACK**

## People press >> 1 time

Unclear if system has registered the button press







# ELEVATORS

Elevator buttons light up ...reduces multiple presses



# POOR FEEDBACK



## Took a day for refrigerator to adjust to new settings



## **HEURISTIC EVALUATION**

# **USABILITY HEURISTICS**

"Rules of thumb" describing features of usable systems Can be used as design principles Can be used to evaluate a design

Example: Minimize users' memory load

# **HEURISTIC EVALUATION** Developed by Jakob Nielsen (1994)

Can be performed on working Ul or on sketches

Small set (3-5) of evaluators (experts) examine UI Evaluators check compliance with usability heuristics Different evaluators will find different problems Evaluators only communicate afterwards to aggregate findings Designers use violations to redesign/fix problems



# **NIELSEN'S TEN HEURISTICS**

- **H1:** Visibility of system status
- H2: Match system and real world
- H3: User control and freedom
- H4: Consistency and standards
- **H5:** Error prevention
- **H6:** Recognition rather than recall
- **H7:** Flexibility and efficiency of use
- H8: Aesthetic and minimalist design
- H9: Help users recognize, diagnose, recover from errors
- **H10:** Help and documentation

## H-1: VISIBILITY OF SYSTEM STATUS

Keep users informed about what is going on.

Response time examples:

- 0.1 sec: no special indicators needed
- I.0 sec: user tends to lose track of data
- In sec: max. duration if user to stay focused on action
- Short delays: Hourglass
- Long delays: Use percent-done progress bars

Overestimate usually better

		 Load
61% 61	6	61%





## H-1: VISIBILITY OF SYSTEM STATUS

Users should always be aware of what is going on So that they can make informed decision Provide redundant information



to save the changes you made in "statements.txt"?
Cancel Save
e to apply your changes before etwork preferences pane?
Cancel Apply

## H-2: MATCH SYSTEM & WORLD

Speak the users' language Follow real world conventions Pay attention to metaphors

Bad example: Mac desktop



## H2-2: MATCH SYSTEM & WORLD





## H-3: USER CONTROL & FREEDOM

## Users don't like to be trapped!

## Strategies

Cancel button (or Esc key) for dialog Make the cancel button responsive! Universal undo



Window	Windows Update									
Û	Restart your computer to finish installing important updates   Windows can't update important files and services while the system is using them. Make sure to save your files before restarting.   Restarting in: 4 min, 33 sec									
	Remind me in: 10 minutes									
	Restart <u>n</u> ow <u>P</u> ostpone									

## H-3: USER CONTROL & FREEDOM

Offer "Exits" for mistaken choices, undo, redo Don't force the user down fixed paths

Wizards

- Must respond to question before going to next step
- Good for infrequent tasks (e.g., network setup) & beginners
- Not good for common tasks (zip/unzip)

### 000 **Bluetooth Setup Assistant** Select Device Type The Bluetooth Setup Assistant sets up your Bluetooth device to work with this computer. Select the type of device you want to set up from the list. Select "Any device" if the device you want to set up is not on the list. Your device needs to be within 30 feet of your computer. Mouse ○ Keyboard Mobile phone O Printer Headset Any device Go Back



## H-4: CONSISTENCY AND STANDARDS



Mic	crosoft	t Visual Bas	ic	
				OK
				Cance
				<u>H</u> elp

× **Microsoft Visual Basic** Help 0K Cancel × 🚯 Microsoft Visual Basic OK Cancel Help

×

X

## H-5: ERROR PREVENTION

# Eliminate error-prone conditions or check for them and ask for confirmation



# H-5: ERROR PREVENTION Aid users with specifying correct input

Trip i	info	rmat	tion	:									
Find hotels near:													
Ac	ity					•							
What	city	?											
SoHo - Tribeca - Lower East Side, New York, United Sta													
Check-in: Check-out:													
4/5/2	2010	)				1	4/14	1/20	10				
٩		Арг	il 2	010					Ma	y 2(	010		Þ
s	М	т	W	т	F	s	s	М	т	W	т	F	s
				1	2	3							1
4	5	6	7	8	9	10	2	3	4	5	6	7	8
11	12	13	14	15	16	17	9	10	11	12	13	14	15
18	19	20	21	22	23	24	16	17	18	19	20	21	22
25	26	27	28	29	30		23	24	25	26	27	28	29
							30	31					
						Clo	se						

