Human-Computer Interaction IS4300

1

I7 – Heuristic Evaluation

- In this individual assignment, you will do heuristic evaluation on two computer prototypes developed by your classmates.
- The two interfaces you will be evaluating will be assigned in class. For each, go to the project team's webpage and review the T6 report for each project, which will give you instructions for running the prototype and background information about the project. This is not an anonymous evaluation, so feel free to contact a project group directly if you need more information than you were given.
- **As soon as you receive your prototype assignments, try to download and run both prototypes.** You don't have to do your heuristic evaluation right away, but poke around a bit and make sure the prototypes appear to work. We need to get logistical problems out of the way as early as possible, since everybody else is going to be working on heuristic evaluations too.

2

I7 – Heuristic Evaluation

- Follow the heuristic evaluation procedure to evaluate both interfaces carefully. Make a numbered list of usability problems and successes you find. For each problem or positive comment, you should:
  - describe the problem or positive feature
  - identify the relevant usability heuristics (from Nielsen's Ten Usability Heuristics, or any other guidelines we've discussed in class)
  - estimate its severity (for problems, use cosmetic, minor, major, or catastrophic; for positive comments, just say good)
- You aren't required to recommend solutions for the problems, but any ideas you have would no doubt be appreciated.
- Be thorough. **You should have at least 20 useful comments** (positive or negative) about each interface that you evaluate. Write your reports in a readable style. The usability of your report to its recipients will matter in your grade. In particular, don't bury the problems you found in reams of free-flowing prose. Where possible, include screenshots to illustrate the problems you found. In general, make your report easy to read and understand.

3

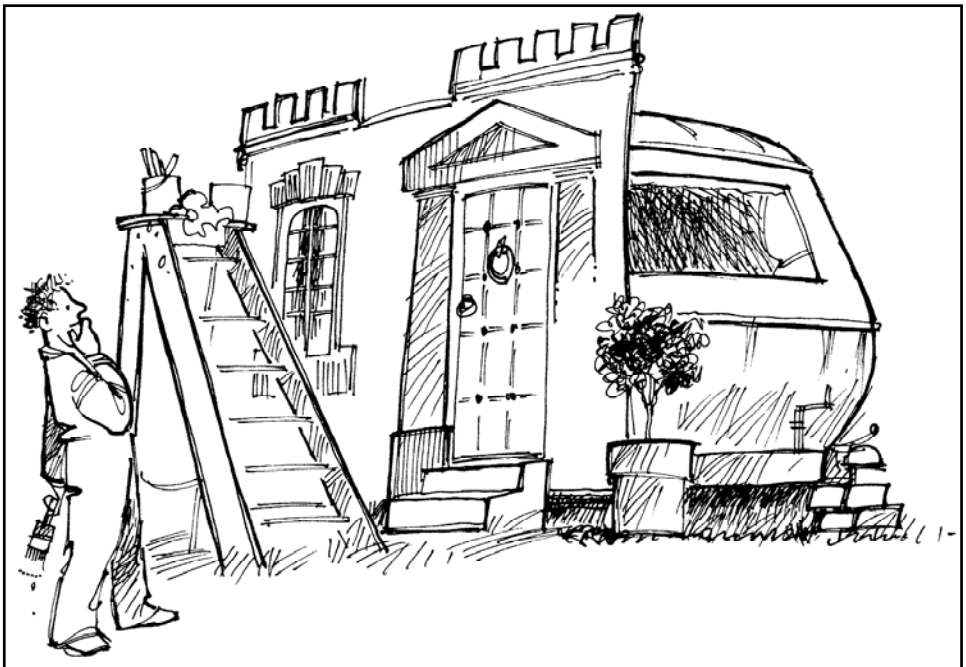
I7 – Heuristic Evaluation

- **What to Post**
  - You should post two reports, one for each interface you evaluated, on separate web pages.
  - Email the relevant URL to the appropriate team members.

4

Stone Ch 28-29

Reporting Results
Making the Case for Usability



Motivation for early usability engineering

Bias, et al (1994). *Cost-Justifying usability*. Morgan Kaufmann

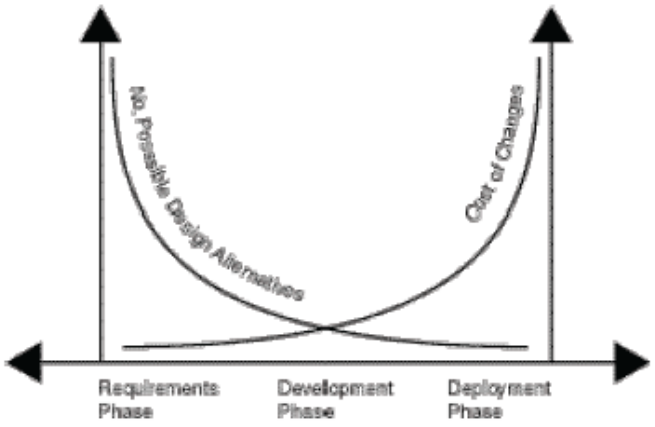


Figure 1. The number of possible designs decreases as the cost to make changes increases. (Bias & Mayhew, 1994, p. 80)

