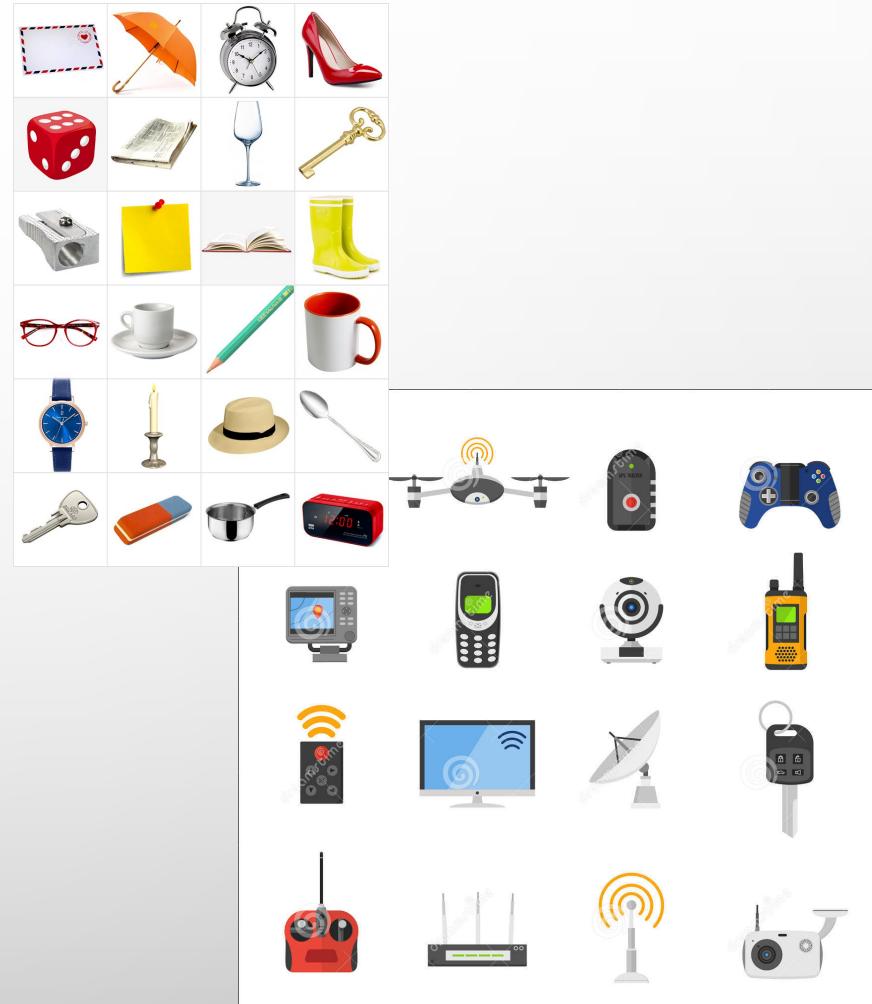


CSC 592: HUMAN COMPUTER INTERACTION -- INTRODUCTION

INSTRUCTOR: KRISHNA VENKATASUBRAMANIAN

INTERACTION DESIGN

- **WE INTERACT WITH OBJECTS EVERYDAY, ALL THE TIME**
 - SMARTPHONES, TABLETS, REMOTE CONTROL, COFFEE MACHINE, PRINTER, GAME CONSOLES, GPS, BLENDER....
- WE UNDERSTAND THESE OBJECTS THROUGH THE INTERACTION WE HAVE WITH THEM.
 - SOME OF THESE INTERACTIONS ARE GOOD, OTHERS ARE TERRIBLE!



What makes an interaction with an ‘object’ good or bad?

DESIGNING INTERACTIONS

Masochists' teapot

- DESIGN OF INTERACTION IS CRUCIAL FOR GOOD OR BAD INTERACTION EXPERIENCE WITH AN OBJECT
- ALL INTERACTIONS WITH OBJECTS ARE A RESULT OF CONSCIOUS DECISION MADE BY SOMEONE



Lateral Rocking Chair

Double Toothbrush



Jacques Carelman's impossible objects
(*Catalogue d'Objets Introuvables*)

ELEVATOR CONTROLS

ELEVATOR CONTROLS AND LABELS ON THE BOTTOM ROW ALL LOOK THE SAME, SO IT IS EASY TO PUSH A LABEL BY MISTAKE INSTEAD OF A CONTROL BUTTON.



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PEOPLE DO NOT MAKE SAME MISTAKE FOR THE
LABELS AND BUTTONS ON THE TOP ROW. WHY NOT?

WHAT DO YOU THINK ABOUT THIS?

- WHAT WENT WRONG
HERE?
- WHAT WAS THE PERSON IN
THE VIDEO EXPECTING?
- WHAT WAS THE DESIGNER
OF THE DOOR ASSUMING?
- WHOSE FAULT IS IT? ☺

<https://twitter.com/caughtcctv/status/1197137942210400256?s=21>

TIVO!!

