CS449/649:
Human-Computer Interaction

Spring 2017

Lecture XII

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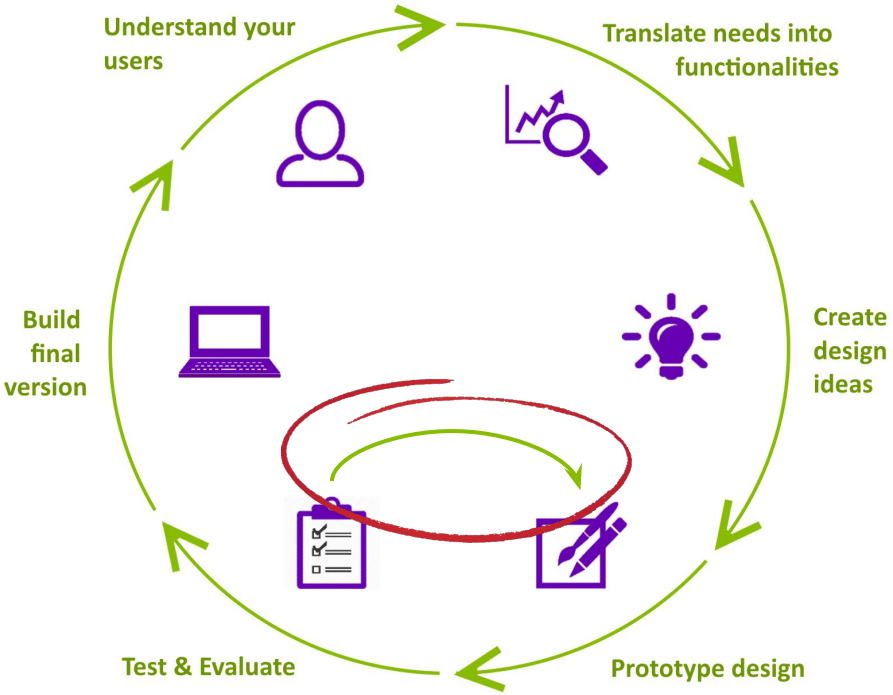
Understand your users
Translate needs into functionalities
Create design ideas
Prototype design
Test & Evaluate
Build final version

Prototype Design

Prototypes
- interactive design model of the product

Low-fidelity

High-fidelity

Tangible & Testable Artifacts

Low-fidelity	High-fidelity
Low-tech	High-tech
Partial functionality	“Full” functionality
Simulated interaction	True interaction

Prototype Design

Designing User Interface

Elements & characteristics	Elements composition	Spatial organisation	Information processing	Interaction
Color Perception	The Von Restorff effect	Rule of Thirds	Dual-coding theory	Manipulation
Shape Perception	Gestalt Principles	Types of vision	Patterns matching	Locomotion
Visceral Reaction Triggers	Fitt's Law	Free space	Social & Emotional info	Conversation

Prototype Design

High Fidelity Prototype Evaluation

- Heuristic Evaluation
- Eye Tracking
- Focus Groups
- Tree Testing
- A/B Testing
- Walk Through
- Click Testing
- Keystroke Level Modeling
- Five Second Test

Prototype Design

Heuristic Evaluation	Tree Testing	Click Testing
Eye Tracking	A/B Testing	Keystroke Level Modeling
Focus Groups	Walk Through	Five Second Test

Evaluated by **experts** (sometimes called “expert review”)

Following **prescribed user journeys** - set of specific, goal-based tasks

Assessment is based on **set of heuristics**

To conduct you need: 3-5 evaluators | List of tasks | List of heuristics | Form for notes

Report: Identify each **issue**, **prioritize** according to severity, relate each issue to **screenshot**

Prototype Design

- **Heuristic Evaluation**
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Usability Heuristics for User Interface Design

- Visibility of system status
- Consistency and standards
- Flexibility and efficiency of use
- Help and documentation
- Match between system and the real world
- Error prevention
- Recognition rather than recall
- User control and freedom
- Help to recognize and recover from errors
- Aesthetic and minimalist design