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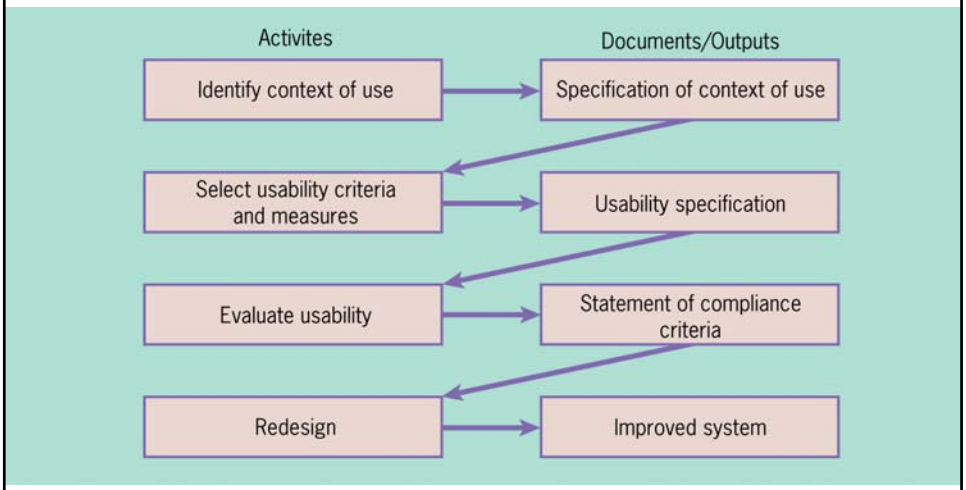
Usability Activities



Also…

Ethnography
Usability report
Study report

Communicating Results if you are separate from the design/implementation team

- How to keep designers from dismissing usability problems?
  - "Interpretation sessions"
  - Video highlights to make the case

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Usability Report Severity Scales Many to choose from…

- Mohlich
  - Disaster – user is unable to continue without human intervention
  - Serious – user is delayed significantly but is able to continue on his/her own
  - Cosmetic – user hesitates for a short moment
- Chatelain
  - Thumb-in-the-eye vs. all others
- Jensen
  - Severity (how bad is it?)
    - Crash, Major, Medium, Minor, Nuisance
  - Priority (how badly do we want to fix it?)
    - Critical, High, Intermediate, Low, Very Low
- Harel
  - Classify by impact to business goals

Influence of Stakeholders on Your Project
yet another taxonomy

- Beneficiary
  - management, managers
- Decision maker
  - decides what to do in the project
- Gatekeeper
  - controls access to other groups
- Worker
  - workload affected

Bottom Line
e.g., Tables 28.1, 28.2

- Who is your audience?
  - Management
  - Designers
  - Customer (e.g., compliance report)
  - Researchers
  - Public
- What impact will your results have?
- What action do you want your readers to take?

Common Scenarios

What kind of report would you produce?

1. You are part of the design team, conducting formative usability testing.
2. You are conducting formative usability testing, separate from the design team.
3. You are conducting acceptance testing for a product to be delivered/received.
4. You are charged with conducting summative usability testing on an existing product (as a prelude to improvement).
5. You compare 2+ commercial products to inform a buying decision.
6. You compare your interface to a well-known standard for public or peer review reporting.

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Sample *Formative* Usability Report Template

Usability.gov

Short - Informal

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Usability.gov
Your guide for developing usable and useful Web sites

Short Usability Test Report for [Site]

Date of Report: [Month Day, Year]
Date of Test: [Month Day, Year]
Location of Test: [City, State]

Prepared for: [Name]
Phone Number: [XXX-XXX-XXXX]
Email: [name@address.gov]

Prepared by: [Name]
Phone Number: [XXX-XXX-XXXX]
Email: [name@address.gov]

Executive summary

NOTE: This section describes the main goal and rationale of the study. Briefly describe the scenarios that participants completed, how the sessions were conducted, and how many participants took part in the study. This section should also discuss overall trends, such as whether or not participants were able to complete all the tasks. Data should be reported as both a number of completed scenarios as well as a percentage. Is there is a reason why tasks were completed or not? Be sure to give an overall impression (theme) about what the reader will encounter in the report.

Methodology

Who we tested

[Eight] participants, having the following characteristics, evaluated [product name].

NOTE: Add or delete main categories as needed. Refer to screener for main demographic information.

Audience Type

User Profile 1	2
User Profile 2	4
User Profile 3	2
TOTAL (participants)	**8**

Computer Usage

0 to 10 hrs. wk.	2
11 to 25 hrs. wk.	4
26+ hrs. wk.	2
TOTAL (participants)	**8**

Age

18-25	2
26-39	2
40-59	2
60-74	2
TOTAL (participants)	**8**

Gender

Women	4
Men	4
TOTAL (participants)	**8**

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What participants did

NOTE: State about how long participants met with the study facilitator and how many tasks they completed. Describe anything else that participants did, such as filling out questionnaires.

What data we collected

NOTE: Describe the data collected, including paths selected, task completion rates, and verbal feedback. Describe any other data that were collected, such as time on task or satisfaction ratings.

Major findings and recommendations

- **List major issues** – Use the bullet format to enable quick scanning.
- **Identify solutions** – Spot issues and trends via user testing and then make recommendations.

NOTE: Readers should be able to use this section to get a good grasp of what the issues are and what possible solutions exist. It is not a list of every single problem, but an overview of the major stumbling blocks identified during testing.