WHY IS THE TIVO REMOTE MUCH BETTER DESIGNED THAN STANDARD REMOTE CONTROLS?

- PEANUT SHAPED TO FIT IN HAND
- LOGICAL LAYOUT AND COLOR-CODED, DISTINCTIVE BUTTONS
- EASY-TO-LOCATE BUTTONS



TURN SIGNAL

- TURN SIGNAL BIKING JACKET USING E-TEXTILE
- MADE BY LEAH BEUCHLEY
- WORTH CHECKING OUT SOME OF THE COOL STUFF ON HER SITE

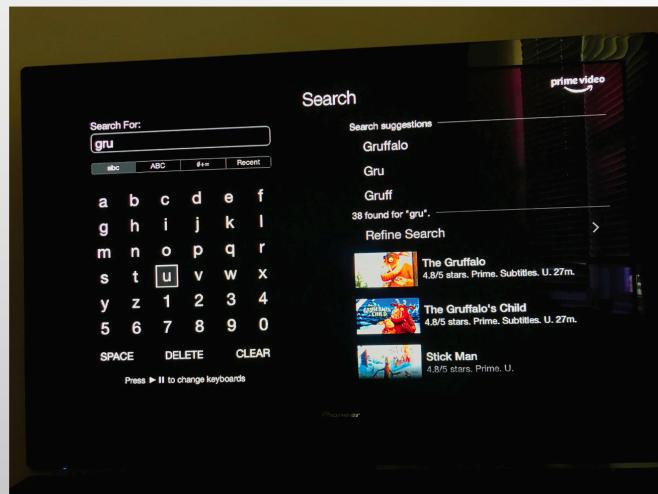
<http://leahbuechley.com/>



DILEMMA

WHICH IS THE BEST WAY TO INTERACT WITH A SMART TV? WHY?

- PECKING USING A GRID KEYBOARD VIA A REMOTE CONTROL
- SWIPING ACROSS TWO ALPHANUMERIC ROWS USING A TOUCHPAD ON A REMOTE CONTROL
- VOICE CONTROL USING REMOTE OR SMART SPEAKER



More and more what was once product design is becoming interaction design

Camera, microwaves, washing machines etc

WHAT IS INTERACTION DESIGN?

“DESIGNING INTERACTIVE PRODUCTS TO SUPPORT THE WAY PEOPLE COMMUNICATE AND INTERACT IN THEIR EVERYDAY AND WORKING LIVES.”

SHARP, ROGERS, AND PREECE (2019)

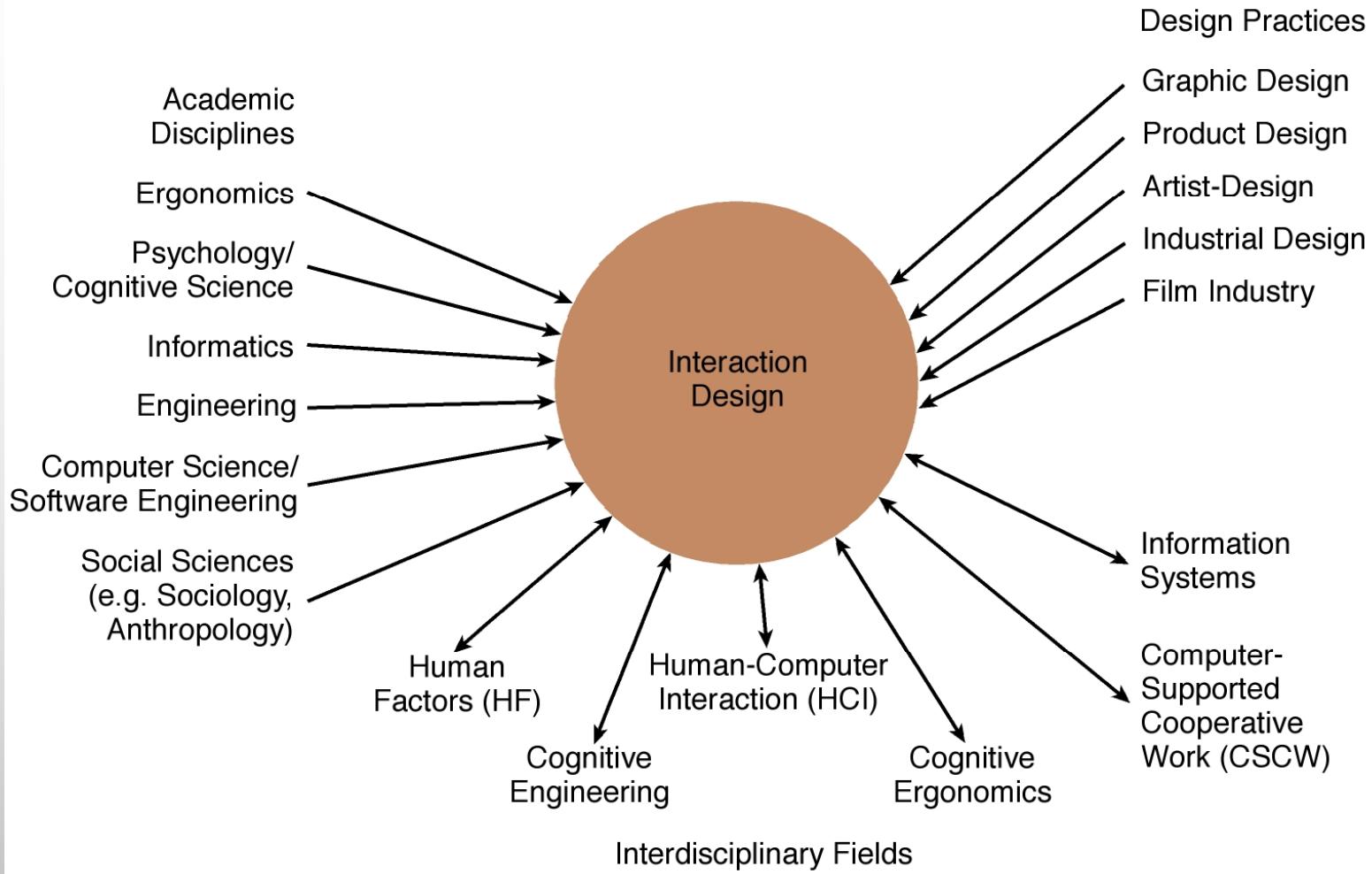
“THE DESIGN OF SPACES FOR HUMAN COMMUNICATION AND INTERACTION.”

