The Design Cycle and Brainstorming

CS160: User Interfaces

Maneesh Agrawala and Jeffrey Nichols

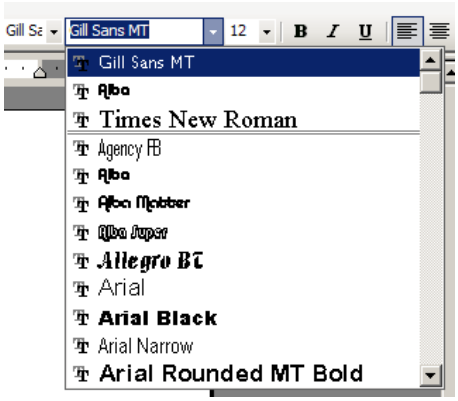
Instructor: Jeffrey Nichols

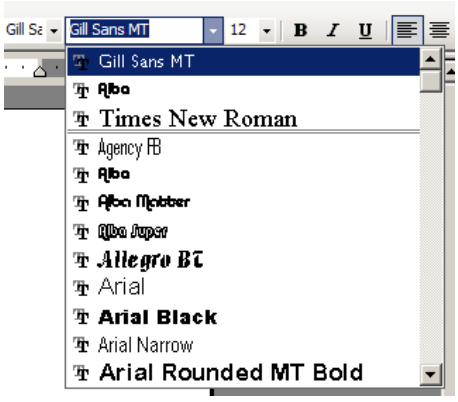
Researcher at IBM Almaden

- San Jose, CA
- Joined IBM December 2006

Work in HCI, Mobile, Web

- Automatic interface generation for handheld devices
- Multi-device communication infrastructures
- Programming-by-demonstration and end-user programming for the web

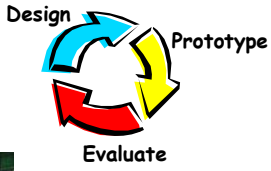




Visual feedback showing available fonts
Most recently used fonts at top (is this good or bad?)

Review

Course overview



Project theme

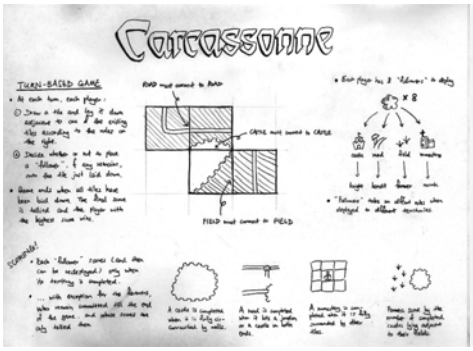
Course mechanics

Due Today (before class)

- Creation of wiki account
- Course petition
- Design assignment: Play and Analyze a Game
- 1 comment per lecture (cs160/cs160Readings)

Design Assignment Examples

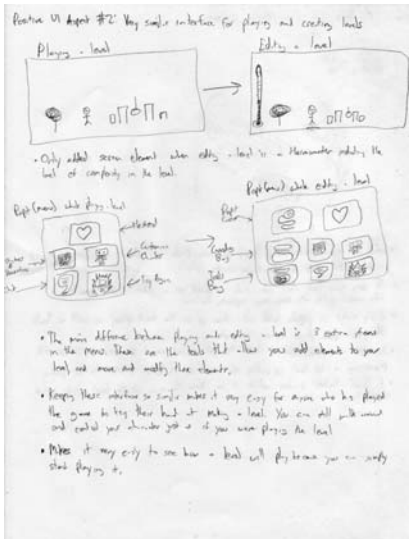
Game Description



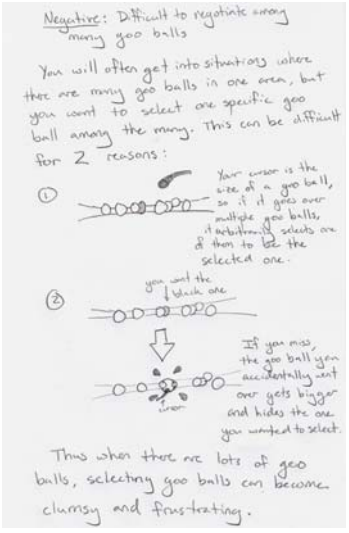
Positive Aspect

Design Assignment Examples

Positive Aspect



Negative Aspect



Assigned Today

No Design Assignment this week

Individual Project Propsal: Due Feb 2

Propose idea for course project

- Based on "games with a purpose" theme
- Exciting to you
- Be creative!
- Consider needs of a well-defined target user group
- Include sketches as appropriate