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Detailed findings and recommendations

Scenario 1 - Exercise/Sports; Fitness

You've heard that many people get injured due to bike accidents. You want to know if wearing a bike helmet will reduce your chance of injury. Where would you look for this information?

Number of participants	X
Percent successful	XX%

Sample Findings	Sample Recommendations
X participants completed the task with ease (score of "2") by finding the [target]. X participants needed prompting or had significant difficult completing the task (score of "1") X participants did not complete the task (score of "0"). X participants found the [target] via [path].	State each separate recommendation in the form of an action item. List as many as needed to resolve the issue, keeping in mind how the recommendations affect the site or application as a whole.

- ***You should also describe the problems (what did you observe?) How many users had this problem?***
- ***Severity: critical, important, cosmetic***
- ***Great to augment these with images or screenshots highlighting the problems***

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Exit Questions/User Impressions

NOTE: It may be useful to put responses in a table, especially if you want to list all participant responses rather than an overall summary. Following are two examples.

Sample 1. Summary of user impressions

Sample Questions	Sample Responses
What is your overall impression to [site]?	Participants liked being able to find health info.
What is your impression of the search capability?	Search worked well, efficiently. Seemed to have the most relevant information at the top.
What did you like best about the site?	1) Resources 2) Articles 3) Health tips
What did you like least about the site?	1) No way to share info 2) Everything in PDF 3) Not enough pictures (images, charts, graphs)
Is there anything that you feel is missing on this site?	1) "Email a friend" 2) FAQs
If you were to describe this site to a colleague in a sentence or two, what would you say?	It's a useful site with a lot of good information.
Do you have any other final comments or questions?	Needs more pictures and color.

Sample 2. User impressions by participant

Participant No.	Like best?	Like least?	Improvements
1	Search	Registration	Add more color
2	A-Z index	Pop-ups	Clickable charts

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Formal Summative Comparison Study Reports

For scientific peer review

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Formal Study Reports

- Objectives (also critiques)
  - Describe what your study is about
  - Motivate your study
  - Assure reader you have conducted a sound study
    - Research Methods – often presented in small font
  - Present results in an objective manner
  - Discuss implications
  - Discuss future work
  - Enable replication

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Typical Study vs. IS/CS/HCI Paper Structure

- Abstract
- Introduction
  - Motivation
  - Related work
  - Hypotheses
- Method
- Results
- Discussion
  - Limitations
  - Implications
  - Future work
- References

- Abstract
- Introduction
  - Motivation
- Related work
- System design
- Evaluation
  - Hypotheses
  - Method
  - Results
  - Discussion – summary, limitations
- Conclusion
  - Implications
  - Future work
- References

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The Abstract

- Concise summary
- Abstract for an empirical study should include
  - Information on the problem under study
  - The nature of the subject sample
  - A description of methods, equipment, and procedures
  - A statement of the results
  - A statement of the conclusions drawn
- Often the last thing you write

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The Introduction

- Part of paper giving justification for study
- Usually has the following information
  - Introduction to the topic under study
  - Brief review of research and theory related to the topic
  - A statement of the problem to be addressed
  - A statement of the purpose of the research
  - A brief description of the research strategy
  - A description of predictions and hypotheses
- CS/IS papers often put Related Work as a separate section after Introduction
  - For each, describe how your work is different

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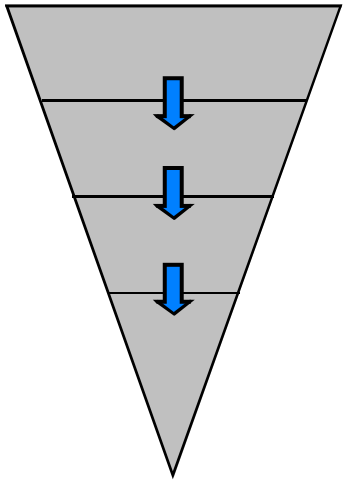
Organization of the Introduction: General to Specific



Present a general introduction to your topic

Review relevant literature

Link literature review to your hypotheses

State your hypotheses

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The Method Section

- Includes information on exactly how a study was carried out
- Subsections
  - Experimental design
  - Participants or subjects
    - Describe in detail the participant or subject sample
    - Human participants go in a *Participants* subsection, and animal subjects in a *Subjects* subsection
  - Measures
    - Ideally including *psychometrics*
  - Apparatus or materials
    - Describe in detail any equipment or materials used
    - Equipment is usually described in an *Apparatus* subsection and written materials in a *Materials* subsection

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The Method Section

- Procedure
  - Describe
    - Exactly how the study was carried out
    - The conditions to which subjects were exposed or under which observed
    - The behaviors measured and how they were scored
    - When and where observations were made
    - Debriefing procedures
- Enough detail should be included in all sections so that the study could be replicated

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The Results Section

- Objective, dry, boring – *just the facts*
- All relevant data and analyses are reported in the results section
- Do not present raw data
- Data should be reported in summary form
  - Descriptive statistics
  - Inferential statistics
- Results of descriptive and inferential statistics must be presented in narrative format
- Describe the source of any unconventional statistical tests

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Commonly Used Statistical Citations

