CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 10:
Paper Prototyping and Testing

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Daniel Epstein
Brad Jacobson
King Xia

design:
use:
build:

Tuesday/Thursday
10:30 to 11:50
MOR 234

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Today

Presentations on Thursday / Friday

Prototyping / Testing Readings Posted

Paper Prototypes over Weekend

Bring Prototypes to Class Tuesday
In-Class Inspection Methods

Is My Design Good?

This is not a meaningful question

It can and will be answered with "Yes"

At least consider asking:

"What are three good things about this design?"

"What are three bad things about this design?"

But really the answer is "it depends"

Remember that designs are used for tasks

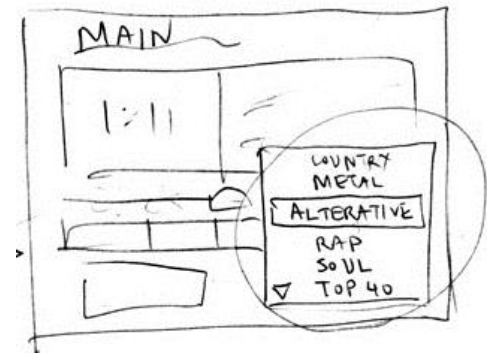We should ask this in the context of tasks

Fidelity in Prototyping

High Fidelity

Prototypes look like the final product

Low Fidelity

Designer sketches with many details missing

We have discussed the value of staying lightweight in sketching, but this also applies to prototyping

High-Fidelity Prototypes Warp

Time and creativity

Require precision (e.g., must choose a font)

Specifying details takes time

Can lose track of the big picture

Perceptions of a person reviewing or testing

Representation communicates "finished"

Comments often focus on color, fonts, alignment

Low-Fidelity Prototypes

Traditional methods take too long

Sketches $\rightarrow$ Prototype $\rightarrow$ Evaluate $\rightarrow$ Iterate

Instead simulate the prototype

Sketches $\rightarrow$ Evaluate $\rightarrow$ Iterate
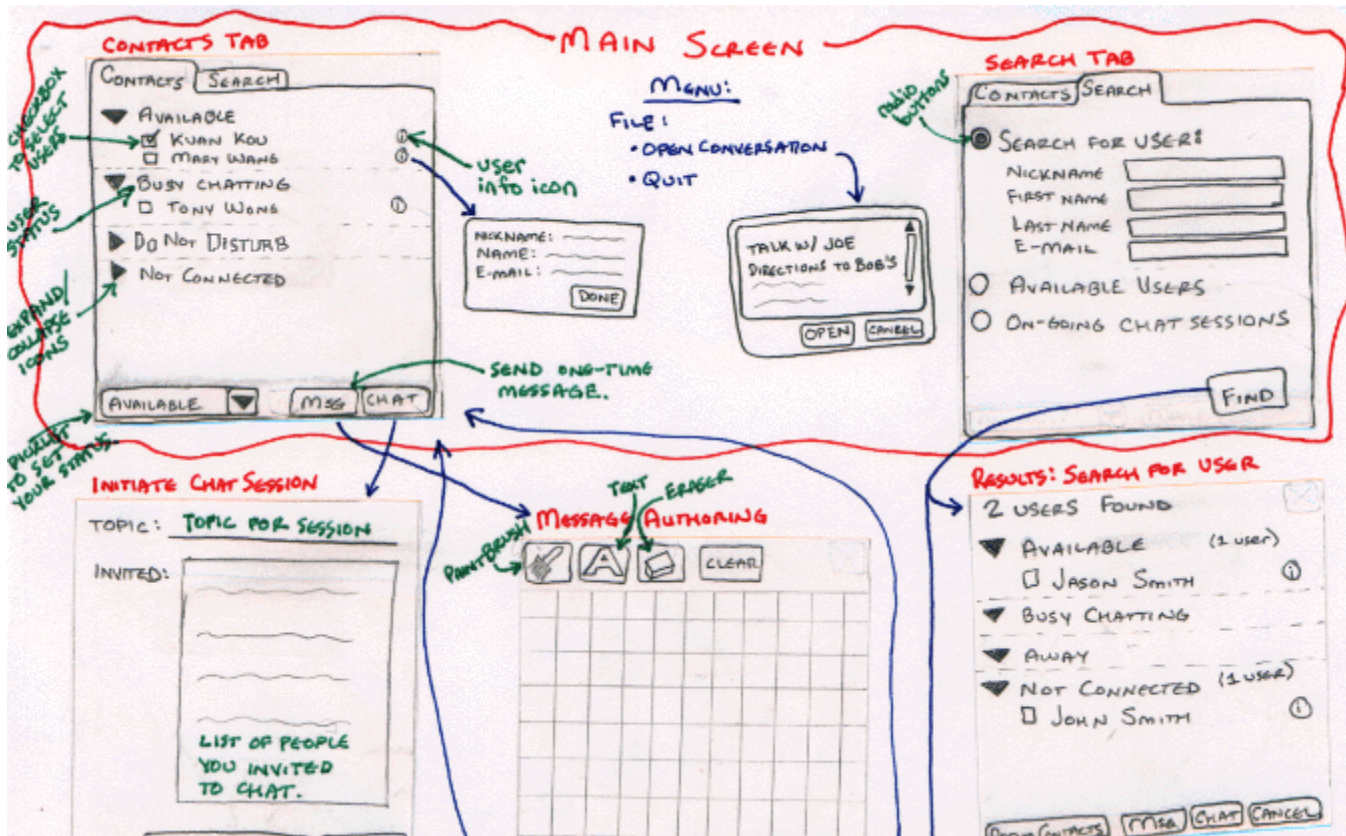
Sketches act as prototypes