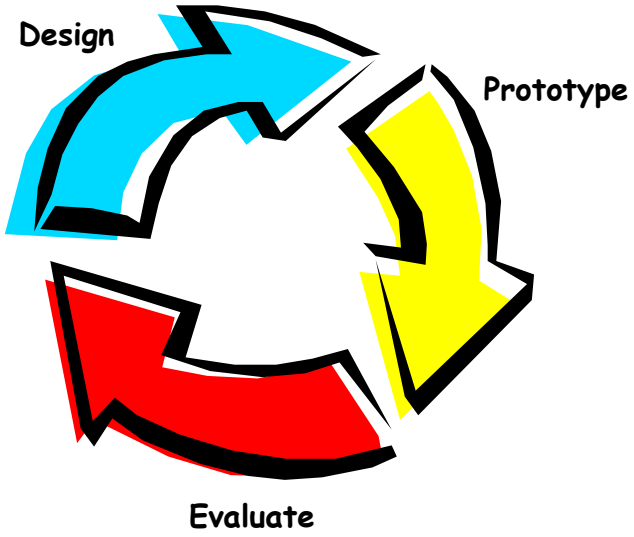
Grading details on the web (20 points total)

Description must be posted to wiki before class Feb 2.

Topics

- The Design Cycle
- Brainstorming

The Design Cycle

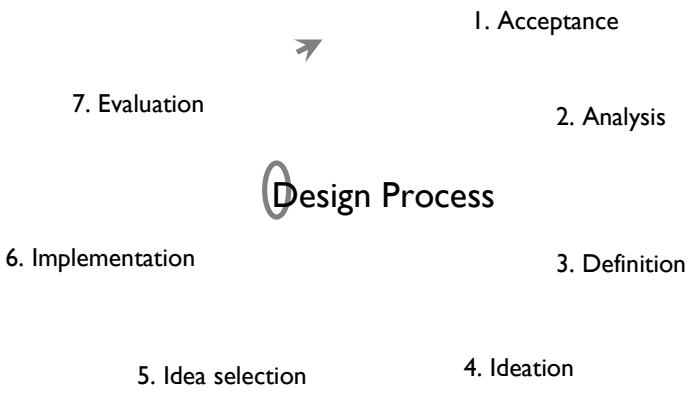


The Art of UI Design

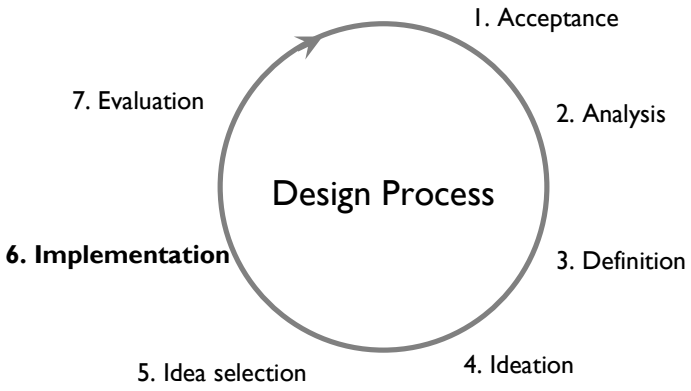
But, there's more to it …

A soufflé is eggs, butter, milk & flour, but the difference between soaring and sinking is in the execution.

