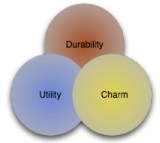
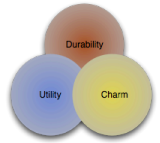


Class 1 CS597

Gregg Vesonder
Computer Science



Roadmap

- Schedule, class rundown
- About me and about you
- The Project
- HCI overview
- NIM Overview

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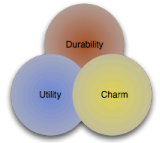

Vesonder's Relevant Bio

- Software for 40+ years
- PhD in Cognitive Psychology - Computer modeling of learning and memory
- 6 year graduate research assistant at Learning Research and Development Center
- 3 years as Personnel Sub System Specialist at Bell Labs
- R&D director for AT&T Watson (speech recognition) and Natural Voices TTS
- [Bell|AT&T] labs for 30+ years
- Dozens of projects
- Architecture Reviewer and served software engineering corporate stint at Bell Labs
- Adjunct at University of Pennsylvania and Stevens Institute of Technology

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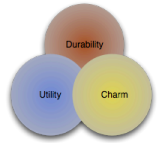
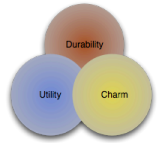


True Confessions

- First time for this course
- EVERYTHING WILL BE DYNAMIC
- Basis for book
- CODING IS NOT OPTIONAL IT IS REQUIRED
  - Javascript, not a course on javascript but …
  - Html5
  - ?
- Coding and me
- Design tools too – moqups
  - http://www.fuelyourcreativity.com/17-great-wireframing-tools-for-web-designers/



Schedule

- Martin Luther King Day, Jan 21– no class
- Jan 28 – Nim paper design due
- Feb 4 – Nim code due
- Feb 11– no Hoboken class, moodle class
- Tuesday, Feb 19 no class – will double up
- March 4th class and mid term on Moodle
- Project report every session in class after Jan 28
- Design review
- Final "Presentation" of HCI Projects April 22 and 29
- Final on Moodle ?.
- Missing schedules will result in grade deduction unless a prior arrangement has been made - I am flexible but …

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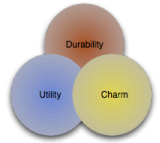
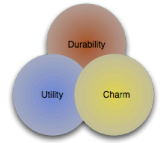


Grade Breakdown

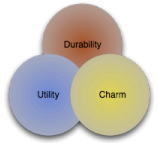
- Homework 10%
- Mid Term 25%
- Final 30%
- Project 35%
- **TOTAL 100%**
- Missing homework, 1st .1 pts, 2nd 1pt, 3rd 1 letter grade



Participation

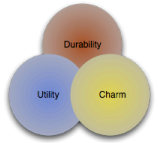
- Class
- Moodle Main forum
- Software universe google group

- **YOUR EXPECTATIONS**



Term Project

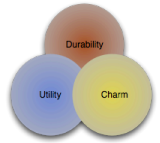
- **Team of 2-4 folks**
- provide a design in a UI tool
- conduct session with users about what the needs are -- there should be data collection with questionnaires -or structured interview, ...
- Decide on a primary "E" that you will focus on improving
- establish personas-construct a low to medium resolution prototype – in code
- do at least one (more is better) iteration testing usability on the user population, perhaps with several versions, data driven
- construct a "final" design based on the results and have working code
- Demonstrate and present final design, studies and personas in a short power point presentation



Evaluate User Experience, 5 E's

DIMENSION	KEY NEEDS	Design Tactics
Effective	Accuracy	Focus on places in the interface for potential error and protect against them. Look for opportunities to provide feedback and confirmations
Efficient	Operational Speed	Present only most important information. Work on smooth, direct navigation. Interaction style should minimize actions required
Engaging	Attract users	Consider what aspects of the product are most attractive and incorporate into design
Easy to learn	Just-in-time instruction	Step by step interfaces that help users navigate through complex tasks. Provide training in small chunks if possible
Error tolerant	Validation	Look for places where selection and calculators can replace data entry. Error messages provide opportunities to correct problems

Quesenbery(2003) in Stone, p.109



HCI Techniques

Focus Group

Side by Side
(Contextual Inquiry)