A designer "plays computer"

Other design team members observe & record

Kindergarten implementation skills reduce barriers to participation in design and testing

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Sketches

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Paper Prototype

Basic Materials

Heavy, white paper
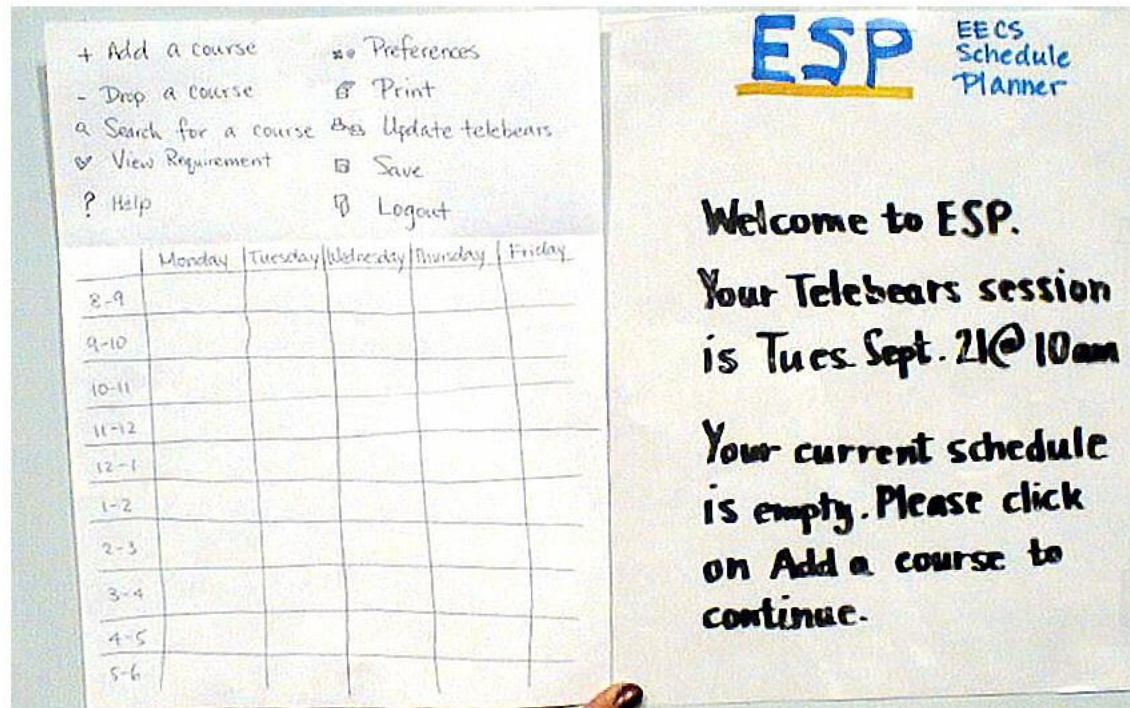
Index cards

Post-its

Tape, stick glue, correction tape

Pens and markers in many colors and sizes
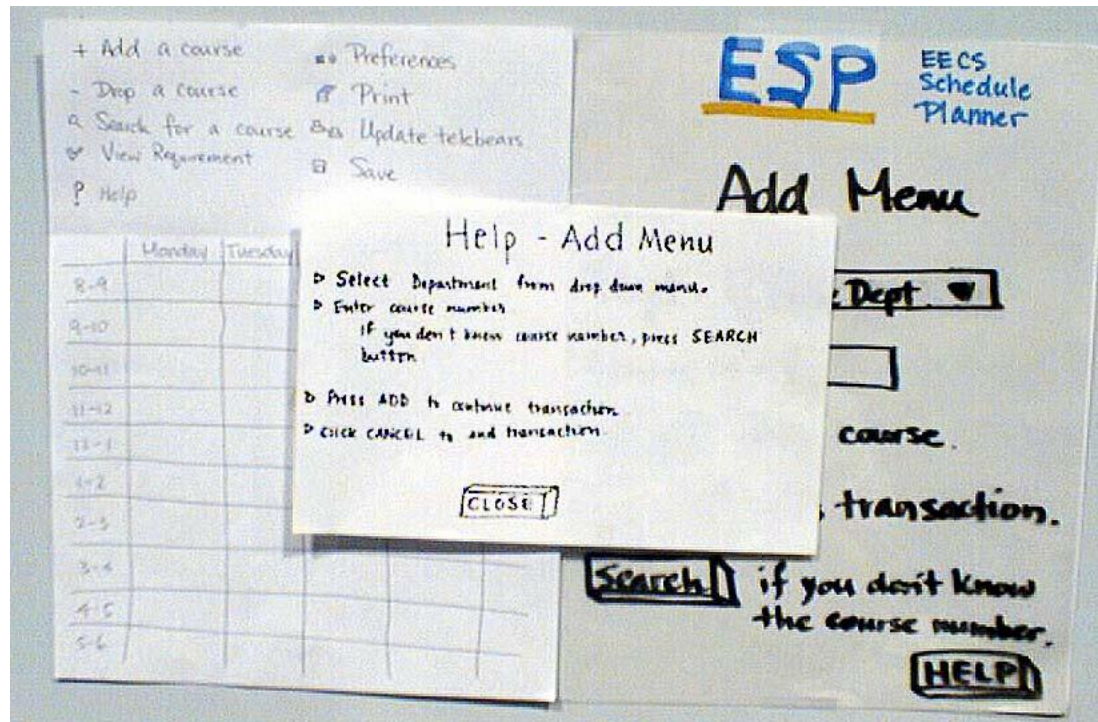
Overhead transparencies