Statistical Test	Format
Analysis of variance	$F(1,85) = 5.96, p < .01$
Chi-square	$\chi^2(3) = 11.34, p < .01$
t test	$t(56) = 4.78, p < .01$
Pearson correlation coefficient	$r = -.87$ [, p<.05]

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The Discussion Section

- This is where you can take some liberties with describing what the results *mean*
- Results are interpreted, conclusions drawn, and findings are related to previous research
- Section begins with a brief restatement of hypotheses
- Next, indicate if hypotheses were confirmed
- The rest of the section is dedicated to integrating findings with previous research
- It is fine to speculate, but speculations should not stray far from the data

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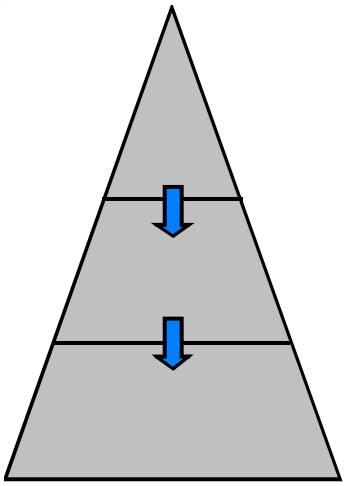
Organization of Discussion: Specific to General



Restate your hypotheses or major finding

Tie your results with previous research and theory

State broad implications of your results, methodological implications, directions for future research

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Example

The Effects of Animated Characters on Anxiety, Task Performance, and Evaluations of User Interfaces

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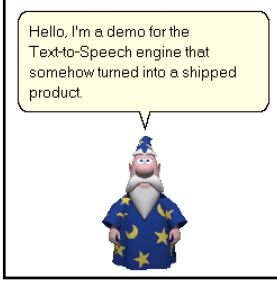

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ABSTRACT

Animated characters are common in user interfaces, but important questions remain about whether characters work in all situations and for all users. This experiment tested the effects of different character presentations on user anxiety, task performance, and subjective evaluations of two commerce websites. There were three character conditions (no character, a character that ignored the user, and a character that closely monitored work on the website). Users were separated into two groups that had different attitudes about accepting help from others: people with control orientations that were *external* (users thought that other people controlled their success) and those with *internal* orientations (users thought they were in control). Results showed that the effects of monitoring and individual differences in thoughts about control worked as they do in real life. Users felt more anxious when characters monitored their website work and this effect was strongest for users with an external control orientation. Monitoring characters also decreased task performance, but increased trust in website content. Results are discussed in terms of design considerations that maximize the positive influence of animated agents.

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INTRODUCTION

The history of ideas about animated characters in human-computer interaction is turning a corner. Initial debates concerned the presence of any character performing any kind of behavior. The questions were whether animated characters—as a general concept in interfaces—were good or bad, useful or useless. These debates rarely yielded an answer more satisfying than—"it depends." As has been the case with the introduction of all new media in the 20th century, the initial debate was framed too aggressively to

An elaboration of the conditions for animated characters to succeed is underway. There are several new studies that demonstrate the potential for animated characters to automate social interactions in ways that make computing more pleasing, productive, and easy. Research has focused on, for example, character appearance [19, 15], non-verbal behavior [6, 17], personality [12, 31], emotion [3, 4], and speech characteristics [20]. This research is important given the increasing use of animated characters in products and services ranging from search engines to shopping "bots" to virtual employees in commerce transactions.

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Social facilitation

Sometimes it's nice to have company—a real person—when you work. Imagine, however, that you're working on a hard problem. Someone enters the room,

Locus of control

Now imagine two different people being monitored while they work on a complex task. The first person believes that she controls her own destiny and that other people have little to do with whether she fails or succeeds. The second person is convinced, however, that he is at the mercy of

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EXPERIMENTAL METHODS

Subjects. Eighty-four people participated in the experiment (60% male and 40% female). An additional 20 people were used to pretest stimulus materials. All subjects were either undergraduate or graduate students recruited at Stanford University. All were experienced computer users (i.e., they knew how to word-process and manage a UNIX email account).

Experimental Design. The experiment was a between-subjects, full-factorial two-by-three design. The two factors were (1) the subjects' locus of control and (2) the monitoring activity of an animated character.

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Locus of Control Pretest. Rotter's [27] Locus of Control Scale was used to determine the internal versus external orientations of potential subjects. This instrument consists of 23 forced-choice items that each present a pair of statements. In each pair, one statement expresses an internal viewpoint and the other an external viewpoint.

Scores on this scale can range from 0, indicating that no external statements are endorsed, to 23, indicating that all external statements are endorsed. The mean score on the pretest was 13.27 (SD = 3.8). Only the 42 subjects that scored lowest (internal) and highest (external) on the pretest were selected to participate. A two-tailed t-test indicated that the scores on the Locus of Control scale for these two groups was significantly different ($t(82) = 18.47$, $p < .001$).

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Stimulus Material. The stimulus material consisted of two primary components: the animated characters that comprised the distinction between the Idle-Character and Monitoring-Character conditions and the web-based tasks that all subjects completed during the experiment.

The animated characters were specially developed for this experiment using Microsoft Agent software. The characters used in both the Idle-Character and the Monitoring-Character conditions were based upon Microsoft's "Genius" animations, so their physical features were identical (see Figure 1 for an illustration). The characters were approximately 1.5" tall (1152 x 870 resolution) and appeared in the lower-left corner of the Microsoft Explorer 4.5 browser that people used to view the web pages.