WINOGRAD (1997)

GOALS OF INTERACTION DESIGN

- GOAL 1:
 - DEVELOP USABLE PRODUCTS
 - USABILITY MEANS **EASY TO LEARN, EFFECTIVE TO USE,** AND PROVIDES AN **ENJOYABLE** EXPERIENCE
- GOAL 2:
 - **INVOLVE USERS** IN THE DESIGN PROCESS

INTERACTION DESIGN



MULTIDISCIPLINARY EFFORT

- MANY PEOPLE FROM DIFFERENT BACKGROUNDS INVOLVED
- DIFFERENT PERSPECTIVES AND WAYS OF SEEING AND TALKING ABOUT THINGS

BENEFITS

- MORE IDEAS AND DESIGNS GENERATED

DISADVANTAGES

- DIFFICULT TO COMMUNICATE AND PROGRESS FORWARD THE DESIGNS BEING CREATE



Interaction Design seems to focus on
USER EXPERIENCE

What is user experience?

THE USER EXPERIENCE

HOW A PRODUCT BEHAVES AND IS USED BY PEOPLE IN THE REAL WORLD

- THE WAY PEOPLE FEEL ABOUT IT AND THEIR PLEASURE AND SATISFACTION WHEN USING IT, LOOKING AT IT, HOLDING IT, AND OPENING OR CLOSING IT
- “EVERY PRODUCT THAT IS USED BY SOMEONE HAS A USER EXPERIENCE: NEWSPAPERS, KETCHUP BOTTLES, RECLINING ARMCHAIRS, CARDIGAN SWEATERS.” (GARRETT, 2010)
- “ALL ASPECTS OF THE END-USER'S INTERACTION WITH THE COMPANY, ITS SERVICES, AND ITS PRODUCTS. (NIELSEN AND NORMAN, 2014)

CANNOT DESIGN A USER EXPERIENCE—ONLY CAN DESIGN FOR A USER EXPERIENCE

DEFINING USER EXPERIENCE

HOW USERS PERCEIVE A PRODUCT, SUCH AS WHETHER A SMARTWATCH IS SEEN AS SLEEK OR CHUNKY, AND THEIR EMOTIONAL REACTION TO IT, SUCH AS WHETHER PEOPLE HAVE A POSITIVE EXPERIENCE WHEN USING IT.

(HORNBÆK AND HERTZUM, 2017)

HASSENZAHL'S (2010) MODEL OF THE USER EXPERIENCE

- **PRAGMATIC:** HOW SIMPLE, PRACTICAL, AND OBVIOUS IT IS FOR THE USER TO ACHIEVE THEIR GOALS
- **HEDONIC:** HOW EVOCATIVE AND STIMULATING THE INTERACTION IS TO USERS

**Can you give me an example of a
product/service you have used that was a
pleasure to use?**

WHY WAS THE IPOD USER EXPERIENCE SUCH A SUCCESS?