## H2-5: ERROR PREVENTION



### MIT Scratch



Lego Mindstorms

Don't allow incorrect input
## H-6: RECOGNITION OVER RECALL



☆ paulos — bash — 80×24

Last login: Thu Aug 22 07:10:06 on ttys001 dhcp-44-211:~ paulos\$

000



# H-6: RECOGNITION OVER RECALL

Minimize the user's memory load by making objects, actions, and options visible.

ile Edit Object Type	Select Fi	Iter Effect View Window Help
New New from Template Open	第N 企業N 第O	
Open Recent Files	•	🔄 Pandav_Bart_Map.ai.ps
Browse	7.20	poster-draft-05-bid.ai
Device Central		poster-draft-05-bid.pdf
Device central		📩 poster-draft-04.ai
Close	жW	📶 creative-apps-space.ai
Save	ЖS	tutorial-mockup-01.pdf
Save As	ΰ₩S	tutorial-mockup-01.ai
Save a Copy	乙第2	scs247-p3-slouch2.emf
Save as Template		sizes.ai
Save for Web & Devices	7-445	table-size-comparison-scaled.ai
Revert	сцњ5 F12	NAMES OF TAXABLE PARTY AND ADDRESS OF TAXABLE PARTY.
Revent	175	
Place		
Save for Microsoft Office		C
Export		
c		P
Scripts	•	
Document Setup	∖сжР	
Document Color Mode		
File Info	て企業日	
Print	H P	
	στο Γ	



### H2-7: FLEXIBILITY AND EFFICIENCY OF USE

Tools	Window	Help		
Web	Search		жK	
Dowr Add-	ons		ℋJ	ry
Zoter	0		ĉ₩Z	
🐇 🌾 Fir	rebug		•	itic
Error	Console		ĉ₩J	
Page	Info		æΙ	
Start Clear	Private Bro Recent His	wsing story	ĉ₩P	



🗞 <bulk rename="" utility=""></bulk>					_ 🗆 🗙
File Actions Options Help					
<ul> <li>Desktop</li> <li>My Documents</li> <li>My Music</li> <li>My Pictures</li> <li>t</li> <li>test</li> <li>My Computer</li> <li>3½ Floppy (A:)</li> <li>Local Disk (C:)</li> </ul>	Name test1.txt test2.txt	New Name test1.doc test2.doc	Sub Type Text Text	Size         Created         Modif           0 KB         4/24/         4/24/           0 KB         4/24/         4/24/	<u>i</u> /
Reg. Expr. (1)   Match   Match   Replace   With   Match Case   Match Case     Filename (2)   Replace	(3) R Removals (5) F First n chars 0 ÷ Last n chars 0 ÷ From 0 ÷ to 0 ÷ Chars B Words Digits □ Chars	Additions (6) R Prefix Aut Mode Type Insert Fint at pos. 0 ÷ Suffix .dod	o Date (7) R None Creation DMY Seg. om Seg.	Numbering (9)         Mode       None       Image: All	₽ E P. mal) ▼
Name Keep   Same     Selections (11)     Filter     *     •	Folders Hidden Hidden	Append Folder Name (8 Name None S ew Location (12)	Beparator R	Remove T	ename
C. * tts (2 Selected)	Favourite				//

### No irrelevant information in dialogues



#### Present information in natural order

![](_page_77_Figure_2.jpeg)

#### Occam's razor

Remove or hide irrelevant or rarely needed information – They compete with important information on screen

Pro: Palm Pilot

Against: Dynamic menus

Use windows frugally

Avoid complex window management

From Cooper's "About face 2.0"

![](_page_77_Picture_10.jpeg)

![](_page_78_Picture_1.jpeg)

![](_page_78_Picture_2.jpeg)

