

HCI Heuristic Evaluations

11/8/18

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Aims:

- Describe the key concepts associated with inspection methods.
- Explain how to do heuristic evaluation and walkthroughs.
- Explain the role of analytics in evaluation- AB testing.
- Describe how to use Fitts' Law – a predictive model.

Inspections

- Several kinds.
- Experts use their knowledge of users & technology to review software usability.
- Expert critiques can be formal or informal.
- Heuristic evaluation is a review guided by a set of heuristics.
- Walkthroughs involve stepping through a pre-planned scenario noting potential problems.

Heuristic evaluation

- Developed by Jacob Nielsen in the early 1990s.
- Based on heuristics distilled from an empirical analysis of 249 usability problems.
- These heuristics have been revised for current technology by Nielsen and others for:
 - mobile devices,
 - wearables,
 - virtual worlds, etc.
- Design guidelines form a basis for developing heuristics.

10 Usability Heuristics for User Interface Design (from Nielsen, 1995)

Visibility of system status

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

Match between system and the real world

The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

User control and freedom

Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

Consistency and standards

Users should not have to wonder whether different words, situations, or actions mean the same thing.

Error prevention

Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

Recognition rather than recall

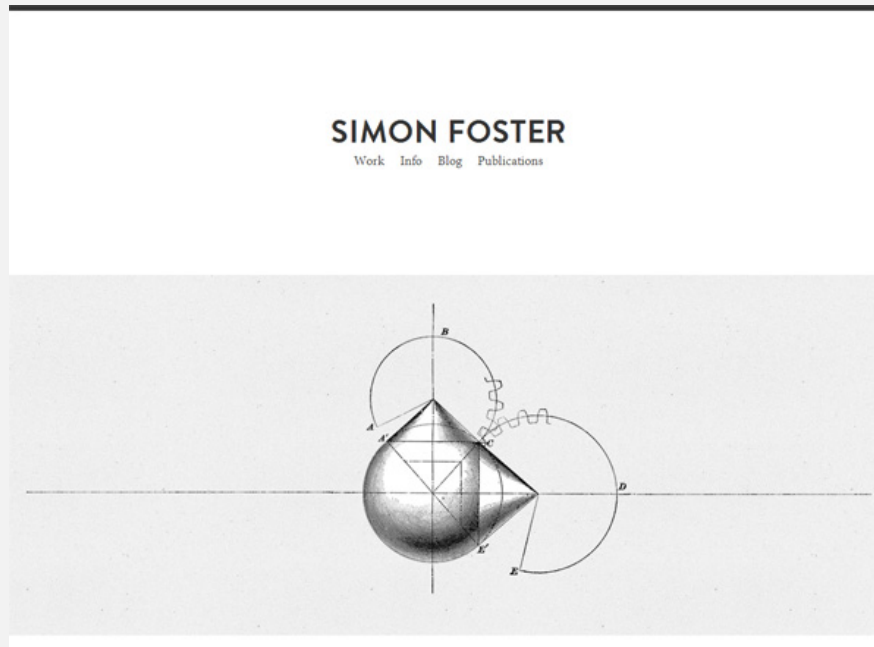
Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

Flexibility and efficiency of use

Accelerators – unseen by the novice user – may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

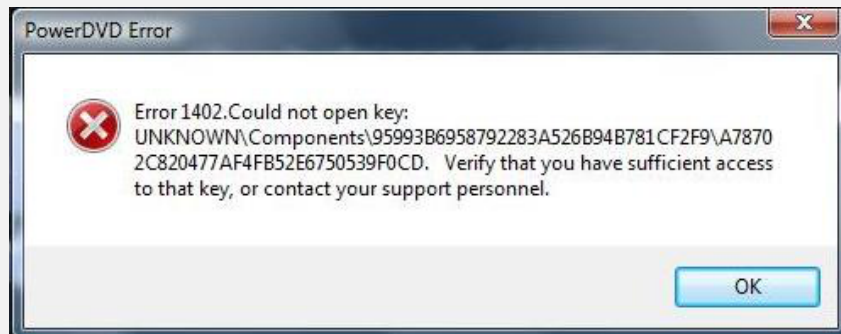
Aesthetic and minimalist design

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.



Help users recognize, diagnose, and recover from errors

Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.