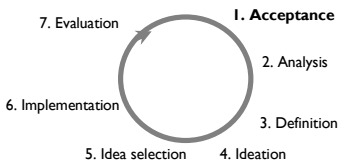
The Design Process [Koberg & Bagnall]



The Design Process [Koberg & Bagnall]



Acceptance

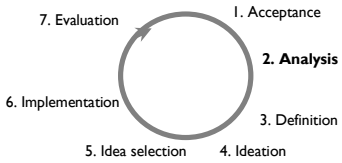


Getting started
- Because of a deadline
- Because of possible reward
- Because you are forced to

Commitment
- Time
- Resources
- Responsibility

Key is to set motivation

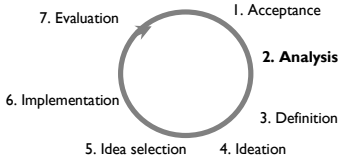
Analysis



Understand users and tasks

Who are the users?
What are their tasks?
Observe and test, don't guess

Analysis

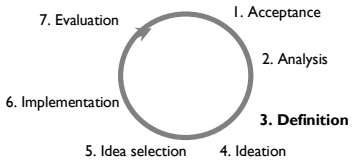


Understand users and tasks

Who are the users?
What are their tasks?
Observe and test, don't guess

Tools
- Notebook
- Tape recorder
- Camera
- Video camera

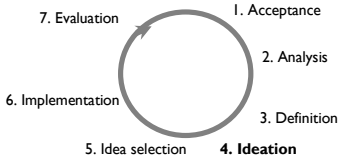
Definition



Focus on the problem
- Choose appropriate level of detail

Not "bicycle cup-holders" but "helping cyclists to drink coffee without accidents"

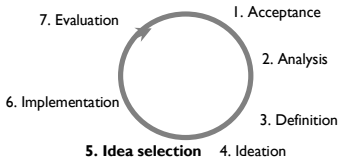
Ideation



Brainstorming
- Stretch mental muscles
  - Loosen up with simple games
  - Do homework
  - Seed with related ideas/objects
- Get physical
  - Sketch
  - Make models
  - Act out
- IDEO rules
  - One conversation at a time
  - Stay focused
  - Encourage wild ideas
  - Defer judgment
  - Build upon idea from others

Aim for quantity

Idea Selection



Define importance of each idea

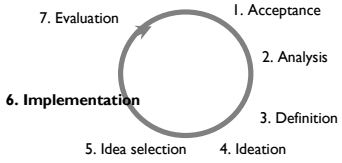
- Does it address problem
- Will target users like it
- Is hardware available
- Is software available
- What is the cost
- Market window
- …

Rank ideas according the your criteria

Pick top N

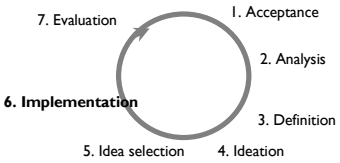
- Choices depend on resources and stage of the project

Implementation



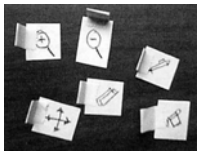
Scale up low → high fidelity

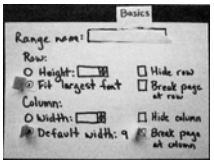
Implementation

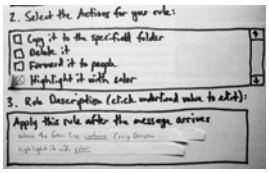


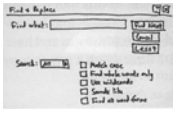
Scale up low → high fidelity

- Low-fidelity (quick, cheap, dirty)
  sketches, paper models, foam core, video, …









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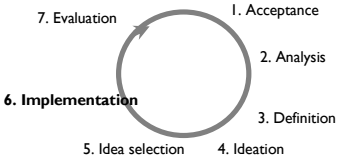
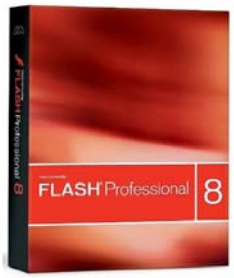
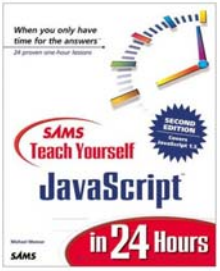


Scale up low → high fidelity

- Low-fidelity (quick, cheap, dirty)
  sketches, paper models, foam core, …
- Medium fidelity (slower, more expensive)
  Flash, JavaScript, AJAX, …