00	mysql5.admin.server27	3.com / localh	ost / bjoern_mt_dk	b / mt_blog   phpMy/	Admin 3.2.2.1		
	) 🦚 (http://mysol5.admin.server27	3.com/index.p	hp?db=bjoern_mt_dt	b&token=d4ce39423c	65ecc62d0b9cbfefe01 😭 🔻 🔵	😗 (ulk rename utility	Q)
binern ord : Control Panel : My	C graphpager com - Information	O 🖉 mysal	Sadmin server274 cm	wm / 0 +			
	localbost N 🕾 biocon ont db N 🗖 mi	blon		<u></u>			
pnpmyAamin		earch Zelev	art Filinand R	Simont & Constit	inne 🐨 Franke 🕅 Denn		
	Internet internet 2300c 210	- Je mis	iert felesport fi	amport Acheron	ing the state of the state		
Database	Do a "query by example" (wildcard: "?	s")					.
mt_db (49)	Field	Туре	Collation	Operator	Va	lue	
bjoern_mt_db (49)	blog_id	int(11)		-			
E b_book	blog_name	varohar(255)	latin1_general_ci	LIKE 🔡			
memoer mt_acco:	blog_description	text	latin1_general_ci	(TIKE			
mt_essociation	blog_site_path	varchar(255)	latin1_general_ci	(TIKE			
<pre>mt_author_meta mt_blog</pre>	blog_site_url	varchar(255)	latin1_general_ci	[ LIKE   • ]			
mt_blog_meta mt_category mt_category	blog archive path	varchar(255)	latin' general ci				
mt_compent mt_comment mt_comment_meta	blog_archive_url	varchar(255)	latin1_general_ci	TIKE :			
mt_config	blog_archive_type	varchar(255)	latin1_general_ci	[ LIKE :			
mt_entry_meta mt_fieintc mt_fieintc	blog archive type preferred	varchar(25)	latin1 general ci				
mt_log mt_retification	blog days on index	int(11)		-			
mt_objectasset mt_objectacore	blog language	varchar(5)	latini general ci				
I mt_objectag mt_permission mt_objectag	blog file extension	varchar(10)	latin1 general ci				
ma_plugistata ma_plugistata ma_plugistata	blog email new comments	tinyint(4)					
⊟ mt_seasion ⊟ mt_sag	blog email new pings	tinyint(4)					
mt_ttping_meta	blog allow comment himi	tinvint(4)					
mt_template     mt_templatemap     mt_templatemap	blog autolink urls	tinvinti4)		-			
mt_touch mt_trackback	blog sort order posts	vamhar(8)	lation general d	- •			
mt_ts_enor mt_ts_exitatistus	blog_sort_order_comments	varehor/8)	lation general ci				
I mt_ta_tunomap I mt_ta_job II ohawik lick	blog_sligw_nonments_default	liquin(A)	autri_generai_cr				
phpwik_nonempty phpwik_pege	blog_allow_comments_detaut	for dealers		-			
phpwik_rating phpwik_recent	blog_anow_prings_deraum	fleet		-			
phpwik_session phpwik_version card	blog_server_onset	ncar	1.5.1	=			
H user	biog_convert_paras	varonar(80)	launi_generai_ci				
	blog_convert_paras_comments	varahar(30)	latin1_general_ci	LIKE			
	blog_status_default	smallint(6)		=			
	blog_allow_anon_comments	tinyint(4)		-			
	blog_words_in_excerpt	smallint(6)		=			
	blog_ping_weblogs	linyinl(4)		(=i			
	blog_ping_blogs	tinyint(4)		-			
	blog_ping_others	text	latin1_general_ci	(HKF 📄			
	blog_mt_update_key	varchar(30)	latin1_general_ci	LIKE 💿			
	blog_autodiscover_links	tinyint(4)		-			
	blog_welcome_msg	text	latin1_general_ci				
	blog archive tmpl monthly	varchar(255)	latin1 general ci	LIKE 💼			
	blog archive tmpl weekly	varchar(255)	latin1 general ci				
	blog_archive_tmpl_daily	varchar(255)	latin1_general_ci	(TIKE 💽			
	blog archive tmpl individual	varchar(255)	latin1 general ci	LIKE			
	blog archive tmpl category	varchar(255)	latin' general ci	LIKE 📑			
	blog google api key	varchar(S2)	latin' general ci				
	blog sanitize spec	varchar(255)	latini general d				
	blog co license	varchar(255)	latin1 general ci				
	blog_is_dynamic	tinyint(4)		=			
	blog_require_comment_emails	tinyint(4)		=			
	blog allow reg comments	tinyint(4)		[-			
	blog_junk_score_threshold	float		=			
	blog_moderate_pings	tinyint(4)		-			
	blog_moderate_unreg_comments	tinyint(4)					
	blog_created_by	inl(11)					1