Interview

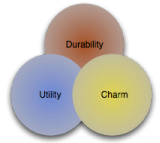
Card Sort

Participatory Design

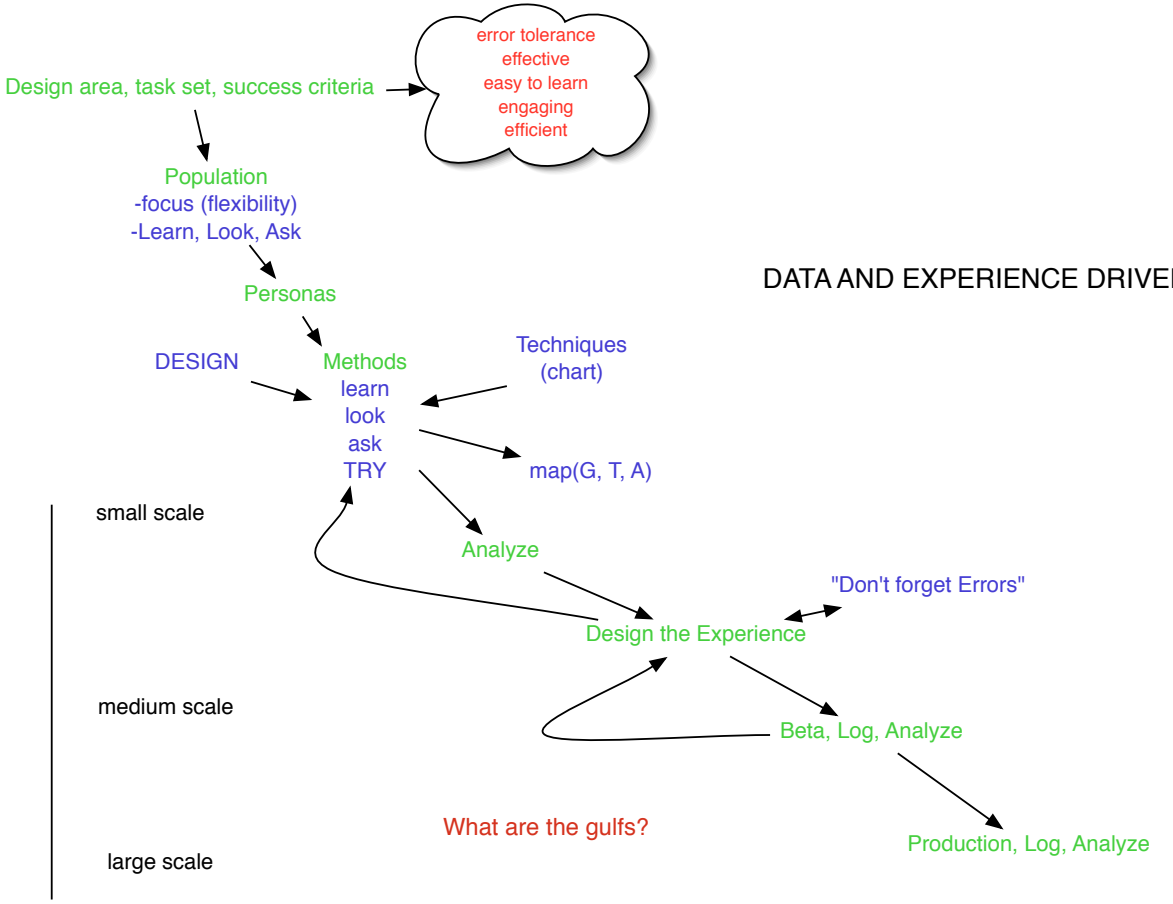
Paper Prototyping

Usability Test

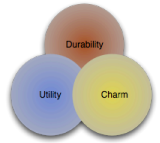
Data Analysis



You May Recall



DATA AND EXPERIENCE DRIVEN!