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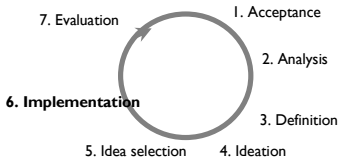
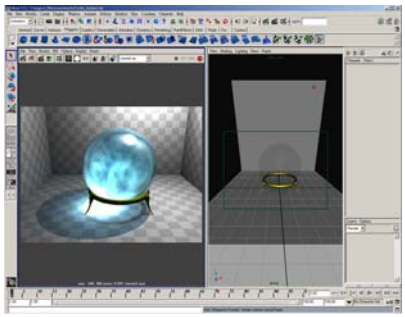


Scale up low → high fidelity

- Low-fidelity (quick, cheap, dirty)
  sketches, paper models, foam core, …
- Medium fidelity (slower, more expensive)
  Flash, JavaScript, AJAX, …
- High fidelity (slowest, most expensive)
  The full interface



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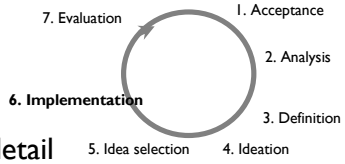
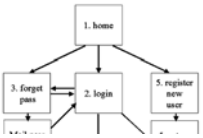


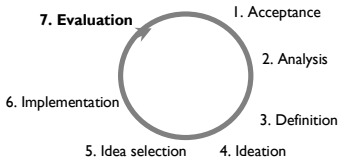
Web design

- Sites *created* at multiple levels of detail
- Sites iteratively *refined* at all levels of detail
- Iterate quickly to see what works

Site Maps → Storyboards → Schematics → Mock-ups



Evaluation

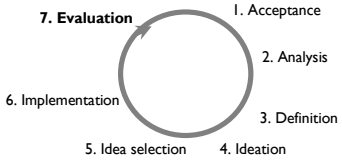


Many types of evaluation:

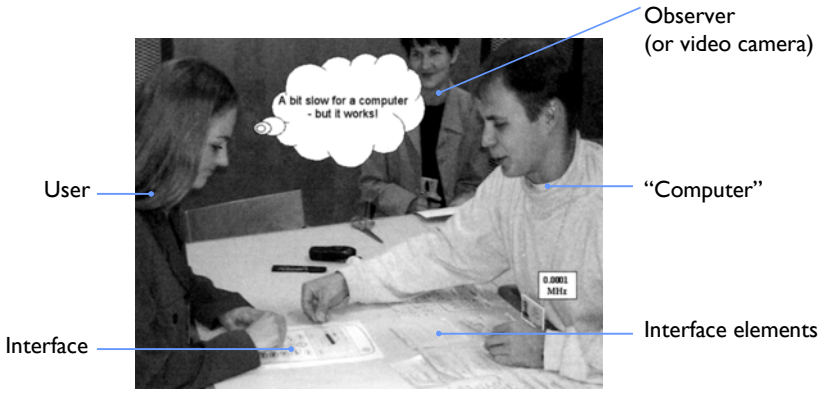
- Prototype walkthroughs
- Think-aloud studies
- Wizard-of-Oz
- Performance comparisons

Type of evaluation chosen depends on the level of implementation, etc.