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Apparatus. The computers used in the primary experiment were identical Hewlett Packard 440 mhz Kayak XWs with 21" color monitors (1152 x 870 resolution). These computers also had identical keyboards and mice, but were located in different experimental labs. The two labs were similar in terms of size and furnishings and use of the two labs was balanced across conditions.

Procedure. After arriving at a prescheduled time, people were brought to one of the labs in which the experiments were run and given a questionnaire. An experimenter then read an introductory script that was identical for all subjects before leaving the room.

People read specific instructions for each task in a frame that appeared at the bottom of their web-browser. When they found a solution to a task, they keyed their response into a text field in the frame and selected a *Submit* button. This brought up the instructions for the next task.

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Anxiety Measure. Anxiety was assessed using a modified version of Speilberger, Gorsuch, & Lushene's [28] State Anxiety Scale. The items were answered on four-point Likert scales on a paper questionnaire. The following items exemplify those that appear on the questionnaire: *I felt calm; I felt secure; I felt strained;* etc.

Performance Measure. Performance was measured by adding the number or tasks completed correctly. The computers used in the experiment recorded people's answers for each task. Performance was calculated on the basis of logfiles compiled by these computers. Tasks included comparing the performance of various mutual funds, configuring computer hardware, etc.

Website Evaluations. Subjective evaluations of the two websites were measured with a sixteen-item questionnaire.

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Manipulation check. The manipulation check was an index of three items answered by all people who were in one of the conditions that involved characters. People were asked whether the character seemed to be *watching* them, whether the character seemed to *record* their answers, and whether the character seemed to be *judging* them. These items were used to form a Monitoring Index that had a Cronbach's *alpha* of .70.

The manipulation was successful. A planned one-tailed *t*-test on the Monitoring Index showed that subjects in the Monitoring-Character condition reported a higher level of monitoring than subjects in the Idle-Character condition ($t(52) = 4.49$, $p < .001$).

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RESULTS

Full factorial ANOVAs were performed on all measures. A summary of these ANOVAs appears in Table 1. The planned tests of all hypotheses are discussed in detail below, as are results pertaining to the relationship of animated characters and locus of control to the evaluation of the websites.

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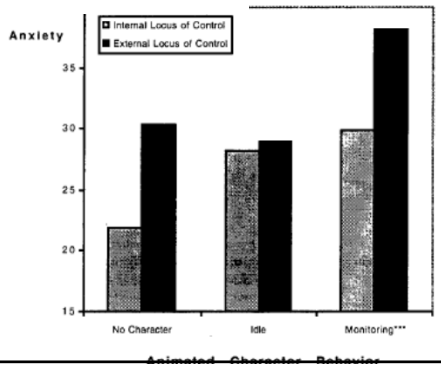
Figure 2 shows the results for anxiety. One-tailed, *a priori* contrasts showed that people were more anxious when an idle character was present than when no character was present ($t(72) = 1.4$, $p = .08$). Also, people were more anxious if an animated character appeared to monitor them than if no character was present ($t(72) = 4.6$, $p < .001$). And people were more anxious if an animated character monitored them than if an idle character was present ($t(72) = 4.6$, $p < .001$). Users with an external locus of control were also more anxious when monitored by an animated character than were users with an internal locus of control ($t(72) = 4.6$, $p < .001$).



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DISCUSSION

The perception of being monitored by an animated character has the same effects on Anxiety and Performance as being monitored by a human, either electronically or in person. When a character watches, users are more likely to feel anxious about their work and to perform less well. This anxiety is most pronounced among users who think that other people control their success.

At the most general level, these results suggests that decisions concerning the use of animated characters should address the details of execution and social presentation. It is not sufficient–for celebration or condemnation–to focus on whether or not an animated character is present. Rather, the ultimate evaluation is similar to those for real people–it depends on what the character does, what it says, and how it presents itself. The effects of animated characters are not

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Citations

- Liberally cite previous & related work.
- If you copy passages you *must* cite and, depending on length, format to indicate it is copied.
- Suggest using EndNote, BibTex or similar.

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Ethical Issues

- Report *all* of your findings (not just the ones you like)
- Adhere to your original plan
  - Report any deviations and why
  - Power analysis, statistics, measures
- Do not drop subjects or data points without rigorous justification
- If your hypothesis test was not significant *you cannot say anything about difference in means.*
- If you did not do an experiment, attempting to control for extraneous variables, *you cannot mention or imply causality.*

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Oral Presentation of Study Results

Oral Presentation

- Main concepts and ideas
- Do *not* go into great detail on experimental methods – just enough so people understand roughly what you did
- Focus on motivation, results, implications
  - If listener wants details they can read the paper or ask questions

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Oral Presentation
Don't do this…

