

Module_8

Evaluation Approaches

CS 4712 UIE
Dr. Sarah North



Introduction and Background

- Interactive systems are present in our everyday lives, and allow us to interact with much of the world around us.
- Since they are so prevalent and useful, there comes a need to evaluate these designs for better user use.
- Three main categories of evaluating user interfaces:
 - Controlled settings with users
 - Natural settings with users
 - And any settings not involving users.

(Preece et. al. 2015)

Introduction and Background

- Interactive systems present everywhere and dominate how we interact with data, objects, and people
- Because they are so prevalent and useful, there exists a great need for evaluation of interactive systems
- 3 categories of evaluation:
 - Controlled settings with users
 - Natural settings with users
 - Settings not involving users (Preece et. al., 2015)
- Usually all 3 categories are combined (Preece et. al., 2015)
- Evaluating methods fall under several categories:
 - Cognitive walkthroughs
 - Heuristics evaluations
 - Think-aloud evaluations
 - Focus groups (Gonzalez-Holland, Whitmer, Moralez, and Mouloua, 2017)
- Need to establish beforehand:
 - Why the system is being evaluated
 - What is going to be evaluated
 - Location of evaluation
 - Date and time of evaluation (Preece et al., 2015)



Evaluating methods categories

1. Cognitive walkthroughs
2. Heuristic evaluations
3. Think aloud evaluations
4. Classic experiments
5. Focus groups.

Guidelines and Standards of Evaluation

- Two design guidelines widely accepted:
 - Nielsen's 10 Heuristics
 - Schneiderman & Plaisanrt's 8 Golden Rules
- The two different guidelines can be combined to create the Nielsen-Schniederma's Heuristics (Gonzalez-Holland et al., 2017)

Jakob Nielsen's 10 heuristics	Shneiderman & Plaisanrt's 8 Golden Rules
1. Flexibility and Efficiency of Use	1. Strive for Consistency
2. Standards and Consistency	2. Offer Informative Feedback
3. System Status Visibility	3. Allow Users to Save and Use Shortcuts
4. Error Prevention for Users	4. Design Dialogues to Yield Closure
5. Reduce User's Memory Load	5. Offer Simple Error Handling
6. Help and Guidance	6. Permit Simple Reversal of Actions
7. Minimalist Design and Emphasis on Aesthetic	7. Support Internal Locus of Control
8. User Control and Freedom	8. Reduce Short-term Memory Load
9. Help User Recognize, Diagnose, and Recover from Errors	-----
10. A Match Between the Real World and The System	 KENNESAW STATE UNIVERSITY

1. Cognitive Walkthroughs

- Cognitive walkthrough:
 - Method used to evaluate the learnability of a product or service (Wilson, 2014)
- Different types of Cognition:
 - Thinking
 - Memory
 - Learning
 - Decision-making
 - Talking
 - Seeing
- Cognition determines how we process information and decide what to do
- Cognition also influences how we will interact with different interfaces
- The most important cognitive element when considering interacting with an interface is sight - how an item looks determines how we will perceive it

Cognitive Walkthroughs (Cont'd)

- Cognitive walkthroughs begin by listing off a number of tasks that the user will most likely take
- The evaluator then works through each task from the perspective of the user
- The focus is on understanding the “learnability” of the system for new and/or infrequent users
- Advantages:
 - Extremely cost-effective
 - Fast and quick to carry out
 - Can be implemented at any stage of development
- Disadvantages:
 - Value of the data is limited by the skills of the evaluator
 - Yields a superficial and narrow analysis
 - Labor intensive