Scissors, X-Acto knife

Paper Prototype

“Screen” faked with
pre-constructed pieces

Paper Prototype

New pieces added in response to interaction

Paper Prototype
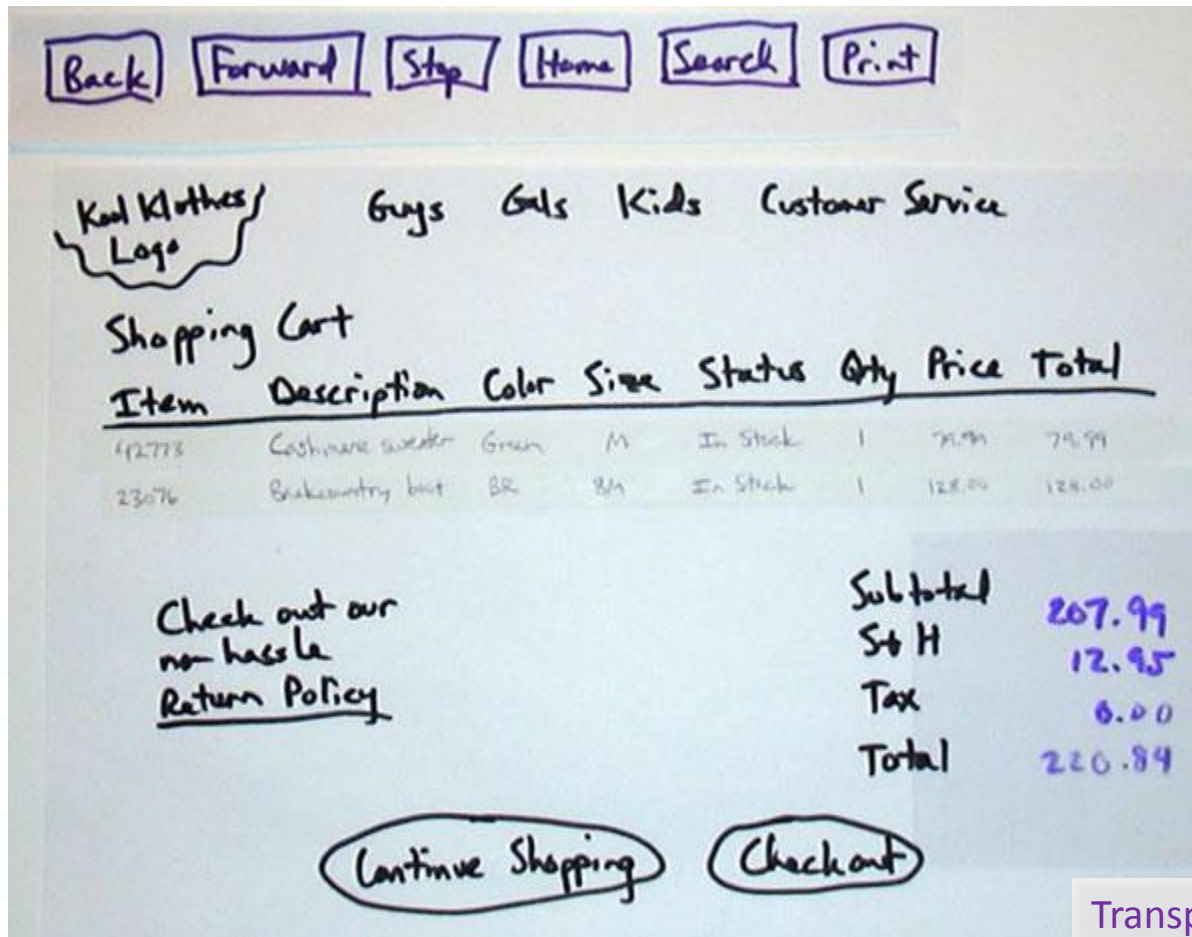
Transparencies allow flexible use of text