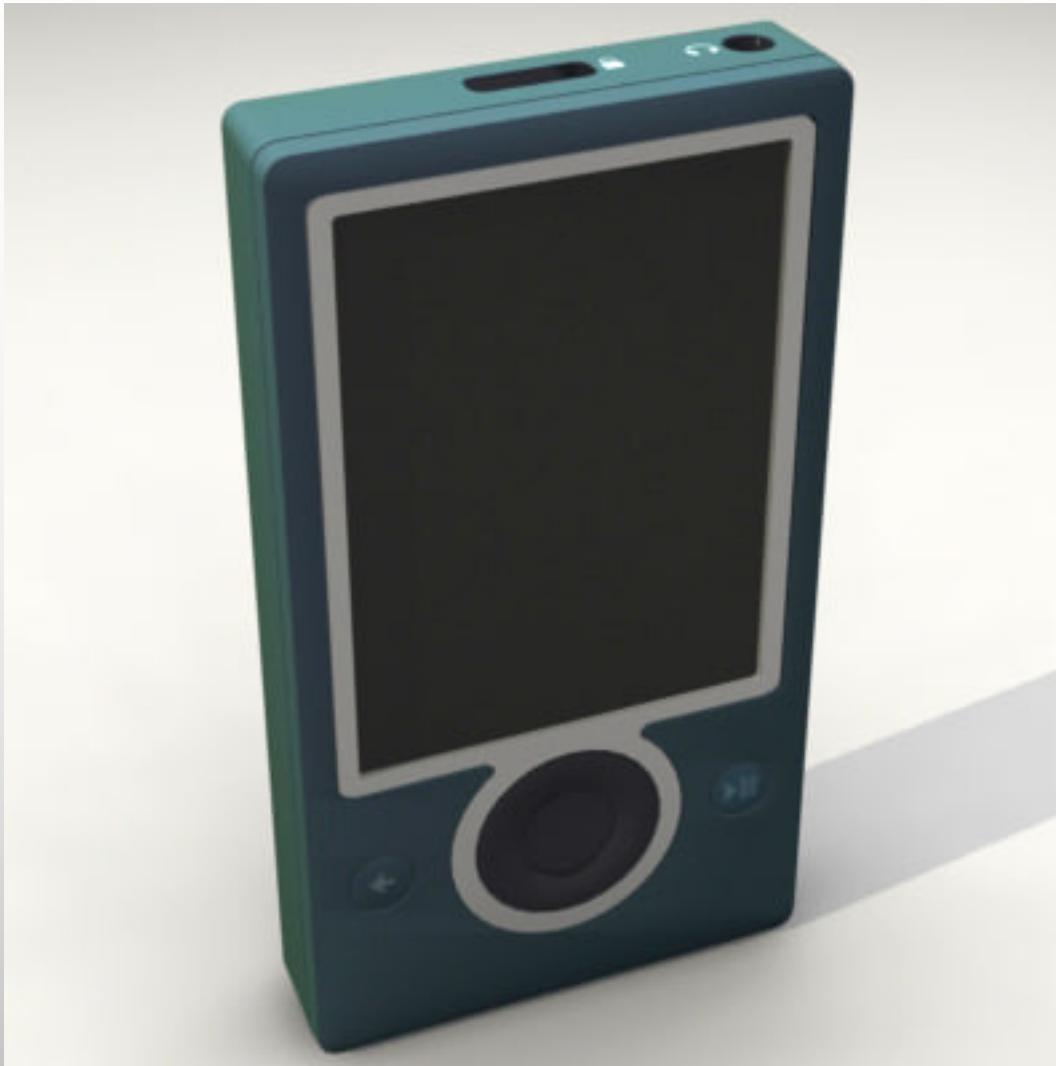


Figure 1.6 The iPod Nano Touch

Source: ©Press Association, reproduced with permission.

- QUALITY USER EXPERIENCE FROM THE START
- SIMPLE, ELEGANT, DISTINCT BRAND, PLEASURABLE, MUST HAVE FASHION ITEM, CATCHY NAMES, COOL...
- THE PRODUCT WAS LAID OUT TO ENCOURAGE INTERACTION

ANYONE REMEMBER WHAT THIS IS?



**RIP: circa
2012!**

HOW TO DO “GOOD” INTERACTION DESIGN

- **USERS SHOULD BE INVOLVED** THROUGHOUT THE DEVELOPMENT OF THE PROJECT
- **SPECIFIC USABILITY AND USER EXPERIENCE GOALS NEED TO BE IDENTIFIED**, CLEARLY DOCUMENTED, AND AGREED TO AT THE BEGINNING OF THE PROJECT
- **ITERATION**

No secret sauce!

WHY THESE STEPS?