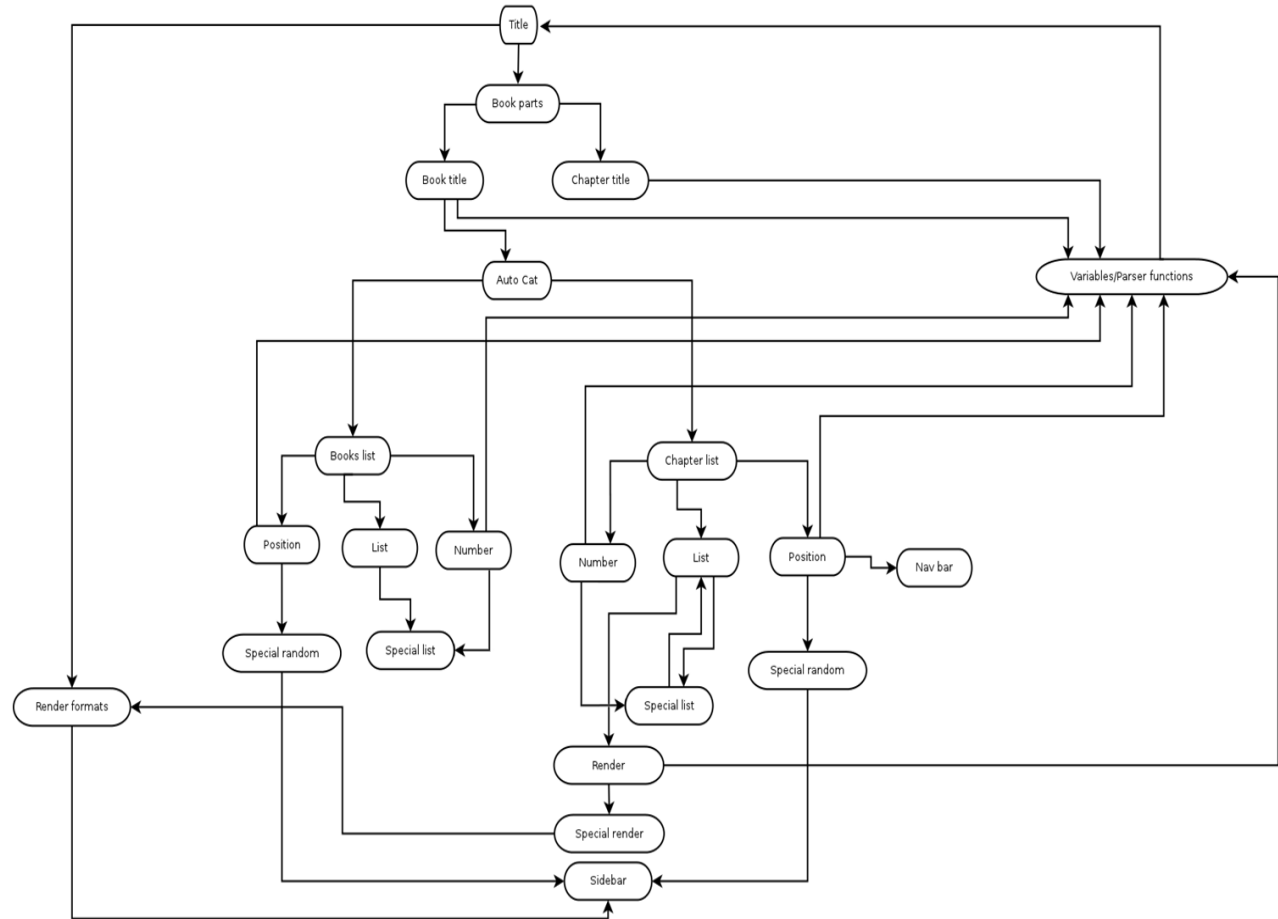
Cognitive Walkthrough: How to

1. Define users and context
2. Determine tasks to walkthrough
3. Assemble evaluator(s)
4. Develop ground rules
5. Conduct actual walkthrough
 - a. Provide presentation of interface to evaluators
 - b. Walkthrough the action sequence for each task from the perspective of a typical user
 - c. Keep these questions in mind:
 - i. Will the user try to achieve the right effect?
 - ii. Will the user notice that the correct action is available?
- ii. Will the user associate the correct action with the effect that the user is trying to achieve?
- iii. Will the user see that progress is being made towards their intended outcome?
- c. Record successes, failures, design suggestions, and issues encountered, as well as assumptions about users, comments on tasks, and other info that might be helpful
5. Bring analysis together
6. Brainstorm possible solutions



KENNESAW STATE
UNIVERSITY

Cognitive Walkthrough — Flow Diagram



2. Heuristic Evaluations

- The method deals with typical users knowledge which applied to identify usability problems
(Preece, Rogers, & Sharp, 2015)
- Research shows that people tend to use simple heuristics when make decisions
(Gigerenzer et al., 1999)
- Usability experts review your site's interface and compare it against accepted usability principles

- Nielsen's Heuristics
 - Visibility of system status
 - Match between system and real world
 - User control and freedom
 - Consistency and standards
 - Error prevention
 - Recognition rather than recall
 - Flexibility and efficiency of use
 - Aesthetic and minimalist design
 - Help users recognize, diagnose, and recover from errors
 - Help and documentation

Heuristic Evaluations

Advantages

- Provide quick / relatively inexpensive feedback for designers
- Obtaining feedback early in the design
- Assigning the correct heuristic can help suggest the best corrective measures to designers
- You can use it together with other usability testing methodologies
- Conduct usability testing to further examine potential issues

Disadvantages

- Requires knowledge and experience to apply the heuristics effectively
- Hiring trained usability experts are sometimes hard to find and expensive
- Recommended to find and use multiple experts and aggregate their results
- Evaluations may identify more minor issues and fewer major issues

3. Think-Aloud Evaluations



Based on the protocol created by
Lewis in 1982



Aimed to understand the cognitive
processes of the human brain



The participants are given a set of
tasks and asked to complete it while
thinking out loud to the testers

Think-Aloud Evaluations (Cont'd)

- Dives deeper into how a real user would interact with the system
- Believed to reveal better design flaws and find the most severe obstacles to the users task performance (Yen & Bekken, 2009)
- Participants are encouraged to express anything they thought, saw, or felt to better understand the design from the user's point of view
- Users generally aren't bothered with a few "off" designs if they are still able to perform their jobs fluidly (Yen & Bekken, 2009)
- A basic thinking-aloud usability study only needs 3 things:
 - Recruited representative users
 - Representative tasks for the users to perform
 - A hands-off approach - allowing the users to do the talking