Measure	Change From Day1	To Day2	ALL CONDS df	t	p	CONTROL df	t	p	NON-REL df	t	p	RELATIONL df	t	p
WAI/COMP	7	27	54	0.205	0.838				24	0.014	0.989	29	0.361	0.720
WAI/BOND	7	27	54	0.519	0.606				24	0.376	0.710	29	1.489	0.147
WAI/TASK	7	27	54	0.134	0.894				24	0.409	0.686	29	0.661	0.514
WAI/GOAL	7	27	54	0.155	0.877				24	0.081	0.936	29	0.329	0.745
CONTINUE LAURA	30	44	54	0.868	0.389				24	0.625	0.538	29	0.619	0.541
MIN/DAY	-6-0	22-30	81	1.470	0.145	26	1.274	0.214	24	0.124	0.903	29	1.104	0.279
	1-7	22-30	81	0.691	0.492	26	0.758	0.456	24	0.109	0.914	29	0.358	0.723
	22-30	38-44	81	3.626	**0.001**	26	2.480	**0.020**	24	1.959	0.062	29	1.804	0.082
DAY/WK>30MIN	-6-0	22-30	81	6.653	**0.000**	26	2.323	**0.028**	24	5.284	**0.000**	29	4.347	**0.000**
	1-7	22-30	81	6.272	**0.000**	26	2.401	**0.024**	24	3.818	**0.001**	29	4.597	**0.000**
	22-30	38-44	81	8.990	**0.000**	26	4.043	**0.000**	24	5.322	**0.000**	29	6.530	**0.000**
STEP/DAY	1-7	22-30	81	1.778	0.079	26	1.197	0.242	24	2.366	**0.026**	29	0.236	0.815
DAY/WK>10KSTEP	1-7	22-30	77	3.986	**0.000**	25	1.355	0.188	23	3.591	**0.002**	27	2.055	**0.050**
STAGE	Intake	30	81	6.988	**0.000**	26	3.403	**0.002**	24	4.000	**0.001**	29	4.738	**0.000**
	30	44	81	2.019	**0.047**	26	1.185	0.247	24	1.000	0.327	29	1.409	0.169
SELF-EFFICACY	1	29	81	4.782	**0.000**	26	0.872	0.391	24	3.314	**0.003**	29	4.750	**0.000**
	29	44	81	2.770	**0.007**	26	1.525	0.139	24	4.550	**0.000**	29	0.085	0.933
PROS	1	29	81	1.998	**0.049**	26	1.418	0.168	24	0.456	0.653	29	1.540	0.134
	29	44	81	0.393	0.695	26	1.147	0.262	24	0.225	0.824	29	0.308	0.760
CONS	1	29	81	0.902	0.370	26	1.124	0.271	24	0.499	0.622	29	0.823	0.417
	29	44	81	0.740	0.462	26	0.386	0.703	24	0.611	0.547	29	0.339	0.737
CONTINUE FT	30	44	81	1.520	0.133	26	1.442	0.161	24	1.163	0.256	29	0.000	1.000

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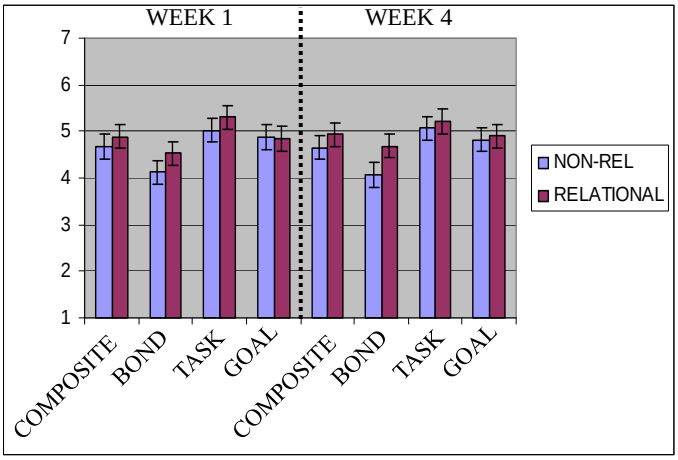
Oral Presentation
Do use as many figures as possible



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Oral Presentation Guide for Visuals

- Visuals should be *exhibits* that you talk about
  - Do not put lots of text on charts
  - Do not read your charts for your presentation
- Use interactivity, video, images to keep your audience awake

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Common Questions

- How did you evaluate that?
- How did you measure that?
- How did you control for *extraneous variable X*?
- Why didn't you use statistic Y?
- Isn't that a biased sample?
- What was your control group?
- How did you do *study procedure Z?*

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Exercise

- You need to conduct a summative comparison evaluation of your team project.
- Write up your evaluation study as a formal written report, to be presented at the 47th Annual Usability World Conference.
- Outline the report.
- Create a ppt chart or slide for each section and describe what you would put in it.