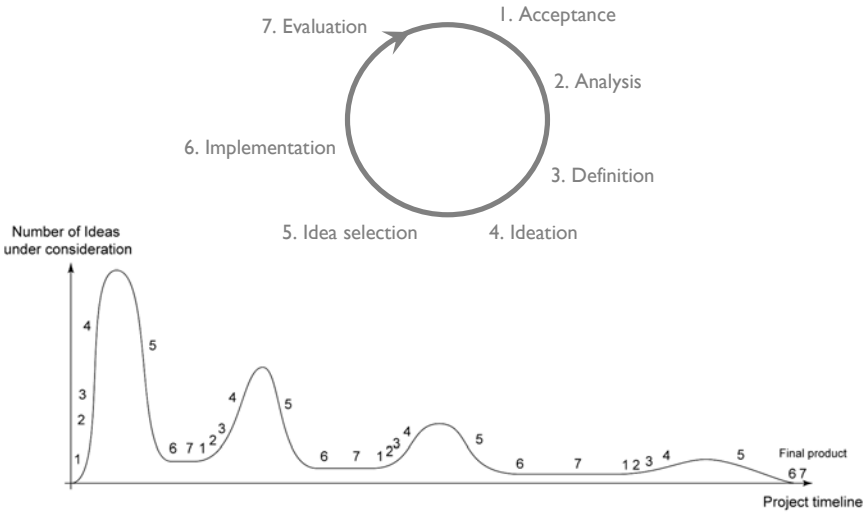
Evaluation



Walk-through prototype design



Design Cycle Over Project Lifespan



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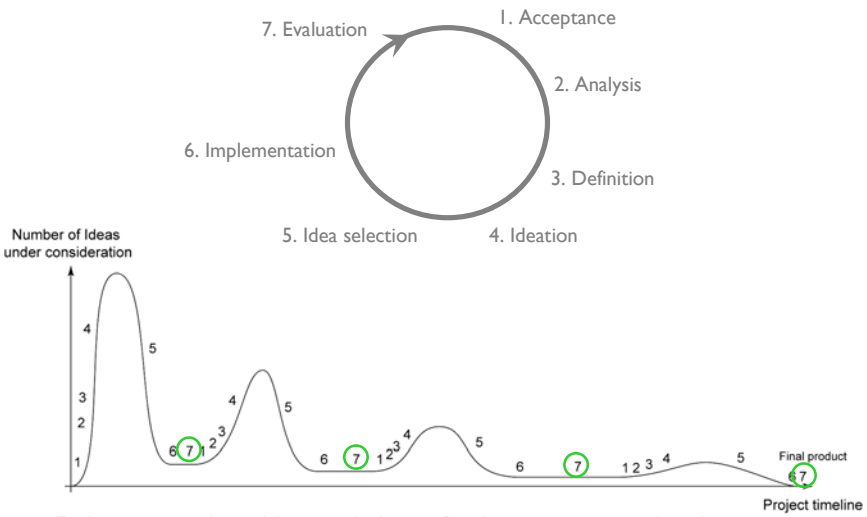
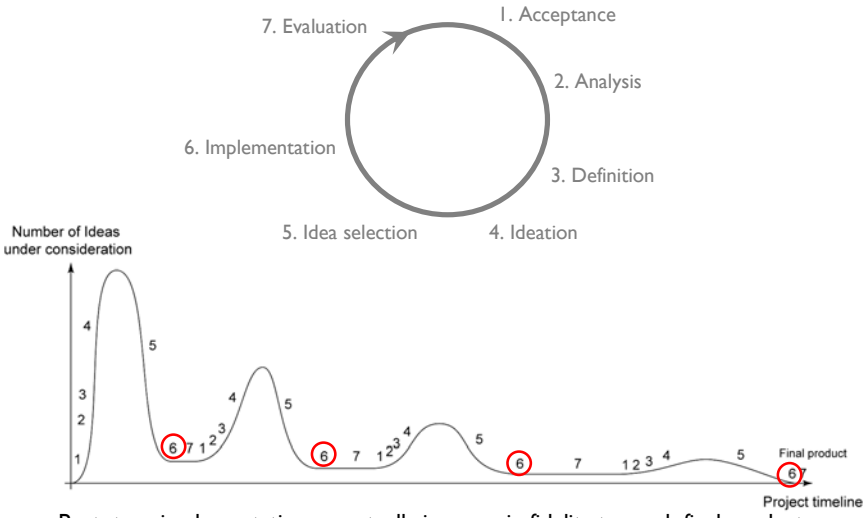


Evaluation reveals problems with design. Re-design requires cycling the process.

Design Cycle Over Project Lifespan



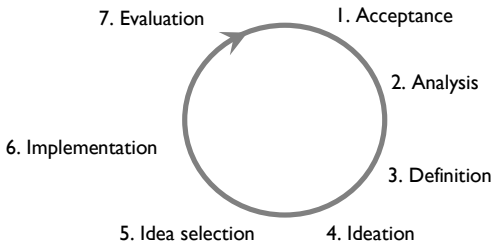
Prototype implementations eventually increase in fidelity to reach final product

Comparison

[Lewis & Rieman]

- Who will use?
- What are their tasks?
- Plagiarize
- Rough out a design
- Think about design
- Create a prototype
- Test it with users
- Iterate
- Build a production version
- Track use
- Evolve the design

[Koberg & Bagnall]