- UNDERSTAND HOW TO DESIGN INTERACTIVE PRODUCTS THAT **FIT WITH WHAT PEOPLE WANT, NEED, AND MAY DESIRE**
 - KNOWLES AND HANSON IN A 2018 STUDY FOUND OLD PEOPLE DON'T PERCEIVE TECHNOLOGY AS USEFUL FOR THEM RATHER THAN NOT BEING ABLE TO USE THEM
- APPRECIATE THAT **ONE SIZE DOES NOT FIT ALL** (FOR EXAMPLE, TEENAGERS ARE VERY DIFFERENT TO GROWN-UPS)
- **IDENTIFY ANY INCORRECT ASSUMPTIONS** THEY MAY HAVE ABOUT PARTICULAR USER GROUPS. (FOR EXAMPLE, NOT ALL OLD PEOPLE WANT OR NEED BIG FONTS)
- BE **AWARE OF BOTH PEOPLE'S SENSITIVITIES AND THEIR CAPABILITIES**
 - PEOPLE MIGHT NOT LIKE THINGS THAT REMIND THEM OF THEIR AGING!

USABILITY GOALS

- **EFFECTIVE TO USE**
 - DOES IT DO WHAT YOU EXPECT IT TO DO
- **EFFICIENT TO USE**
 - DOES IT SUPPORT PEOPLE PERFORMING A TASK
- **SAFE TO USE**
 - DOESN'T ALLOW ERRORS
 - ALLOWS RECOVERY

USABILITY GOALS

- **HAVE GOOD UTILITY**
 - DOES IT PROVIDE THE RIGHT KIND OF FUNCTIONALITY NEEDED?
- **EASY TO LEARN**
 - HOW EASY IS TO LEARN TO DO THINGS?
- **EASY TO REMEMBER HOW TO USE**
 - HOW EASY IS TO GET BACK INTO DOING THINGS ESPECIALLY IF YOU COME BACK TO IT AFTER A WHILE?

USER EXPERIENCE GOALS

- SELECTING TERMS TO CONVEY A PERSON'S FEELINGS, EMOTIONS, AND SO FORTH CAN HELP DESIGNERS UNDERSTAND THE MULTIFACETED NATURE OF THE USER EXPERIENCE
- HOW DO USABILITY GOALS DIFFER FROM USER EXPERIENCE GOALS?
- ARE THERE TRADE-OFFS BETWEEN THE TWO KINDS OF GOALS?
 - (FOR EXAMPLE, CAN A PRODUCT BE BOTH FUN AND SAFE?)
- HOW EASY IS IT TO MEASURE USABILITY VERSUS USER EXPERIENCE GOALS?

USER EXPERIENCE GOALS

DESIRABLE ASPECTS

SATISFYING	HELPFUL	FUN
ENJOYABLE	MOTIVATING	PROVOCATIVE
ENGAGING	CHALLENGING	SURPRISING
PLEASURABLE	ENHANCING SOCIABILITY	REWARDING
EXCITING	SUPPORTING CREATIVITY	EMOTIONALLY FULFILLING
ENTERTAINING	COGNITIVELY STIMULATING	EXPERIENCING FLOW

UNDESIRABLE ASPECTS

BORING	UNPLEASANT
FRUSTRATING	PATRONIZING
MAKING ONE FEEL GUILTY	MAKING ONE FEEL STUPID
ANNOYING	CUTESY
CHILDISH	GIMMICKY

CULTURAL DIFFERENCES

5/21/2015 VERSUS 21/5/2015?

- WHICH SHOULD BE USED FOR INTERNATIONAL SERVICES AND ONLINE FORMS?
- WHY IS IT THAT CERTAIN PRODUCTS, LIKE SMARTPHONES, ARE UNIVERSALLY ACCEPTED BY PEOPLE FROM ALL PARTS OF THE WORLD, WHEREAS PEOPLE FROM DIFFERENT CULTURES REACT TO WEBSITES DIFFERENTLY?

ACCESSIBILITY AND INCLUSIVENESS

ACCESSIBILITY: THE EXTENT TO WHICH AN INTERACTIVE PRODUCT IS ACCESSIBLE BY AS MANY PEOPLE AS POSSIBLE

- FOCUS IS ON PEOPLE WITH DISABILITIES; FOR INSTANCE, THOSE USING ANDROID OS OR APPLE VOICEOVER

INCLUSIVENESS: MAKING PRODUCTS AND SERVICES THAT ACCOMMODATE THE WIDEST POSSIBLE NUMBER OF PEOPLE

- FOR EXAMPLE, SMARTPHONES DESIGNED FOR ALL AND MADE AVAILABLE TO EVERYONE REGARDLESS OF THEIR DISABILITY, EDUCATION, AGE, OR INCOME

DISABILITIES

- WHETHER SOMEONE IS DISABLED CHANGES OVER TIME WITH AGE, OR RECOVERY FROM AN ACCIDENT
- THE SEVERITY AND IMPACT OF AN IMPAIRMENT CAN VARY OVER THE COURSE OF A DAY OR IN DIFFERENT ENVIRONMENTAL CONDITIONS
- **DISABILITIES CAN RESULT BECAUSE TECHNOLOGIES ARE DESIGNED TO NECESSITATE A CERTAIN TYPE OF INTERACTION THAT IS IMPOSSIBLE FOR SOMEONE WITH AN IMPAIRMENT**