Constructing the Prototype

Set a deadline

  Do not think too long

  Instead build it, then learn and iterate as you go

Put different screen regions on cards

  Anything that moves, changes, appears/disappears

Ready responses for actions

  Have those pull-down menus already made

  Planned tasks can guide this

Use photocopier to make many versions

Constructing the Prototype
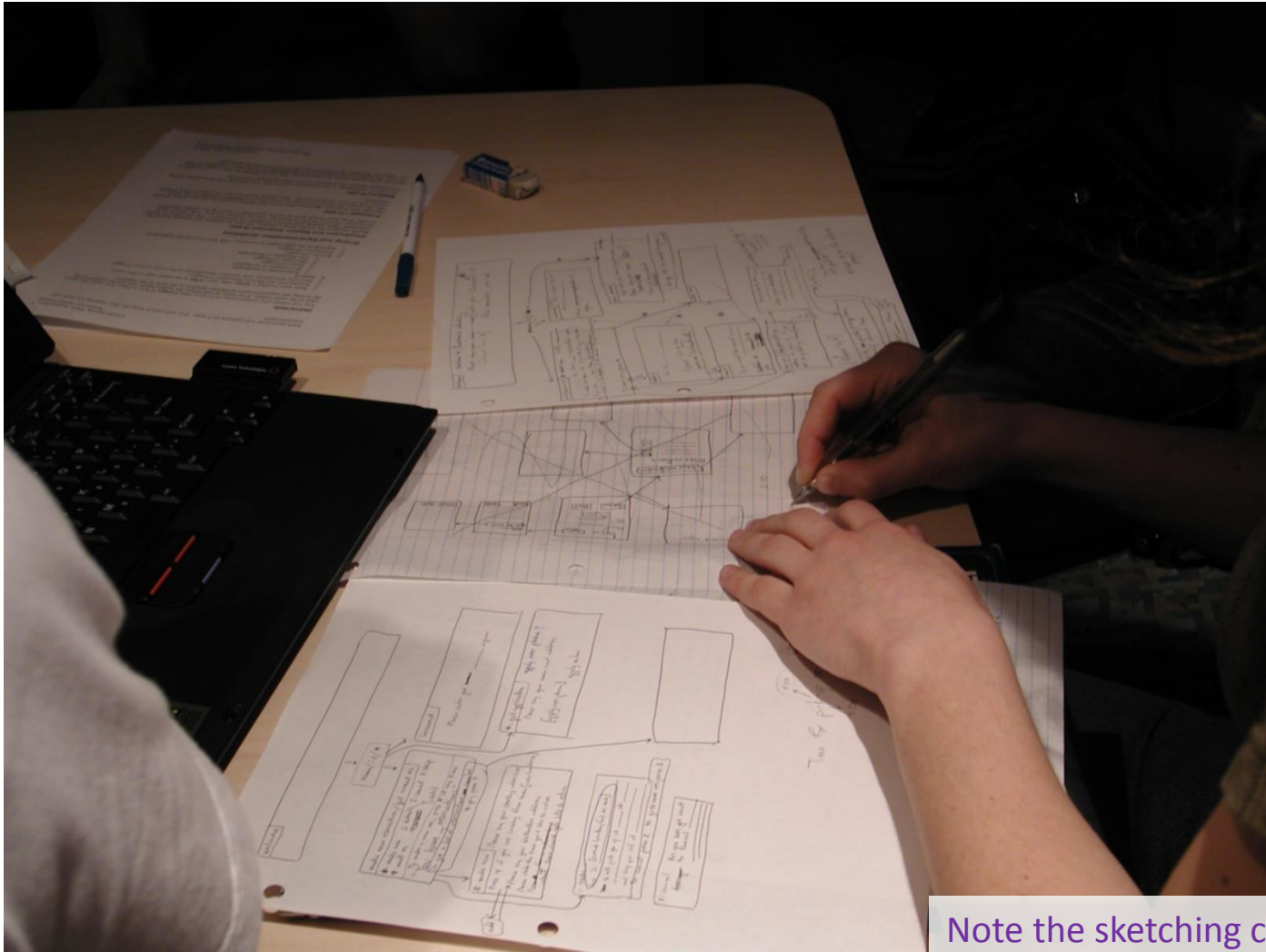
Note the sketching continues

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Constructing the Prototype

Planning what is needed given tasks

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Constructing the Prototype

Prototyping physical form

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Constructing the Prototype

Prototyping physical form

Constructing the Prototype

Remember your target platform constraints

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Why Usability Test?

Find and fix problems in a design

Removes the expert blind spot

Obtain data to unify team around changes

Uncover unexpected behaviors

Results drive changes, sometimes innovations

In the long run, this is a win-win

Both improves design and saves money

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Deciding What Data to Collect

Process data

Observations of what people do and think

Focused on improving this process

Summary, statistical, or bottom-line data

Summary of what happened (time, errors, success)

Focused on measurement

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Deciding What Data to Collect

Process data

- Observations of what people do and think
- Focused on improving this process

Summary, statistical, or bottom-line data

- Summary of what happened (time, errors, success)
- Focused on measurement

Focus on process data

- Gives overview of where the problems are
- More useful than "too slow" or "too many errors"

Not a Scientific Experiment

Focus is on improving the design

Experimental control is not as necessary

Data measurement is not as precise

Number of participants is fairly small

Changes can be made

Fix the obviously broken design

Quickly explore alternatives

Modify the focus of testing between participants

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Task-Based Usability

Set up an overall context

"We are interested in improving people's ability to save, update, and use contacts in their mobile phones."