#### H-9: HELP USERS RECOGNIZE, DIAGNOSE, AND RECOVER FROM ERRORS

![](_page_80_Picture_1.jpeg)

# **BETTER ERROR MESSAGES**

![](_page_81_Figure_1.jpeg)

![](_page_81_Picture_2.jpeg)

### H2-9: HELP USERS RECOGNIZE, DIAGNOSE, AND RECOVER FROM ERRORS

Search Mail Search the Web Show search options Create a filter
2 conversations have been moved to the Trash. Learn more Undo
Archive Report spam Delete Move to Labels More actions Refresh

![](_page_82_Picture_2.jpeg)

### H2-9: HELP USERS RECOGNIZE, DIAGNOSE, AND RECOVER FROM ERRORS

#### Moved to trash

![](_page_83_Figure_2.jpeg)

![](_page_83_Picture_3.jpeg)

### H-10: HELP AND DOCUMENTATION

Help should be:

- Easy to search
- Focused on the user's task
- List concrete steps to carry out
- Not too long

![](_page_84_Picture_6.jpeg)

# **TYPES OF HELP**

Tutorial and/or getting started manuals Presents the system conceptual model Basis for successful explorations Provides on-line tours and demos Demonstrates basic features Reference manuals Designed with experts in mind Reminders

					_			
۷	Cr	Mn	Fe	Co	Ni	Cu	Zn	G
Nb	Мо	Tc	Ru	Name: Iron (Fe) Atomic Number: 26 Atomic Mass: 55.845				Ir
Та	w	Re	Os					T
Db	Sg	Bh	Hs	Mt	-	10-1		-

### Short reference cards, keyboard templates, tooltips...

![](_page_85_Picture_5.jpeg)

## **TYPES OF HELP** Context sensitive help Search

![](_page_86_Figure_1.jpeg)

![](_page_86_Figure_2.jpeg)

# NEW USER GUIDES

![](_page_87_Picture_1.jpeg)

![](_page_88_Picture_0.jpeg)

#### Suggestions just for you.

Based on your choices, here are some suggestions for you. We recommend **following** all of them!

#### Suggestions for you

![](_page_89_Picture_4.jpeg)

John Gruber @gruber · Aug 28 "She's like a drunk older woman on a cruise." V The Las Vegas Strip, Paradise

![](_page_89_Picture_6.jpeg)

Walt Mossberg @waltmossberg · Aug 29 Apple Built iOS 8, Developers Are Coming on.recode.net/1ryIL @InaFried & @DawnC331

![](_page_89_Picture_8.jpeg)

Danny Sullivan @dannysullivan · 20h I can confirm saying "Xbox load Battlefield no wait scratch tha works. I found that pretty impressive.

![](_page_89_Picture_10.jpeg)

Om Malik @om · 1h

Because I am missing Paris and my Parisian friends! #latergram #endofsummer instagram.com/p/sVVRUUqThF/

![](_page_89_Picture_13.jpeg)

△ Jenna Wortham △ @jennydeluxe · 24h Some thoughts on Instagram's Hyperlapse, and Fast-Forwardi Future nyti.ms/1pqQfcZ

![](_page_89_Picture_15.jpeg)

dick costolo @dickc · Aug 26

Snapchat at \$10b not absurd. Crazy growth, clear monetization of the best social product thinkers out there. Long (figuratively)

![](_page_89_Picture_18.jpeg)

Laughing Squid @LaughingSquid · 1h

Iris the Tiny Piglet Bounds Through the Grass, Gets a Belly Ru a Walk Around the Neighborhood laughingsquid.com/iris-the-t