Research Methods

Statistical
many people

Surveys

Video
Ethnography

Saying — Doing

Focus Groups

Observational
Techniques

Interpretive
few people

First an abbreviated history of HCI

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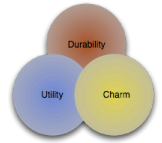
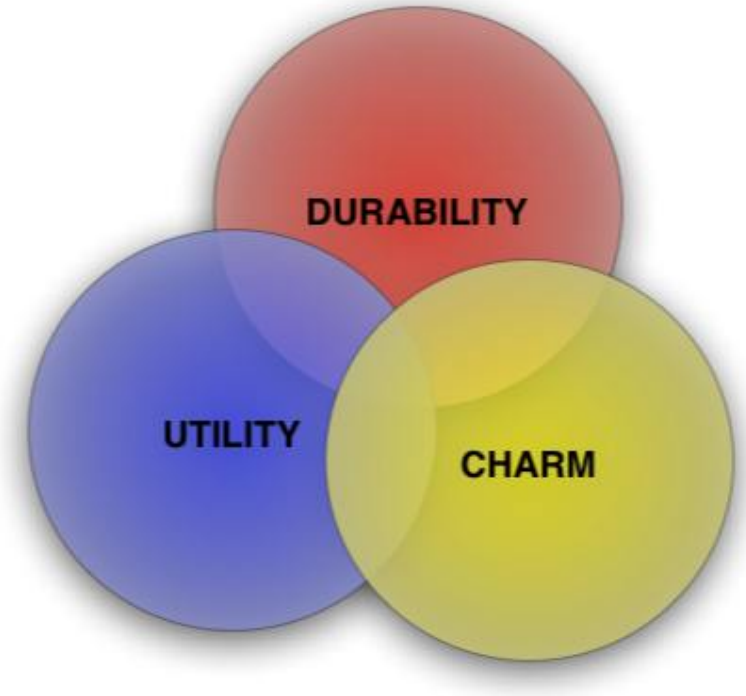
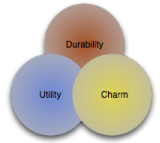


Firmitas, Utilitas, Venustas





Software Engineering Principles

- Patterns
- Documentation
- Code reviews
- Coding Standards
- Algorithms
- Performance analysis
- GitHub | Google Docs | …
- …

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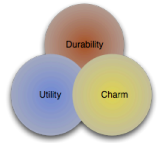
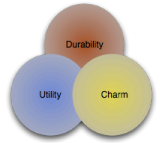


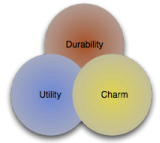
HCI Overview

- Motivation for HCI the Benefits
- Definition of HCI
- Current view of Cognitive Science
- Interaction Design
- User Centered Design
- Evaluation
- Heuristics



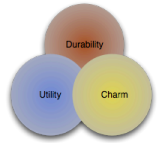
Why Spend Effort on the UI?

- Increased efficiency
- Improved productivity
- Reduced errors
- Reduced training - strive for game like training
- Improved acceptance



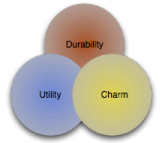
Definition

- This definition emphasizes the benefits
- US Military Standard for Human Engineering Design Criteria (1999):
  - Achieve required **performance** by operator, control and maintenance personnel
  - **Minimize** skill and personnel requirements and training time
  - Achieve require **reliability** of personnel-equipment/ software combinations
  - Foster **design standardization** w/in and among systems



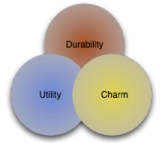
Yet Another Definition

- But then there are other approaches and motivations
- Raskin: An interface is humane if it is responsive to human needs and considerate of human frailties
  - Boot up - that the user should not be kept waiting unnecessarily is an obvious and humane design principle
  - Users should set the pace of interaction
  - Windows - hitting start to shutdown
- Asimov paraphrase: "A computer shall not harm your work or, through inaction, allow your work to come to harm"
- A computer should not waste your time or require you to do more work than is strictly necessary



Interaction Design

- Identify needs and establish requirements for the user experience
- develop alternative designs that meet the requirements
- Build interactive versions of the designs so that they can be communicated and assessed
- Evaluate throughout the process what is being built and the user experience it offers