Then prescribe tasks

1. Try to find the contacts list in the phone

2. View the contact information for John Smith

3. Change John Smith's number to be 555-555-5555

Tasks can be chained to naturally lead to the next

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Stages of a Usability Test

Preparation

Introducing the Test

Conducting the Test

Debriefing

Analyzing the Data

Creating the Report

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Preparing for a Test

Select your participants

      Friends and family are not your design targets

      Understand background, consider recruiting questionnaire
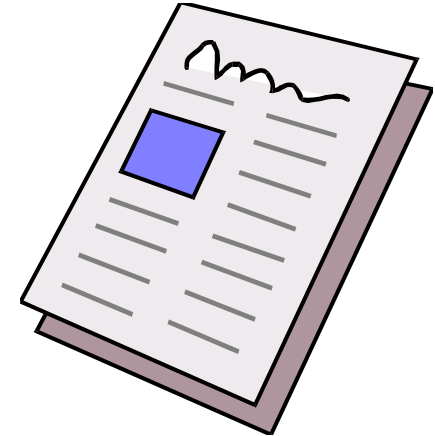
Prepare tasks and paper prototype

Practice to avoid "bugs" in your prototype

Usability Test Proposal

A report that contains

Objective, Description of System, Environment and Materials, Participants, Methodology, Tasks, Test Measures

Work through it with colleagues to debug test

Reuse when presenting final report

Introducing the Test

Address Feelings of Judgment

"Today we are interested in learning about X. That's where you come in!"

"I did not develop X. I just want to know what the problems are with X."

"It is X being tested here, not you."

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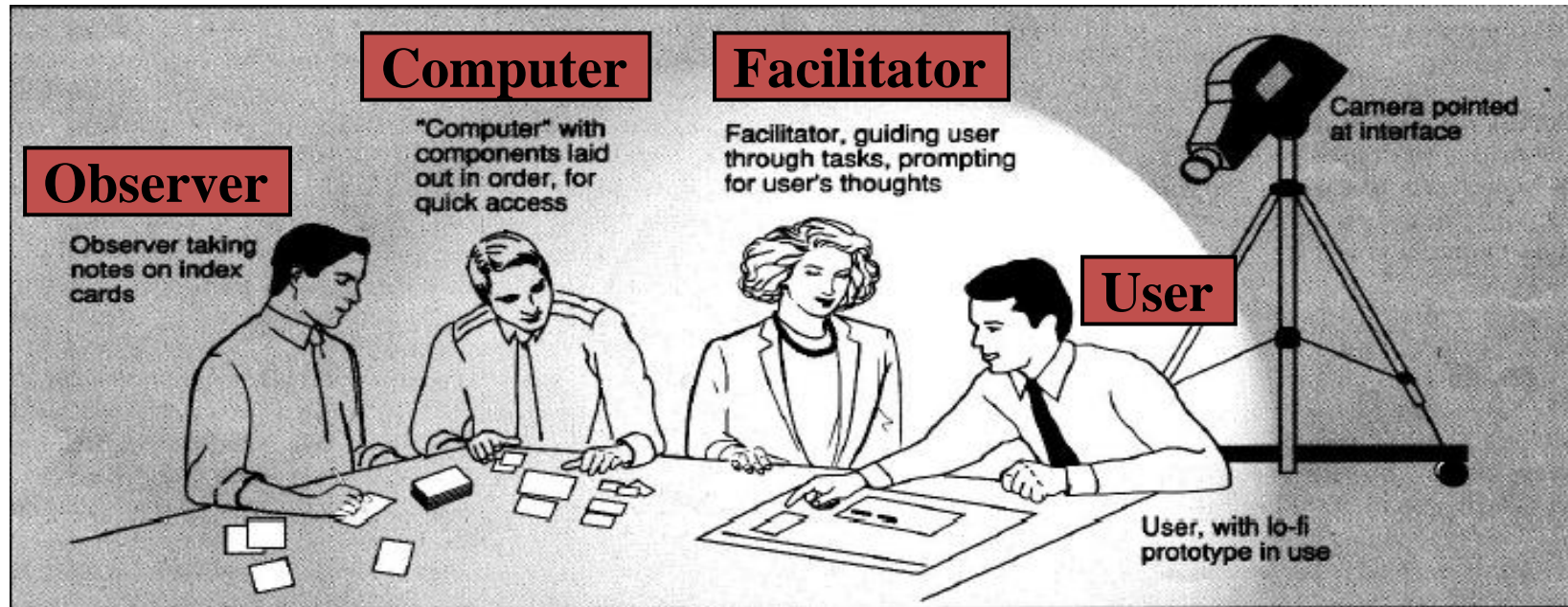
Introducing the Test