UNDERSTANDING DISABILITY

DISABILITIES CAN BE CLASSIFIED AS:

- **SENSORY** IMPAIRMENT (SUCH AS LOSS OF VISION OR HEARING)
- **PHYSICAL** IMPAIRMENT (HAVING LOSS OF FUNCTIONS TO ONE OR MORE PARTS OF THE BODY AFTER A STROKE OR SPINAL CORD INJURY)
- **COGNITIVE** (INCLUDING LEARNING IMPAIRMENT OR LOSS OF MEMORY/COGNITIVE FUNCTION DUE TO OLD AGE)

EACH TYPE CAN BE FURTHER DEFINED IN TERMS OF CAPABILITY:

- FOR EXAMPLE, SOMEONE MIGHT HAVE ONLY PERIPHERAL VISION, BE COLOR BLIND, OR HAVE NO LIGHT PERCEPTION

IMPAIRMENT CAN BE CATEGORIZED:

- **PERMANENT** (FOR INSTANCE, LONG-TERM WHEELCHAIR USER)
- **TEMPORARY** (THAT IS, AFTER AN ACCIDENT OR ILLNESS)
- **SITUATIONAL** (FOR EXAMPLE, A NOISY ENVIRONMENT MEANS THAT A PERSON CAN'T HEAR)

BEING COOL ABOUT DISABILITY

- PROSTHETICS CAN BE DESIGNED TO MOVE BEYOND BEING FUNCTIONAL (AND OFTEN UGLY) TO BEING DESIRABLE AND FASHIONABLE
- PEOPLE NOW REFER TO “WEARING THEIR WHEELS,” RATHER THAN “USING A WHEELCHAIR”

Fashionable leg cover designed by Alleles Design Studio

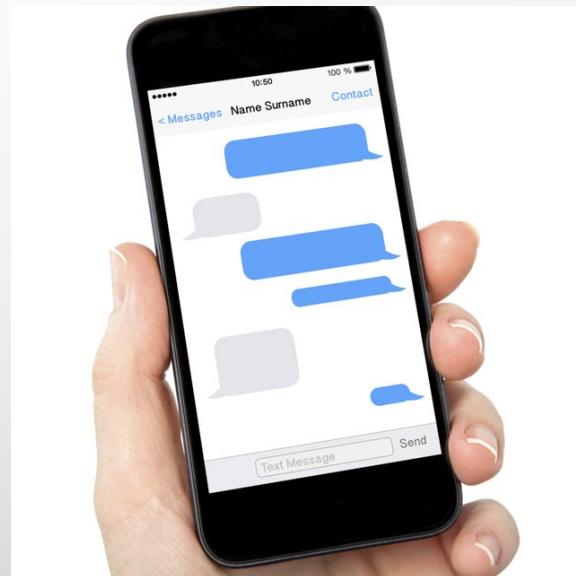


ACCESSIBLE DESIGN

- OFTEN LEADS TO PRODUCTS THAT ARE USEFUL FOR THE LARGER POPULATION
- **ACCESSIBILITY DESIGN LEADS TECHNOLOGICAL INNOVATION**



Eye glasses are the most obvious!
What was once assistive technology is
now a fashion statement



SMS/Text was designed for hearing impaired folks to use cellphones

**Do you feel modern technologies (you use)
are inclusive? (irrespective of disabilities)**

HOW TO DESIGN FOR "GOOD" INTERACTIVE EXPERIENCE

DESIGN PRINCIPLES

- GENERALIZABLE ABSTRACTIONS FOR THINKING ABOUT DIFFERENT ASPECTS OF DESIGN
- THE DO'S AND DON'TS OF INTERACTION DESIGN
- WHAT TO PROVIDE AND WHAT NOT TO PROVIDE AT THE INTERFACE
- DERIVED FROM A MIX OF THEORY-BASED KNOWLEDGE, EXPERIENCE, AND COMMON-SENSE
- 6 PRINCIPLES
 - VISIBILITY
 - FEEDBACK
 - CONSTRAINTS
 - LOGIC
 - CONSISTENCY
 - AFFORDANCES

VISIBILITY - POOR INTERFACE



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- THIS IS A CONTROL PANEL FOR AN ELEVATOR
- HOW DOES IT WORK?
- PUSH A BUTTON FOR THE FLOOR YOU WANT?
- NOTHING HAPPENS. PUSH ANY OTHER BUTTON? STILL NOTHING. WHAT DO YOU NEED TO DO?
- IT IS NOT VISIBLE AS TO WHAT TO DO!

VISIBILITY - IMPROVING ON A POOR INTERFACE



...WITH THIS ELEVATOR, YOU NEED TO INSERT YOUR ROOM CARD IN THE SLOT BY THE BUTTONS TO GET THE ELEVATOR TO WORK!