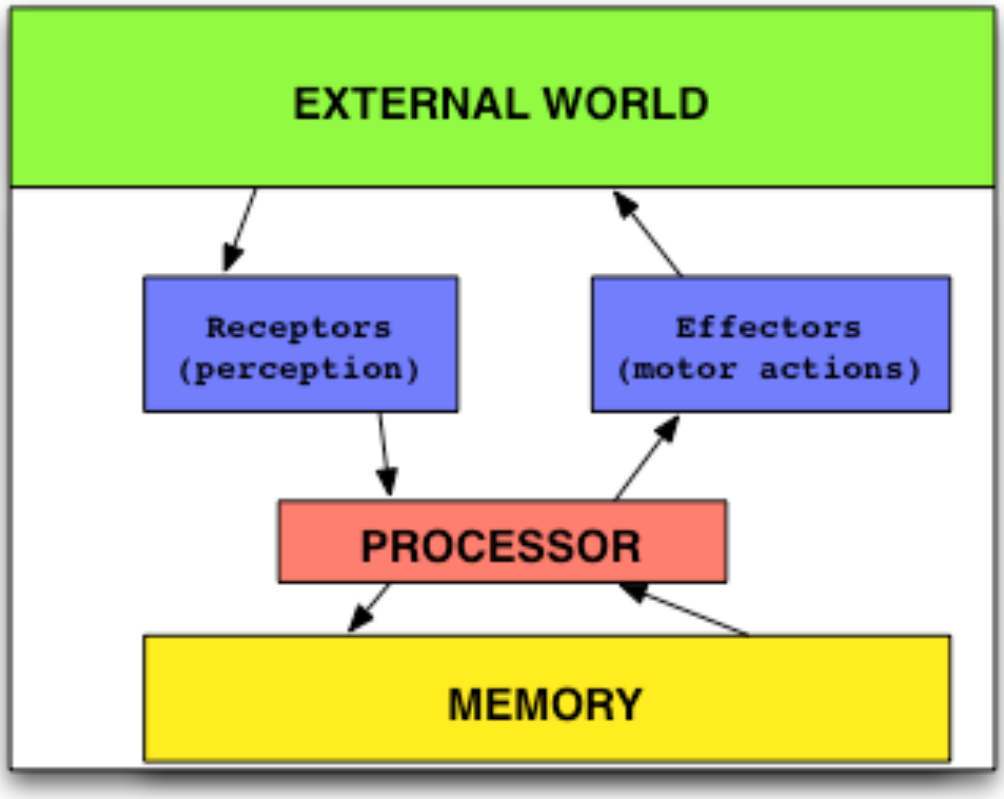
Approach to UI

- So how do we get there?
- The user interface is **the system** to the user- not a novel approach, also known as User Centered Design
  - **Cognitive sciences (including "humanities") ***
  - **Artistic Design**
  - **Ergonomics ***
- User Interface is the point of view of the user! Includes hardware and software
- Do not separate design of functionality from design of interface - remember "User manual first" (combines functionality and interface) attitude to interface development
- Overlearning is powerful - sometimes RPN is the right thing!
- Mental model (desktop) vs. conceptual model/design model - have to be closely related
- First a bit about ourselves

User Experience!

Human Information Processor

AI agent view



The Human Information Processing System - Atkinson and Shiffrin

INPUT

Sensory Store

Short Term Memory

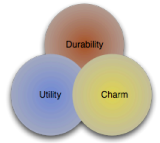
Long Term Memory

Displacement/ Decay

Decay/ Displacement

Repetition

Interference

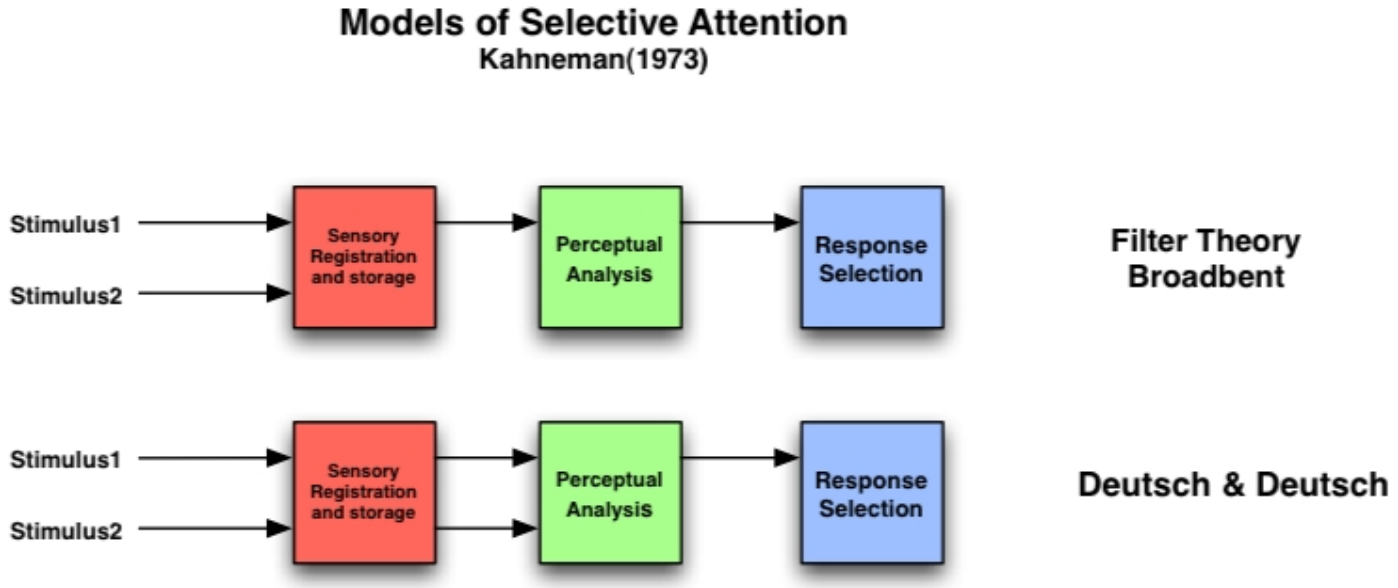


Conscious vs. Unconscious
(from Raskin, 2000)