Jacob Nielsen

Prototype Design

Heuristic Evaluation

Eye Tracking

Focus Groups

Tree Testing

A/B Testing

Walk Through

Click Testing

Keystroke Level Modeling

Five Second Test

Other sets of usability heuristics:

Ben Shneiderman: *Eight Golden Rules of Interface Design*

Jill Gerhardt-Powals: *10 Cognitive Engineering Principles*

Bruce Tognazzini: *First principles of interaction design*

William Lidwell, Kritina Holden, Jill Butler: *Universal principles of design*

Connell & Hammond: *30 Usability Principles*

Alan Cooper: About face 2.0: The essentials of interaction design

Larry Constantine: *Software for use*

List made by Luke Chambers

Prototype Design

Heuristic Evaluation	Tree Testing	Click Testing
Eye Tracking	A/B Testing	Keystroke Level Modeling
Focus Groups	Walk Through	Five Second Test

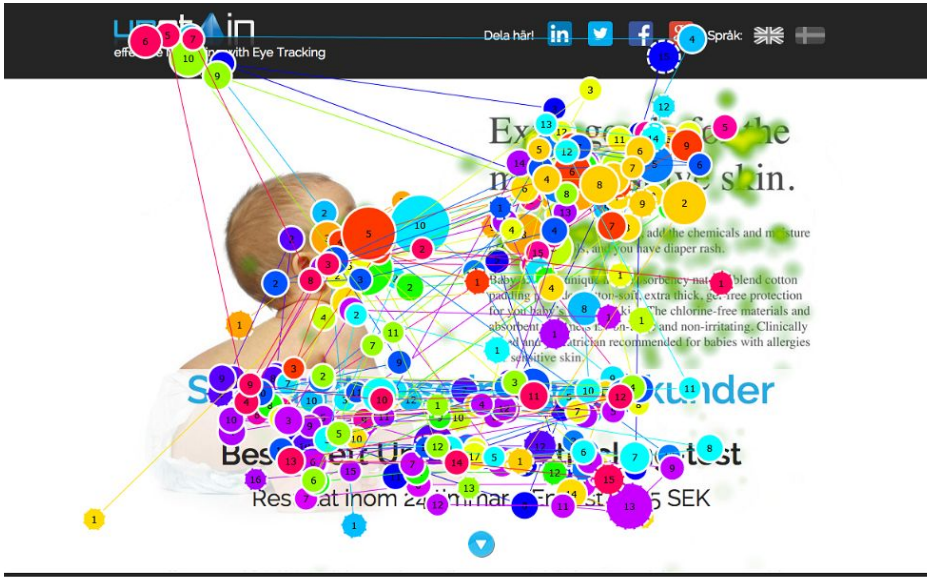
Detects person's fovea **fixations** and the **movements in between** fixations

Showing hard-to-articulate behaviour

Where participants expected to find certain elements	Whether participants noticed a particular element	Whether there are differences between user groups
What elements of the interface are distractive	Efficiency of a design guidances through a task	Which content participants read in details, scan or ignore

Reported as a **gaze plot** for one participants and as **heat maps** for study overall

Gaze Plot



Heat Map

Images: http://www.upstain.com/

Prototype Design

Heuristic Evaluation	Tree Testing	Click Testing
Eye Tracking	A/B Testing	Keystroke Level Modeling
Focus Groups	Walk Through	Five Second Test

Typically lasts about two hours, 6-10 people

Type of an interview: Conversation based on **open-ended** questions and **story sharing**

Run by a **moderator** who maintains focus of the conversation according to a **discussion plan** and asks clarification questions

Explores users' **attitudes**, opinions and expectations as well as **general reaction** to a concept or prototype, all **self-reported**

Prototype Design

Heuristic Evaluation | Tree Testing | Click Testing

Eye Tracking | A/B Testing | Keystroke Level Modeling

Focus Groups | Walk Through | Five Second Test

Assessment of Information Architecture: Detects navigation structure problems

Items | Groups | Labels

~50 participants, ~10 tests per person, keep trees under several hundreds items (guidelines, not a rule)

Ask participants to find an item, use realistic task scenarios.