HOW WOULD YOU MAKE THIS ACTION MORE VISIBLE?

- MAKE THE CARD READER MORE OBVIOUS
- PROVIDE AN AUDITORY MESSAGE THAT SAYS WHAT TO DO (WHICH LANGUAGE?)
- PROVIDE A BIG LABEL NEXT TO THE CARD READER THAT FLASHES WHEN SOMEONE ENTERS
- MAKE RELEVANT PARTS VISIBLE
- MAKE WHAT HAS TO BE DONE OBVIOUS

Can you give me an example of an interaction where visibility mattered?

FEEDBACK

- **SENDING INFORMATION BACK TO THE USER ABOUT WHAT HAS BEEN DONE**
- INCLUDES SOUND, HIGHLIGHTING, ANIMATION, AND COMBINATIONS OF THESE
 - FOR EXAMPLE, WHEN SCREEN BUTTON IS CLICKED, IT PROVIDES SOUND OR RED HIGHLIGHT FEEDBACK:

 → “ccclichhk”

 → 

Can you give me an example of an interaction where lack of feedback was a problem?

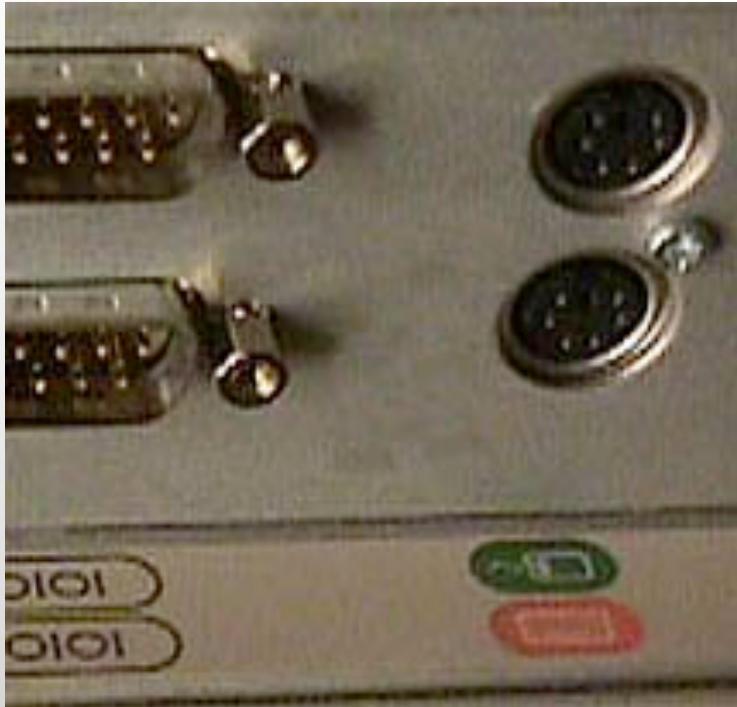
CONSTRAINTS

- RESTRICTING THE POSSIBLE ACTIONS THAT CAN BE PERFORMED
- HELPS PREVENT USER FROM SELECTING INCORRECT OPTIONS
- PHYSICAL OBJECTS CAN BE DESIGNED TO CONSTRAIN THINGS.
 - FOR EXAMPLE, THERE BEING ONLY ONE WAY YOU CAN INSERT A KEY INTO A LOCK
- **THIS SHOULD NOT BE POSSIBLE!**
 - LACK OF ADEQUATE CONSTRAINTS IN THE PIECES BEING ASSEMBLED



Can you give me an example of an interaction where lack of constraints was a problem?

LOGICAL OR AMBIGUOUS DESIGN?



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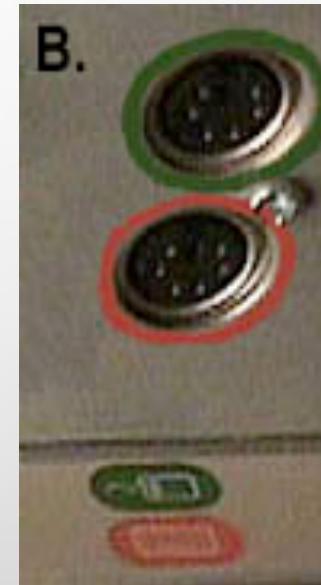
- WHERE DO YOU PLUG THE MOUSE?
- WHERE DO YOU PLUG THE KEYBOARD, IN THE TOP OR BOTTOM CONNECTOR?
- DO THE COLOR-CODED ICONS HELP?

HOW TO DESIGN THEM MORE LOGICALLY



www.baddesigns.com

(A) PROVIDES DIRECT
ADJACENT MAPPING
BETWEEN ICON AND
CONNECTOR



www.baddesigns.com

(B) PROVIDES COLOR
CODING THAT
ASSOCIATES THE
CONNECTORS WITH THE
LABELS

Have you ever dealt with ambiguous
design?