Set Expectations for Process

"It is essential you think out loud while working with X. Tell me constantly what you are thinking, looking for, wondering, confused about, surprised, and so on. If you stop talking, I will prompt you to talk."

"I will not be able to answer your questions when you start using X. Do you have any questions now?"

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Conducting a Test

Observer — Observer taking notes on index cards

Computer — "Computer" with components laid out in order, for quick access

Facilitator — Facilitator, guiding user through tasks, prompting for user's thoughts

User — User, with lo-fi prototype in use

Camera pointed at interface

See the Gommol reading tips on a test session

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Talk-Aloud Prompts

"Tell me what you are trying to do."

"Please keep talking."

"Tell me what you are thinking."

"Are you looking for something? What?"

"What did you expect to happen just now?"

"What do you mean by that?"

"Talk-aloud" is similar but distinct from "think-aloud"

Most do not know or care about the difference, so you may see the terms used interchangeably

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Insight Problems

When people are trying to figure something out, talking aloud can prevent needed "insight"

If your participant is really baffled, it might not be the best time to prompt them to keep talking

Wait for a natural break, and then ask "What were you thinking just there?"

Retrospective talk-aloud

Record session, talk through immediately afterward

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Answering Questions

Remember the purpose of this test

You would not be there "in real life"

You want to see if they can figure it out

You want to see how hard it is

You want to see how catastrophic the outcome is

But you do not want to punish the person or completely undermine the rest of the session

Note any help you provide as a major failure

Do not allow observing engineers to help

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Debriefing

Give them more details about what you were interested in discovering, with their help

Answer any questions they have

Now you can show them how to accomplish the tasks, talk about what you learned from the test

Thank them for their time

Appropriate to give some compensation

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Analyzing and Reporting the Results

Tests yield many forms of data

Quantitative counts

time, success/failure
confusions, errors, workarounds

Observations

notes about when, where, why, how above occur

Participant comments and feedback

during session of via a questionnaire

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Analyzing and Reporting the Results

Summarize the data

Make a list of critical incidents
- can be positive and negative
- include references back to original data
- try to judge why each difficulty occurred

Sort and prioritize findings
- what does data tell you
- what are the important results
- anything missing from test

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Task Design is Important

The goal of a test is to figure out how a person interacts with an interface in the wild…

There are two possible explanations for why a test does not find significant problems:

The interface does not have significant problems

The test itself has significant problems

Task Design is Important

Testing is not entirely in the wild

As a part of focusing the test, you often need to give a person a somewhat artificial task

The artificiality of the task may influence how people interact with an interface...

...and thus may influence the outcomes and insights gained through user testing

Bad: Artificial Subgoals

People using the design "in the wild"
may not necessarily form these same subgoals

The task should give one top-level goal, a people
should form their subgoals while pursuing this

Now you want to choose the type of paper you want to print your document on. Lets imagine that Bin "B" has the paper you want to print your paper on, please complete this task.

Now set the darkness of your copies to about 50% dark.
After setting the darkness, you decide you want to print 2 sides of copies on two sides of paper. Please complete this task.

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Bad: Artificial Ordering

With an artificial ordering of information or subgoals, people might not proceed in this order

The ordering might also be biased towards the layout of the interface, which would conceal any problems with finding the appropriate control

- Enter in 10 copies, with lightness set to 10%.
- Choose 1 sided to 2 sided, use paper source bin A.
- Cover sheet needed, using paper bin B for cover sheet.
- Set stapling feature on and collating on.
- Start printing.

Bad: Changing the Task

The task is to make copies, and this happens to involve entering information in the copier interface

But this task description is an data entry task, "Here is some information. Put it in the interface."