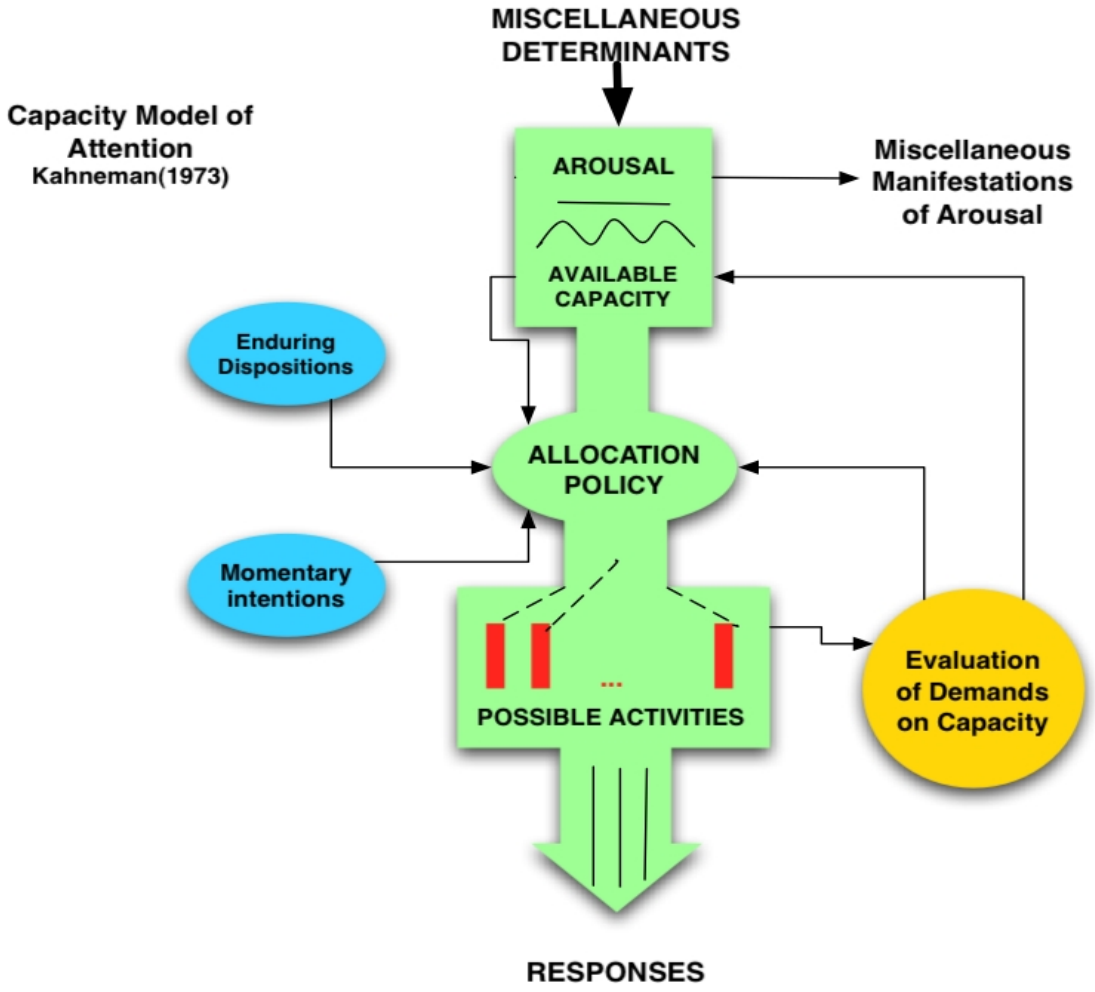
PROPERTY	CONSCIOUS	UNCONSCIOUS
Engaged by	Novelty, Emergencies, Danger	Repetition, Expected events, Safety
Used in	New circumstances	Routine situations
Can handle	Decisions	Non-branching tasks
Accepts	Logical propositions	Logic or inconsistencies
Operates	Sequentially	Simultaneously
Controls	Volition(free will)	Habits
Capacity	Tiny	Huge
Persists for	10ths of seconds	Decades (lifelong?)