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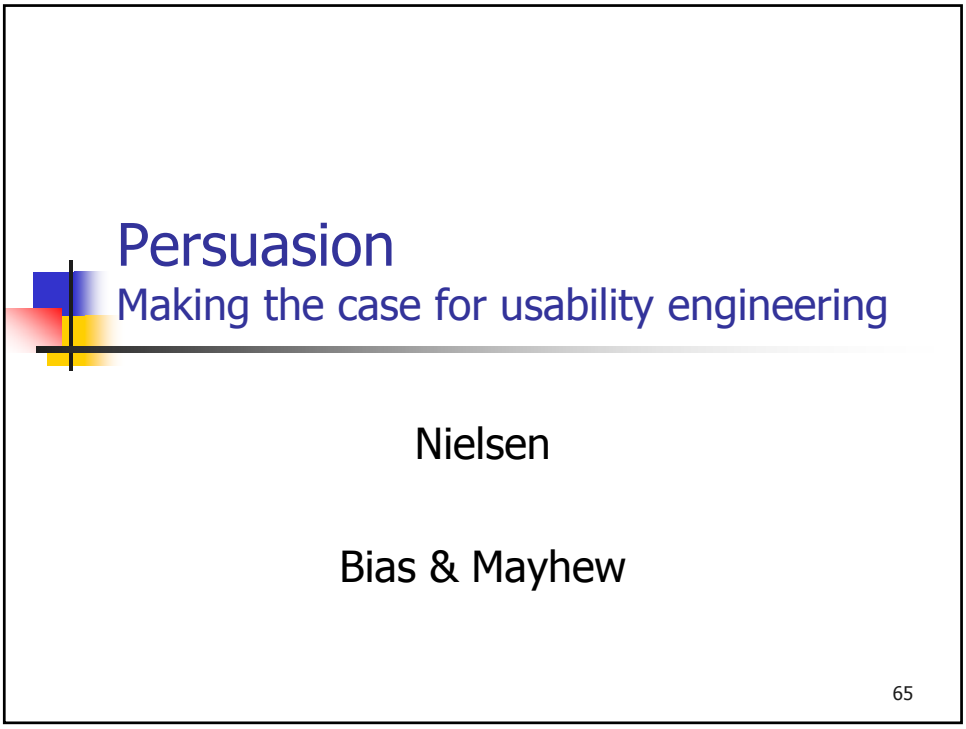
Stone Chapter 29

Winning and maintaining support for user-centered design


Persuasion
Making the case for usability engineering
Nielsen
Bias & Mayhew
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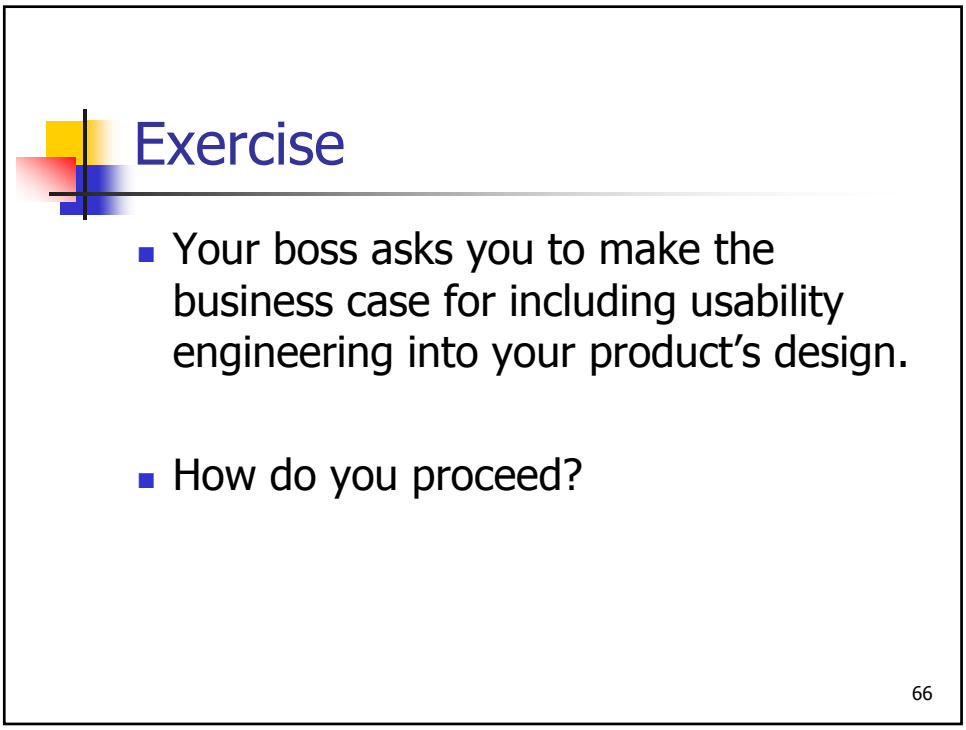
Exercise
Your boss asks you to make the business case for including usability engineering into your product's design.
How do you proceed?
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Persuasion

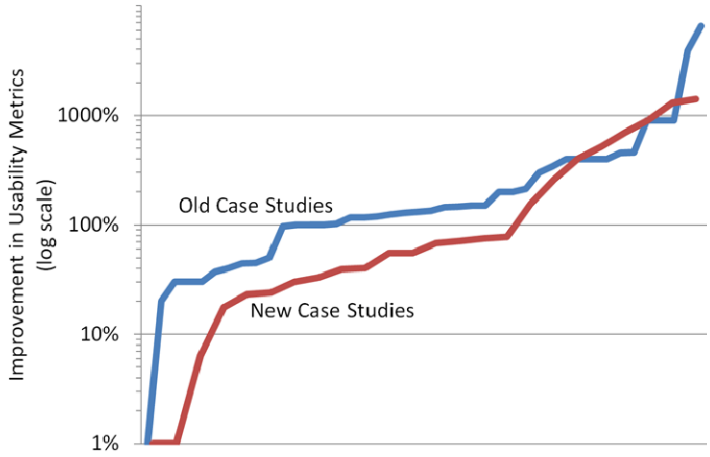
Ch 1 of Nielsen's *Usability Engineering*