- Make 23 copies
- With collate
- Cover sheets
- Default darkness
- 1 Sided-> 1 Sided

Bad: Giving the Answers

Tells the person what terminology the interface uses, which they might not otherwise know

lighten = contrast, sorted = collated?

You are a teacher and are trying to make 40 copies of a one-sided magazine article that is 10 pages long for your class tomorrow. Due to the large number of copies, you print the article double-sided, in other words 10 page article would be printed on 5 sheets of paper. Due to the high contrast of the article, you must lighten the copy, in other words change the contrast. You then want the copies to be collated and stapled.

Good: Giving Context

Giving realistic context through scenarios can reduce the artificiality of the task

It's your first day in the office, starting a new job. You would like to make some copies of several documents that your boss gave you to browse through. Your colleague in the next cubicle tells you that you need an access code to make copies. The code is 5150. You walk over to the copy machine at the end of the hall and realize that it is not the Xerox copier that you are accustomed too... Make 2 copies of the "Company Annual Report".

Consider: Under-Specified Tasks

Many realistic goals are under-specified, as people have only a general idea what they want

By under-specifying the task, you can elicit realistic confusion and decision-making

You just finished fixing up the old hot rod in the garage and now its time to sell her. Make a couple copies of the pictures you took to send into the used car sales magazines. It's ok that they're in black and white but maybe you should lighten them up a bit. Your account billing code is 5150.

Task Design Summary

Task design is difficult and important

Poorly designed tasks mask interface failures

If you are not confident in your task descriptions, have others help you "debug" them before testing

Ethical Considerations

Testing is stressful, can be distressing

   people can leave in tears

You have a responsibility to alleviate

   make voluntary with informed consent

   avoid pressure to participate

   let them know they can stop at any time

   stress that you are testing the system, not them

   make collected data as anonymous as possible

Human Subjects Approvals

Research requires human subjects review of process

This does not formally apply to your design work

But understand why we do this and check yourself

Companies are judged in the eye of the public

Public Announcement

WE WILL PAY YOU $4.00 FOR ONE HOUR OF YOUR TIME

Persons Needed for a Study of Memory

*We will pay five hundred New Haven men to help us complete a scientific study of memory and learning. The study is being done at Yale University.

*Each person who participates will be paid $4.00 (plus 50c carfare) for approximately 1 hour's time. We need you for only one hour; there are no further obligations. You may choose the time you would like to come (evenings, weekdays, or weekends).

*No special training, education, or experience is needed. We want:

Factory workers	Businessmen	Construction workers
City employees	Clerks	Salespeople
Laborers	Professional people	White-collar workers
Barbers	Telephone workers	Others

All persons must be between the ages of 20 and 50. High school and college students cannot be used.

*If you meet these qualifications, fill out the coupon below and mail it now to Professor Stanley Milgram, Department of Psychology, Yale University, New Haven. You will be notified later of the specific time and place of the study. We reserve the right to decline any application.

*You will be paid $4.00 (plus 50c carfare) as soon as you arrive at the laboratory.

- -

TO:
PROF. STANLEY MILGRAM, DEPARTMENT OF PSYCHOLOGY, YALE UNIVERSITY, NEW HAVEN, CONN. I want to take part in this study of memory and learning. I am between the ages of 20 and 50. I will be paid $4.00 (plus 50c carfare) if I participate.

NAME (Please Print). . . . .

ADDRESS . . . .

TELEPHONE NO. . . . . Best time to call you . . . .

AGE . . . . OCCUPATION. . . . . SEX . . . .
CAN YOU COME:

WEEKDAYS . . . . EVENINGS . . . . . . WEEKENDS. . . . .

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In-Class Design, Prototype, Test

Design and prototype a new touchscreen alarm clock to be deployed in a very high end hotel brand. Your alarm clock should be immediately usable for tired, busy, or just-don't-want-to-be-bothered travelers who will spend zero time learning your interface.

In addition to displaying the current time, your alarm clock should include basic functionality for:

turning the alarm on/off

setting the wake-up time

anything else you think is appropriate

Guests will interact with your alarm using a touch panel.

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