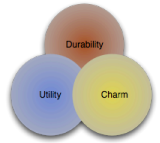
Conscious ≈ STM, Unconscious ≈ LTM

Your Attention Please!



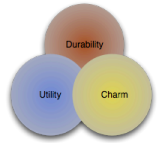
Saturated Yet?





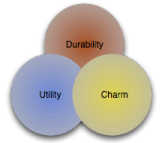
Psychological Principles

- Working memory (STM) is only around 5 - auditory tasks depend on working memory
- Long Term Memory is slow and things may be available but not accessible - multiple coherent cues make it easier
- Attention can be overloaded and depends on the state of the individual
- Recognition is easier than recall
- Remember issues of Just Noticeable Differences, JNDs
- Expert Novice distinctions are a factor in enjoyment of the system

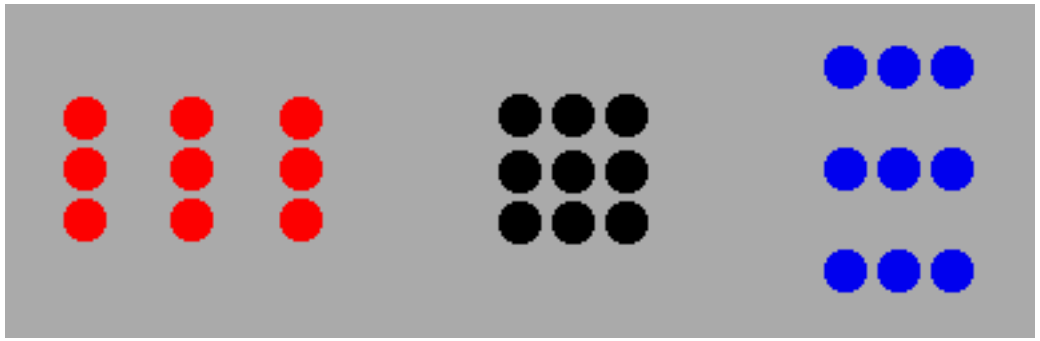


More Principles

- Humans receive more information through visual system and store it spatially -- mental rotation studies, the more rotation, the longer to respond
- Humans tend to structure what they see to form cohesive patterns -- 5 Gestalt laws
  - **Proximity** - we tend to group things together that are close together in space
  - **Simularity** - we tend to group things together that are similar
  - **Continuation** - we tend to perceive things in good form
  - **Closure** - we tend to make our experience as complete as possible
  - **Figure and ground** - we tend to organize our perception by distinguishing between a figure and a background



Proximity



Thanks to Psy280 notes from Toronto!

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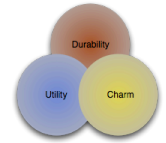
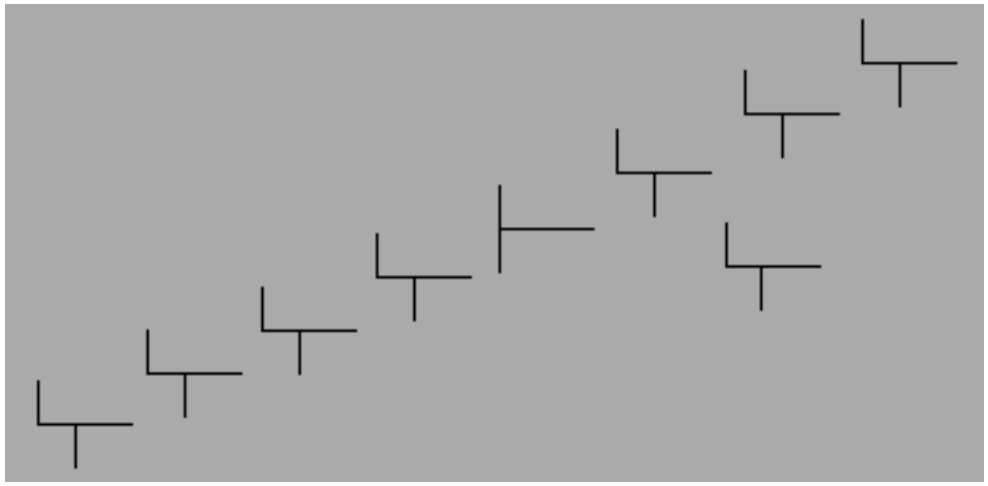