- Rotary dial telephone – 1 hour usability test sped up dialing by 0.15s/digit = $1M/yr savings
  - etc.
- Average usability budget for development projects = 1.5 person-years (ideal = 2.3)
- Change requests 100x more expensive than problems corrected during development

Nielsen 2008 Update

Usability ROI Declining, But Still Strong

http://www.useit.com/alertbox/roi.html



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2008 Update Continued…

- The formula for website success is:

  B = V × C × L

- Where
- B = amount of business done by the site
- V = unique visitors coming to the site
- C = conversion rate (the percentage of visitors who become customers)
- L = loyalty rate (the degree to which customers return to conduct repeat business)

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Cost Justification

- "Cost Justification", Randolph Bias, et al, Ch 62, *The Human-Computer Interaction Handbook*, 2003

- Impacts of more usable systems
  - Lower development cost (problems found early)
  - Less documentation required
  - Less training required
  - Less time required by User

More reasons…

Internal ROI

- Increased user productivity
- Decreased user errors
- Decreased training costs
- Savings gained from making changes earlier in design life cycle (lower
- development cost)
- Decreased user support
- Decreased documentation docsts

External ROI

- Increased sales
- Decreased customer support costs
- Lower product cost (savings from making changes early)
- Reduced cost of providing training
- Increased customer efficiency

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More reasons…

About 15% of the space in reviews published in trade magazines, journals, and national newspapers is devoted to user friendliness or usability (Nielsen, 1993) .

Media giants such as The New York Times, the Financial Times, and the Wall Street Journal publish weekly columns that evaluate software (Bias & Mayhew, 1994).

Info World devotes between 18% and 30% of its software review articles to ease of learning, ease of use, and quality of documentation (Nielsen, 1993).

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Fixing problems early…

The rule of thumb in many usability-aware organizations is that the cost-benefit ratio for usability is $1:$10-$100. Once a system is in development, correcting a problem costs 10 times as much as fixing the same problem in design. If the system has been released, it costs 100 times as much relative to fixing in design. (Gilb, 1988)

The average user interface has some 40 flaws. Correcting the easiest 20 of these yields an average improvement in usability of 50%. The big win, however, occurs when usability is factored in from the beginning. This can yield efficiency improvements of over 700%." (Landauer, T. K. 1995, The trouble with computers: Usefulness, usability, and productivity. MIT Press)

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Motivation for early usability engineering

Bias, et al (1994). *Cost-Justifying usability*. Morgan Kaufmann

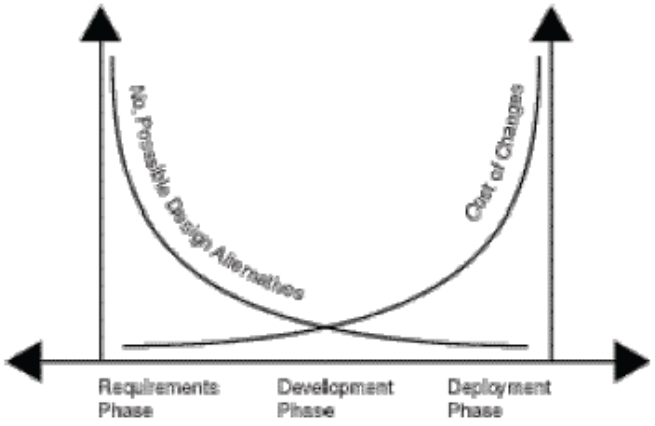

Figure 1. The number of possible designs decreases as the cost to make changes increases. (Bias & Mayhew, 1994, p. 80)

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Training

At one company, end-user training for a usability-engineered internal system was one hour compared to a full week of training for a similar system that had no usability work. Usability engineering allowed another company to eliminate training and save $140,000. As a result of usability improvements at AT&T, the company saved $2,500,000 in training expenses. (Bias & Mayhew, 1994)

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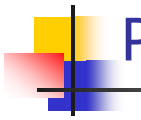
Example cost justification
(Bias & Mayhew)

TABLE 62.1. Usability Cost-Justification Software

Manufacturer	Year 1	Year 2	Year 3	Total
Cost				
Usability lab	($33,000)			
Usability lab projects	($179,974)			
Total cost	($212,974)	$0	$0	($212,974)
Cost savings				
Customer support	$168,000	$168,000	$168,000	
Software development	$15,050			
Additional sales				
Total cost savings	$183,050	$168,000	$168,000	$519,050
Net	($29,926)	$168,000	$168,000	$306,074



T7 Heuristic Evaluation & Prototype Revision

- You can continue implementing the "back end" of your system, but should not make any major changes to the UI.
- After you receive the heuristic evaluations you should assign each of these problems a severity rating (cosmetic, minor, major, catastrophic), and brainstorm possible solutions for it. Modify your system to correct as many of the problems found as possible (in priority order), documenting how you do this.
- **What to Post**
  - A link to your updated prototype and a report describing how you responded to the heuristic evaluations.

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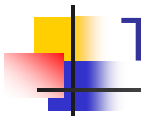

To Do

- I7 – Heuristic Evaluation (next class)
- T7 – Prototype Revision (1 week)
- Read Stone ch 12

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