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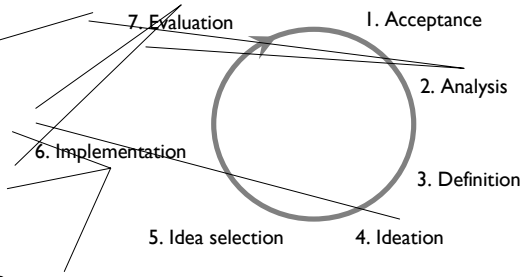
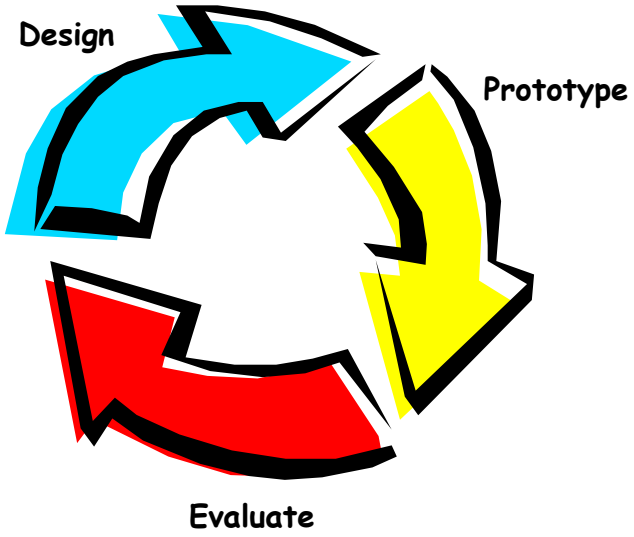
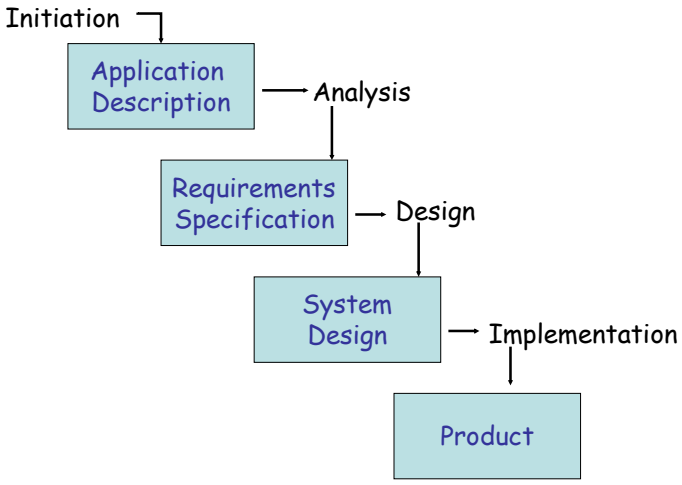




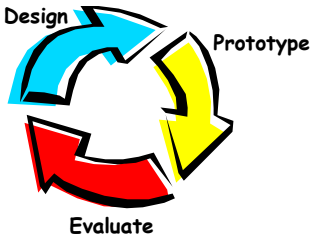
Waterfall Model (Soft. Eng.)

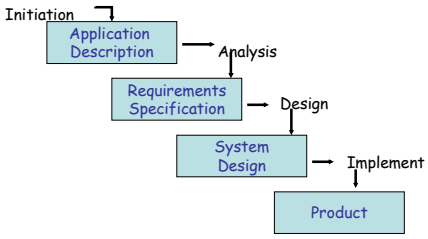


Comparison

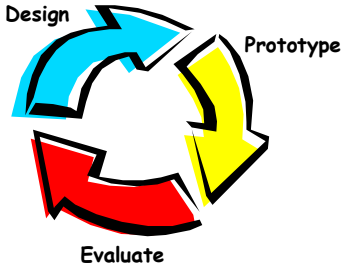
Focus differs

- WF has no feedback
  - High cost of fixing errors
  - Increases by 10x at each stage
  - Iterative design finds problems earlier





Video: The Deep Dive



How well do the follow the cycle?
What do they do for each step of the cycle?
How many cycles do you think they went through?