Continuation



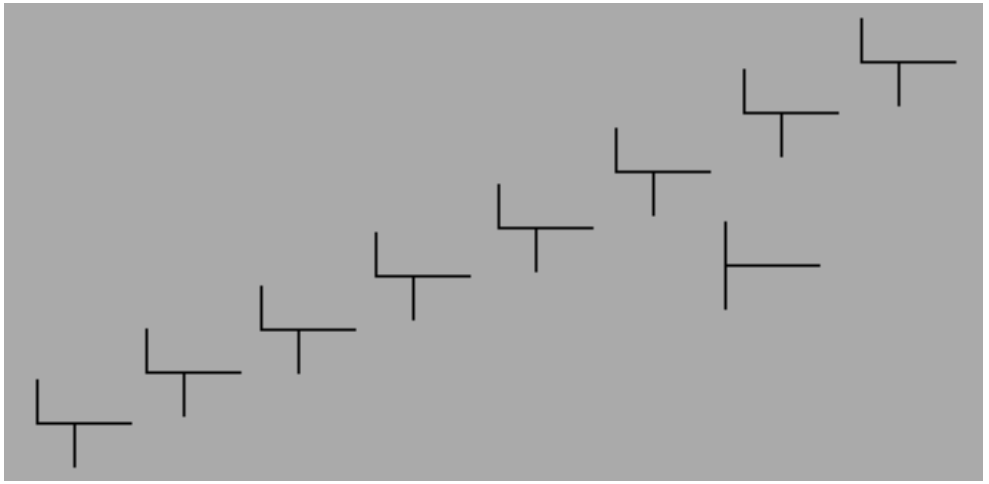
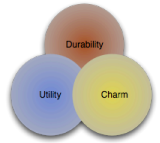
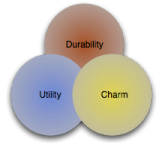


Figure - Ground



Still More Principles

- **Multimodal information** is easier to use than single mode (text + image + sound) increasing the richness of memory -- similar to mnemonic tricks such as the method of loci -- depth of processing!

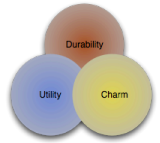


Cognitive and Perceptual Abilities

(we just scratched the surface in our discussion and will cover more as appropriate)

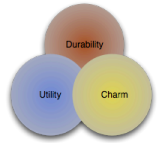
- Human cognitive processes
  - Short term memory
  - Long term memory and learning
  - Problem solving
  - Decision making
  - Attention and set (scope of concerns)
  - Search and scanning
  - Time perception

- Factors affecting perceptual and motor performance:
  - Arousal and vigilance
  - Fatigue
  - Perceptual (mental) load
  - Knowledge of results
  - Boredom and monotony
  - Sensory deprivation
  - Sleep deprivation
  - Anxiety and fear
  - Isolation
  - Aging
  - Drugs and alcohol
  - Circadian rhythms



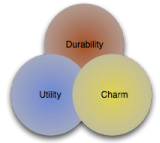
PAR

- Is your experience up to PAR?
- Perception
- Attention
- Retention



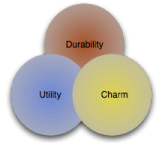
Other Psychological Differences

- Personality differences, gender, cultural -- be sensitive to names: Kill, abort, master, slave
- Myers-Briggs Type Indicator no wrong answer (example of personality tests):
  - Extroversion-introversion
  - Sensing vs Intuition
  - Perceptive vs Judging
  - Feeling vs thinking
  - Matching personality types to professions, example of psychological scales, there are many of them!