CONSISTENCY

- DESIGN INTERFACES TO HAVE SIMILAR OPERATIONS AND USE SIMILAR ELEMENTS FOR SIMILAR TASKS. (FOR EXAMPLE, ALWAYS USE CTRL KEY PLUS FIRST INITIAL OF THE COMMAND FOR AN OPERATION: CTRL+C, CTRL+S, CTRL+O)
- THE MAIN BENEFIT IS THAT CONSISTENT INTERFACES ARE EASIER TO LEARN AND USE

WHEN CONSISTENCY BREAKS DOWN

- WHAT HAPPENS IF THERE IS MORE THAN ONE COMMAND STARTING WITH THE SAME LETTER?
 - (FOR EXAMPLE, SAVE, SPELLING, SELECT, STYLE)
- YOU HAVE TO FIND OTHER INITIALS OR COMBINATIONS OF KEYS, THEREBY BREAKING THE CONSISTENCY RULE
 - (FOR EXAMPLE, CTRL+S, CTRL+SP, CTRL+SHIFT+L)
- **INCREASES LEARNING BURDEN ON USER, MAKING THEM MORE PRONE TO ERRORS**

Can you give me an example of an interaction where lack of consistency was a problem?

KEYPAD NUMBERS LAYOUT

A CASE OF INCONSISTENCY

(a) phones, remote controls

1	2	3
4	5	6
7	8	9
0		

(b) calculators, computer keypads

7	8	9
4	5	6
1	2	3
0		

AFFORDANCES: TO GIVE A CLUE

- **REFERS TO AN ATTRIBUTE OF AN OBJECT THAT ALLOWS PEOPLE TO KNOW HOW TO USE IT.**
 - (FOR EXAMPLE, A MOUSE BUTTON INVITES PUSHING, A DOOR HANDLE AFFORDS PULLING)
- NORMAN (1988) USED THE TERM TO DISCUSS THE DESIGN OF EVERYDAY OBJECTS
- HAS SINCE BEEN POPULARIZED IN INTERACTION DESIGN TO DISCUSS HOW TO DESIGN INTERFACES
 - (FOR EXAMPLE, SCROLLBARS TO ENABLE MOVING UP AND DOWN; ICONS TO CLICK ON)

Can you give me an example of affordances of objects?

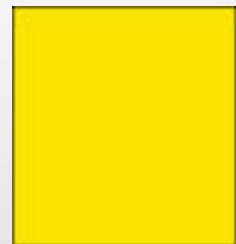
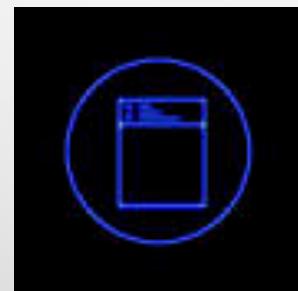
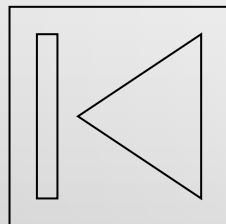
WHAT DOES “AFFORDANCE” HAVE TO OFFER INTERACTION DESIGN?

- **INTERFACES ARE VIRTUAL AND DO NOT HAVE AFFORDANCES LIKE PHYSICAL OBJECTS**
- NORMAN ARGUES THAT IT DOES NOT MAKE SENSE TO TALK ABOUT INTERFACES IN TERMS OF ‘REAL’ AFFORDANCES
- INSTEAD, INTERFACES ARE BETTER CONCEPTUALIZED AS ‘**PERCEIVED AFFORDANCES**:
 - LEARNED CONVENTIONS OF ARBITRARY MAPPINGS BETWEEN ACTION AND EFFECT AT THE INTERFACE
 - SOME MAPPINGS ARE BETTER THAN OTHERS
 - E.G., 1 YEAR OLD KIDS HAVE SEEN USE TABLETS BY AUTOMATICALLY ZOOMING IN AND OUT AND SCROLLING

ACTIVITY

VIRTUAL AFFORDANCES

- HOW DO THESE SCREEN OBJECTS AFFORD?
- WHAT IF YOU WERE A NOVICE USER?
- WOULD YOU KNOW WHAT TO DO WITH THEM?



SUMMARY

- INTERACTION DESIGN IS CONCERNED WITH **DESIGNING INTERACTIVE PRODUCTS** TO SUPPORT HOW PEOPLE COMMUNICATE AND INTERACT IN THEIR EVERYDAY AND WORKING LIVES
- IT IS **CONCERNED WITH HOW TO CREATE QUALITY USER EXPERIENCES** FOR SERVICES, DEVICES, AND INTERACTIVE PRODUCTS
- IT IS **MULTIDISCIPLINARY, INVOLVING MANY INPUTS FROM WIDE-REACHING DISCIPLINES AND FIELDS**
- **IT'S ALL ABOUT THE PEOPLE!!**



That's all Folks!
Any Question?