4. Classic Experiments

- Relies on statistical analysis
- Three main characteristics:
 - a. Must be a group under study so that it can be observed that a process has any effect on the group and is worth researching
 - b. Participants need to be randomly selected so as to be unbiased
 - c. There must be a defined outcome measure both before and after the experiment. (*Greeno, 2002*)
- Classic experiments do not rely on user input, but a hypothesis and a testing outcome

Experimental design types:

- a. Experimental causal chain design
- b. Measurement of mediation design
- c. Moderation of process design (*Spencer, 2005*)



KENNESAW STATE
UNIVERSITY

Classic Experiments (Cont'd)

Recommendations for Experimental Designs based on Ease of Manipulating and Measuring

		Ease of manipulating proposed process	
		Easy	Hard
Ease of measuring proposed process	Easy	Experimental casual chain design	Measurement of mediation design
	Hard	Moderation of process design	No design is likely to work

5. Focus Groups

- Rely on open and quality communication between participants
- Explores both what people think as well as how and why they think
- Act as a conversation between participants
 - Exchange information and personal experiences (Kitzinger, 1995)



Focus Groups (Cont'd)

- **Focus groups serve 3 purposes:**
 - **Self-contained methods**
 - Only method of data gathering
 - **Supplementary sources**
 - Another method takes precedence
 - **Multi-method studies**
 - Employed equally alongside other methods (Morgan, 1996)
- **Focus groups answer:**
 - What is the user looking for?
 - How accessible do they imagine the program to be?
 - Who is the program's target user audience?
 - How user-friendly must it be?
 - What issues and requirements do stakeholders bring?
 - What quality-of-life improvements can be discovered?

Focus Groups (Cont'd)

- Users can catch bugs that were overlooked
- Users can give honest input on design choices
- Users can offer feedback on accessibility and usability
- Focus groups are valuable at every step of the design process
- The hallmark of focus group research is its “explicit use of the group interaction to produce data and insights that would be less accessible without the interaction.”
(Morgan, 1996)

Summary

Interfaces are used everyday by people to interact with the world around them, which makes sense why they should be properly tested. Of the different types of interface evaluations, there are three general categories:

- controlled setting with users,
- natural setting with users,
- and any setting not involving users.
- Some include efficiency of use, consistency, error handling and freedom of control, which are referred to in **J Jakob Nielsen's 10 heuristics** and **Shneiderman ad Plaisanrt's eight golden.**
- Each having their own benefits but among all interfaces there are guidelines and standards which should be sought after. rules. Within the three main categories there are many different methods of testing such as cognitive walkthroughs.



In Summation (Cont'd)

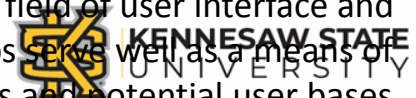
Cognitive walkthrough is the evaluation of a good or service. The way it works is to think about how other users who would use the product try to process on how to make it function. It helps developers to create a simplistic and easy-to-use product in order for a better user experience. It also helps with errors occurring.

Heuristic evaluation is used to establish a clear line between different elements of a user interface. This can be represented as a pyramid, where the bottom is the common elements and the closer it is to the top, the more important are the elements is on the interface. This helps with separating the least important elements from the most important elements and developers to focus more on different elements that are inserted within an interface.

The thinking aloud protocol is another method of testing usability. It is a method that assigns certain tasks for users to complete and encourages them to verbalize their thoughts while completing the task, to gain a better understanding of the way they perceive and interact with the interface.

Classic experiments is a subtype of the experimental design, where an experiment is conducted with minimal outside influences to better determine the cause of something. They are derived from a simple hypothesis, and that hypothesis is then tested under certain circumstances to determine if it was correct.

Focus groups serve as a form of group interview that allows for fluid communication and feedback. In research, this qualitative method of study provides direct, open, and honest reporting from subjects. In the field of user interface and design interaction, focus groups serve well as a means of gathering feedback from clients and potential user bases.



Extended Resources

Link	Description
https://www.youtube.com/watch?v=qQxq5Muo5GI	This youtube video discusses the thinking aloud methodology for website usability testing
https://www.youtube.com/watch?v=qtLnBz6lbRQ	Research methods of the experimental design, describing the steps that bring about an experimental conclusion.
https://www.youtube.com/watch?v=3TwgVQIZPsw	This Ted-Ed video explains how focus groups works, how they came about, and the uses they serve in research.
https://www.youtube.com/watch?v=cCAPz14yjd4	This lecture video from Yale University discusses different methods of qualitative research, including focus groups and their place in research methodologies.
https://www.youtube.com/watch?v=_RxfU6dPZuU	This video discusses Jakob Nielsen's 10 heuristics to better usability
https://www.youtube.com/watch?v=a3niUbFJlEw	This short youtube video explains the definition of Cognitive Walkthrough and gives examples on how it is used in a work environment.



KENNESAW STATE
UNIVERSITY