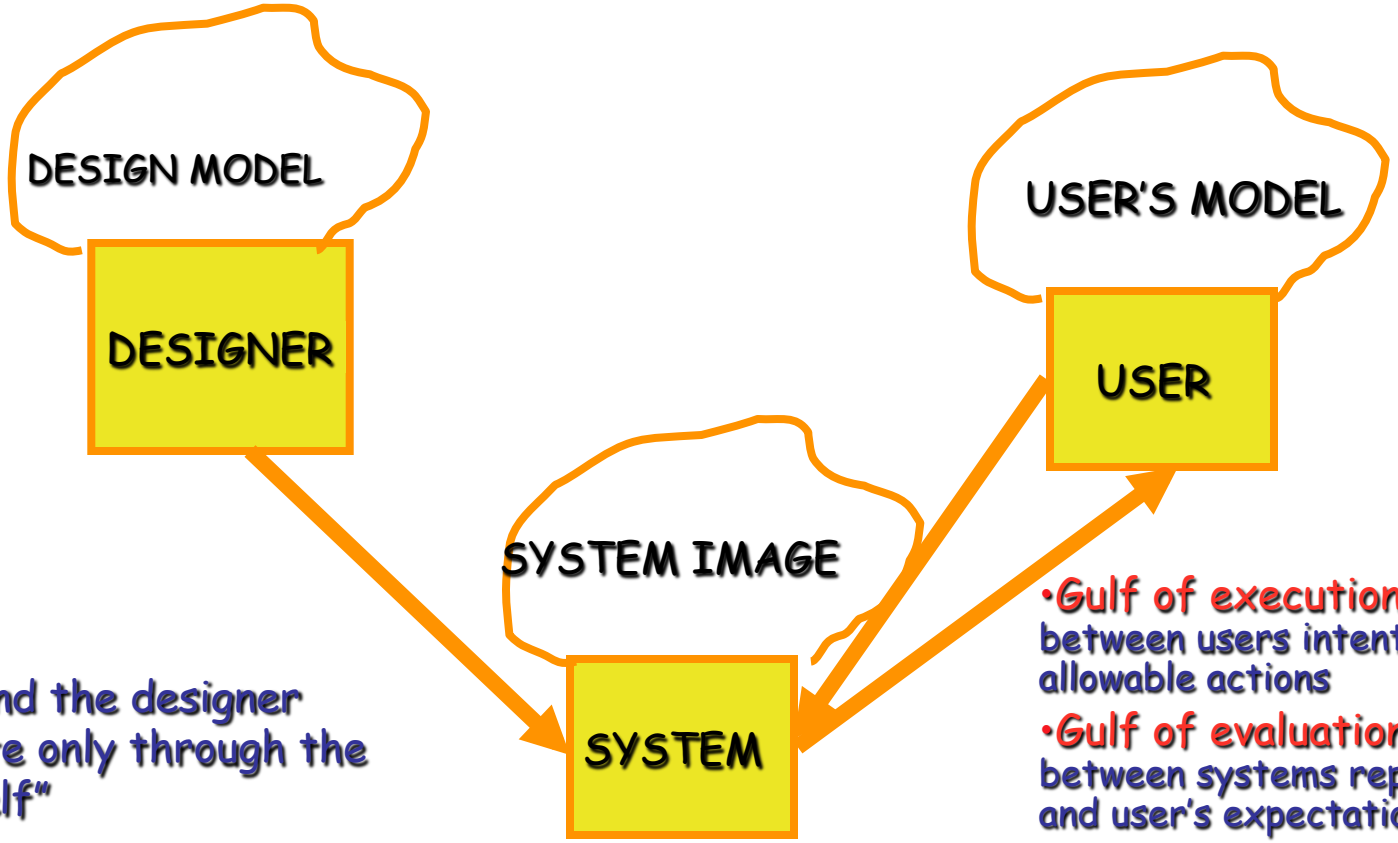


OPD-2

- Cultural and International Diversity
  - Still largely unexplored but important in international market
  - Respect for tradition vs novelty
  - Japanese, Chinese may scan screen in different order
  - Sampling of other international issues:
    - Numeric (,.) and currency formats
    - Weights and measure
    - Names and titles
    - National identification
    - Etiquette, policies, tone, formality
    - Government regulations
    - Surfaces in out sourcing too
  - On to design



Knowledge in the World and in the Head

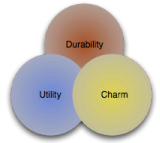


"the user and the designer communicate only through the system itself"

- Gulf of execution - mismatch between users intention and allowable actions
- Gulf of evaluation - mismatch between systems representation and user's expectations

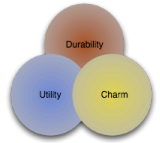
The Design Challenge

Norman!



Secret Sauce (Sharp,et.al.)

- Taking into account what people are good and bad at
- Considering what might help people with the way they are currently doing things
- Thinking through (and acting through) what might be a quality user experience
- Listening to what people want and getting them involved in the design - What a concept!
- Using "tried and tested" user based techniques during design



NIM

- Start with 21 sticks (standard game)
- Players selects 1, 2 or 3 sticks
- Player selecting last stick loses
- example
- Want to develop a learning program

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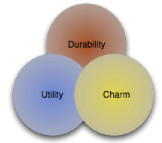

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