Brainstorming

The Psychology of Creativity

Conformity: the enemy of creativity

Groups and organizations encourage conformity

Part of "brand" or "corporate identity"

The Psychology of Creativity

Pressure to conform affects judgment and perception:

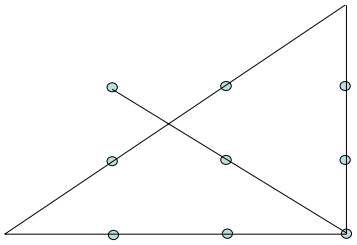
- The emperor's new clothes
- McCarthyism: if you're not one of us, you're one of them…

People in minority will adopt majority opinion and even manufacture their own explanation of it.

Enhancing Creativity

Thinking outside the box:

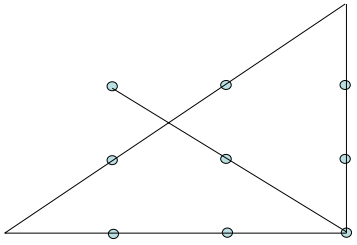
Draw a series of 4 straight lines through all the points below, without lifting pen from paper:



Why Is This Hard?

We adopt expectations about the solution

- Based on conventions
- Based on what we believe the questioner expects



Creativity and Dissent

Authentic dissenters – people who really disagree with group – can enhance group creativity

Their opinion needn't be right – but they can free the group from stagnant thinking.

The originality of the minority stimulates the majority

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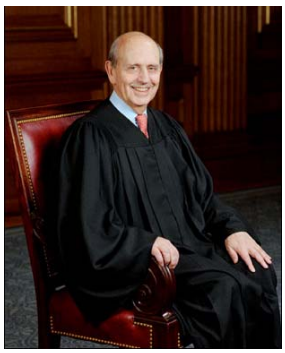


Dissent and Authenticity

The benefits of dissent are weakened if

Dissent is not real: A deliberate "devil's advocate" in the group can actually stifle dissent, because the majority know the opinion is manufactured.

Dissent is not encouraged: Polite or pro-forma acceptance is not enough.

IDEO's Brainstorming Rules

1. Sharpen the Focus
2. Playful Rules
3. Number your Ideas
4. Build and Jump
5. The Space Remembers
6. Stretch Your Mental Muscles
7. Get Physical

Aim for quantity

Hope for quality

Sharpen the Focus

Posing the right problem is critical – neither too narrow, nor too fuzzy

Not "bicycle cup-holders" but "helping cyclists to drink coffee without accidents"

Number Your Ideas

Obvious but very useful

Helps keep track of them when the brainstormer is successful (and 100 or more ideas are in play)

Allows ideas to take on an identity of their own

Build and Jump

Build to keep momentum on an idea:

- "shock absorbers are a great idea; what are other ways to reduce coffee spillage on bumps?"

Jump to regain momentum when a theme tapers out:

- "OK, but what about hands-free solutions?"

Concept Refinement

Premature idea rejection is a serious barrier to good design.

One big differentiator between good designers and great ones is the latter's ability to successfully develop unusual ideas

This requires a strong instinct to be able to distinguish fatal vs. minor flaws in an idea

The Space Remembers

Covering whiteboards or papering walls with text is extremely useful in group work.

It's a very effective form of external (RAM) memory for group

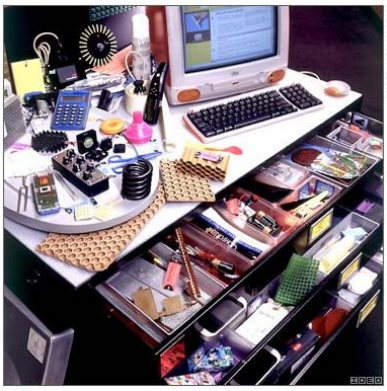
Even better, its shared RAM. Helps group share understanding

Stretch your Mental Muscles

Warmups: word games, puzzles

Get immersed in the domain: go visit the toy shop, or the bicycle shop, phone shop etc…

Bring some examples of the technology to the brainstomer



Get Physical

Sketch

Make models

Act out

Next Time

Be prepared to present game analysis in section

Lecture Topic: Games Overview & Structure

- The Structure of Games. *Game Design Workshop* Chap 2. Fullerton will need username/password for this one
- Designing Games With A Purpose Luis Von Ahn and Laura Dabbish, *Communications of the ACM,* August 2008, Volume 51, Number 8, pp. 58-67

Don't forget!

- Read, then write a comment on the wiki
- Individual Project Proposal, Due Feb 2