Measurements:

Task completion | Time per task | Number of attempts | Taken pathes

Tip: Ask about confidence, associate confidence and completion

amazon.ca Try Prime

All

Shop by Department

Your Store | Deals Store | Gift Cards | Sell | Help

- Appstore for Android
  Shop over 375,000 apps and games
- Books
- Music
- Prime Photos & Drive
  Unlimited Storage
- Movies & TV Shows
- Kindle
- Electronics
- Software
- Video Games
- **Home, Kitchen, & Pets**
- Tools, Patio & Garden
- Health, Beauty, & Grocery
- Toys & Baby
- Clothing, Shoes & Jewelry
- Sports & Outdoors
- Automotive & Industrial
- Boutiques Francophones

Full Store Directory

Home

- All Home
- Furniture
- Home Décor
- Arts, Crafts & Sewing
- Bedding
- Vacuums & Floorcare
- Heating & Cooling
- Storage & Organization

Pet Supplies

- All Pets
- Dogs
- Cats

Kitchen & Dining

- All Kitchen
- Small Appliances
- Utensils, Gadgets & Barware
- Cookware

Furni
& Dé
› Shop n

Shop by Department

Your

Home | Best Sellers | Kitchen &

Show results for

‹ Home & Kitchen

Arts, Crafts & Sewing

- Art Supplies (34,581)
- Beading & Jewelry Making (45,257)
- Cases & Transport (1,396)
- Craft Supplies (61,817)
- Fabric (7,779)
- Fabric Care (44)
- Fabric Painting & Dyeing (1,165)
- Furniture & Accessories (3,547)
- Knitting & Crochet (5,200)
- Metalwork (9,056)
- Needlework (8,267)
- Organization & Storage (2,577)
- Photography (90)
- Printmaking (2,414)
- Safety & Cleaning (314)
- Scrapbooking (41,915)
- Sewing (34,595)

Home | Best Sellers | Kitchen

1-24 of 62,157 results for **Home**

Show results for

‹ Home & Kitchen

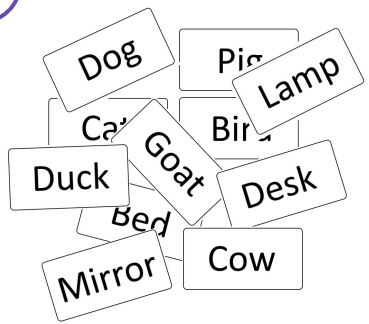
‹ Arts, Crafts & Sewing

Craft Supplies

- Adhesives (3,449)
- Basket Making (242)
- Candle Making (771)
- Ceramics & Pottery (1,063)
- Cutting Tools (2,138)
- Doll Making (884)
- Floral Arranging (547)
- Framing Materials (866)
- Glitter (701)
- Gold Leaf (135)
- Leathercraft (2,851)
- Mosaic Making (137)
- Paper & Paper Crafts (11,756)
- Purse Making (215)
- Rivets (625)
- Rug Making & Latch Hook (200)
- Sculpture Supplies (703)
- Soap Making (7,849)
- Stained Glass Making (382)
- Woodcrafts (1,152)

Closed Card Sort:

1



Participants get a stack of cards

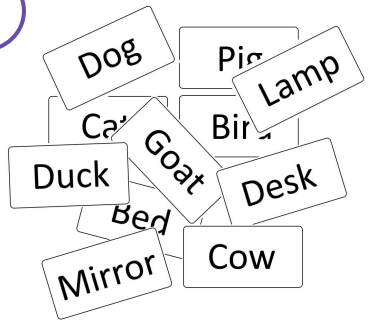
2

Animals	Furniture
Goat	Table
Dog	Mirror
Cow	Desk
Pig	Chair

Participants sort cards into groups the researchers created

Open Card Sort:

1



Participants get a stack of cards

2

Goat	Table
Dog	Mirror
Chair	Desk
Cow	

Participants sort cards into groups

3

Has 4 legs	Flat
Goat	Table
Dog	Mirror
Chair	Desk
Cow	

Participants label groups

Prototype Design

Heuristic Evaluation | Tree Testing | Click Testing

Eye Tracking | **A/B Testing** | Keystroke Level Modeling

Focus Groups | Walk Through | Five Second Test

Quantitative comparison of **two versions** of an element by a defined **success metric**

- Trigger elements style
- Images and text content
- Headlines / descriptions
- Layout, style, color scheme
- Input forms

Split user traffic between two versions and run them **simultaneously**

Correlation does not mean causation. Variations should aim at addressing **actual causes** of an issue

Need to reach **statistical confidence**

Prototype Design

Heuristic Evaluation	Tree Testing	Click Testing
Eye Tracking	A/B Testing	Keystroke Level Modeling
Focus Groups	**Walk Through**	Five Second Test

Task-based approach to identify potential problems for **novice users.**

Users prefer to **learn by doing** rather than reading manuals

Create a **"successful story"** for each task and include **step-by-step** list of actions (for assessment).

During the walkthrough assess:

- **Does user attempt the expected step?**
- **Does user notice available correct option?**
- **Do user's expectation align with the outcome?**
- **Does user understand provided feedback?**

Wharton, C., Rieman, J., Lewis, C., Polson, P. "The cognitive walkthrough method: A practitioner's guide." Usability inspection methods. John Wiley & Sons, Inc., 1994

Prototype Design

Heuristic Evaluation	Tree Testing	**Click Testing**
Eye Tracking	A/B Testing	Keystroke Level Modeling
Focus Groups	Walk Through	Five Second Test

Examines what user **clicks on first** in order to complete a given task

Users are almost **twice as likely to succeed** in a task if their first click was down the right path

To conduct you need a **list of tasks** (for users) and **correct paths** (for researchers)

- Track each click
- Track time to make first click

Create a **satisfaction / confidence scale** and **difficulty scale**, ask participants to assess each task

Create **heatmaps** to visualize study results and analyze clusters

Prototype Design

Heuristic Evaluation	Tree Testing	Click Testing
Eye Tracking	A/B Testing	**Keystroke Level Modeling**
Focus Groups	Walk Through	Five Second Test

Predicts a **skilled** user's error-free task time (within 10-20% of the actual time), estimate of UI **efficiency**

Keystroke 0.8sec	Pointing 1.1sec	Homing 0.4sec	Drawing	Mental Operator 1.35 sec

KLM was proposed by Stuart K. Card, Thomas P. Moran and Allen Newell. A **GOMS** model technique

TLM (touch level model) was proposed by Andrew D. Rice and Jonathan W. Lartigue

Added **operators for touchscreen** interactions

Prototype Design

- Heuristic Evaluation
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- **Five Second Test**

Tests **first impression** of a page / screen and its **communicative ability** regarding the main purpose

Participant is given context and exposed to an **image of a page for 5 seconds**, then image is removed

- **What participant can recall**
- **What can they do on the page**
- **What caught their attention**

Best on pages designed with a single primary purpose

- **Is critical content clear?**
- **Is purpose clear?**
- **Are options obvious?**
- **General impression**

Week 6 take-away

Questions:

- High fidelity prototypes:
  - Characteristics and purposes
  - Implementation from scratch vs using special software
- Designing user interface:
  - Elements and characteristics
  - Elements composition
  - Spatial organisation
  - Information processing
  - Interaction
- Evaluating high fidelity prototypes and UI
  - Heuristic evaluation
  - Eye tracking
  - Focus groups
  - Tree testing
  - A/B testing
  - Cognitive walkthrough
  - Click testing
  - Keystroke level modeling
  - 5 second test