![](_page_89_Picture_21.jpeg)

![](_page_89_Picture_23.jpeg)

	×
YI via	×
at load Titanfall"	×
m	×
ing to the	×
on path, & one )	×
b and Goes for tiny	×

31. When you talk to Siri, the voice assistant that is part of Apple's iOS, it renders an animation of the sound levels as shown below. What HCI Heuristic is being used? (2 points)

![](_page_90_Picture_2.jpeg)

33. In Apple's iOS a user can type part of what they are looking for with suggestions dynamically appearing below. The example below shows a user trying to locate the Calendar App. Which HCI Heuristic is being used? (2 points)

![](_page_91_Picture_1.jpeg)

34. Later a user is using the same iOS device from question 33 to locate the Calendar App using the main app view (see image below). Which HCI Heuristic is being violated here with respect to what is also shown in question 33. (2 points)

![](_page_92_Figure_1.jpeg)

![](_page_92_Picture_2.jpeg)

![](_page_92_Picture_3.jpeg)

![](_page_93_Picture_0.jpeg)

### THE PROCESS OF HEURISTIC EVALUATION

# PHASES OF HEURISTIC EVAL. (1-2)

1) Pre-evaluation training Provide the evaluator with domain knowledge if needed

### 2) Evaluation

Individuals evaluate interface then aggregate results Compare interface elements with heuristics

Work in 2 passes First pass: get a feel for flow and scope Second pass: focus on specific elements

Each evaluator produces list of problems Explain why with reference to heuristic or other information Be specific and list each problem separately

## PHASES OF HEURISTIC EVAL. (3-4)

### 3) Severity rating

Establishes a ranking between problems Cosmetic, minor, major and catastrophic First rate individually, then as a group

### 4) Debriefing

Discuss outcome with design team Suggest potential solutions Assess how hard things are to fix

# EXAMPLES

Typography uses mix of upper/lower case formats and fonts Violates "Consistency and standards" (H-4) Slows users down Fix: pick a single format for entire interface

Probably wouldn't be found by user testing

# LEVELS OF SEVERITY

- 0 don't agree that this is a usability problem
- 1 cosmetic problem
- 2 minor usability problem
- 3 major usability problem; important to fix
- 4 usability catastrophe; imperative to fix

![](_page_97_Picture_6.jpeg)

tant to fix ve to fix

# **SEVERITY RATINGS EXAMPLE** 1. [H-4 Consistency] [Severity 3]

The interface used the string "Save" on the first screen for saving the user's file, but used the string "Write file" on the second screen. Users may be confused by this different terminology for the same function.

# DEBRIEFING

Conduct with evaluators, observers, and development team members

- Discuss general characteristics of UI
- Suggest improvements to address major usability problems
- Development team rates how hard things are to fix
- Make it a brainstorming session

![](_page_100_Picture_0.jpeg)

### **PROS AND CONS OF HEURISTIC EVALUATION**

# HEVS. USER TESTING

HE is much faster 1-2 hours each evaluator vs. days-weeks

HE doesn't require interpreting user's actions

User testing is far more accurate Takes into account actual users and tasks HE may miss problems & find "false positives"

Good to alternate between HE & user-based testing Find different problems Don't waste participants

![](_page_101_Picture_5.jpeg)

# NUMBER OF EVALUATORS Single evaluator achieves poor results

Only finds 35% of usability problems 5 evaluators find ~ 75% of usability problems Why not more evaluators???? 10? 20? Adding evaluators costs more Many evaluators won't find many more problems

But always depends on market for product: popular products  $\rightarrow$  high support cost for small bugs

# **DECREASING RETURNS**

![](_page_103_Figure_2.jpeg)

Caveat: graphs are for one specific example!

# SUMMARY

Heuristic evaluation is a discount method

Have evaluators go through the UI twice Ask them to see if it complies with heuristics Note where it doesn't and say why

Have evaluators independently rate severity

Combine the findings from 3 to 5 evaluators Discuss problems with design team

Cheaper alternative to user testing Finds different problems, so good to alternate