Help and documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

Activity 2: Rating 2 websites based on the 10 heuristics

Go to apple.com

Explore the website

Take each heuristic and rate on a scale of 1-10 (10 being best) how well the website aligns to each

Do the same for asu.edu

Visibility of system status

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Help and documentation

Number of evaluators

Nielsen suggests that on average 5 evaluators identify 75-80% of usability problems.

Cockton and Woolrych (2001) point out that the number of users needed to find 75-80% of usability problems depends on the context and nature of the problems.

No. of evaluators & problems

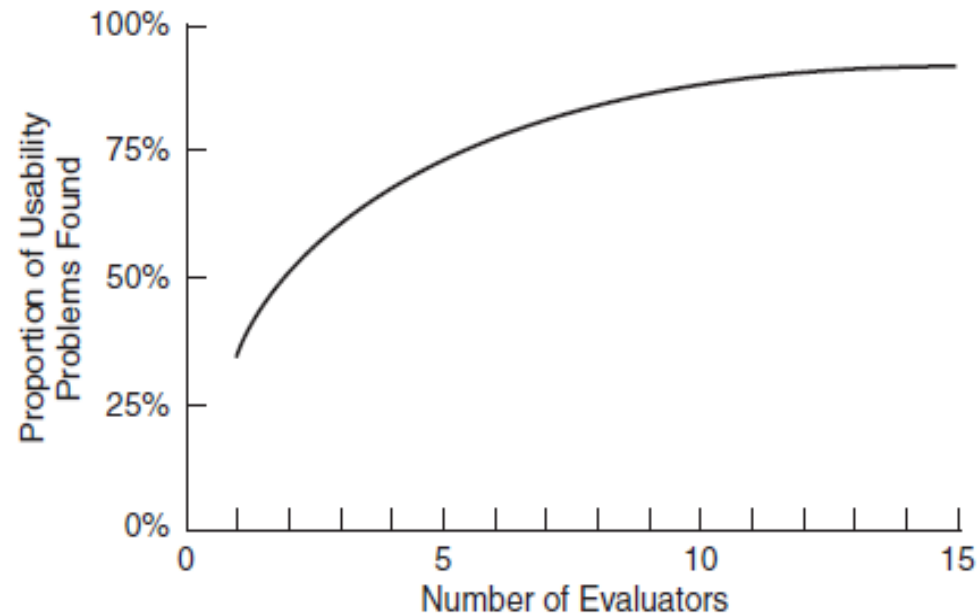


Figure 15.1 Curve showing the proportion of usability problems in an interface found by heuristic evaluation using various numbers of evaluators. The curve represents the average of six case studies of heuristic evaluation

Source: Usability Inspection Methods, J. Nielson & R.L. Mack ©1994. Reproduced with permission of John Wiley & Sons Inc.

Heuristics for websites focus on key criteria (Budd, 2007)

- Clarity
- Minimize unnecessary complexity & cognitive load
- Provide users with context
- Promote positive & pleasurable user experience

3 stages for doing heuristic evaluation

1. Briefing session to tell experts what to do.
2. Evaluation period of 1-2 hours in which:
 1. Each expert works separately;
 2. Take one pass to get a feel for the product;
 3. Take a second pass to focus on specific features.
3. Debriefing session in which experts work together to prioritize problems.

Advantages and problems

- Few ethical & practical issues to consider because users not involved.
- Can be difficult & expensive to find experts.
- Best experts have knowledge of application domain & users.
- Biggest problems:
 - Important problems may get missed;
 - Many trivial problems are often identified;
 - Experts have biases.

Cognitive walkthroughs

- Focus on ease of learning.
- Designer presents an aspect of the design & usage scenarios.
- Expert is told the assumptions about user population, context of use, task details.
- One or more experts walk through the design prototype with the scenario.
- Experts are guided by 3 questions.

The 3 questions

- Will the correct action be sufficiently evident to the user?
- Will the user notice that the correct action is available?
- Will the user associate and interpret the response from the action correctly?

As the experts work through the scenario they note problems.

Pluralistic walkthrough

- Variation on the cognitive walkthrough theme.
- Performed by a carefully managed team.
- The panel of experts begins by working separately.
- Then there is managed discussion that leads to agreed decisions.
- The approach lends itself well to participatory design.
- Also other adaptations of basic cognitive walkthroughs.

Evaluation using analytics

- A method for evaluating user traffic through a system or part of a system.
- Many examples: Google Analytics (chapter 7), Visistat (shown below), Learning Analytics.
- Times of day & visitor IP addresses

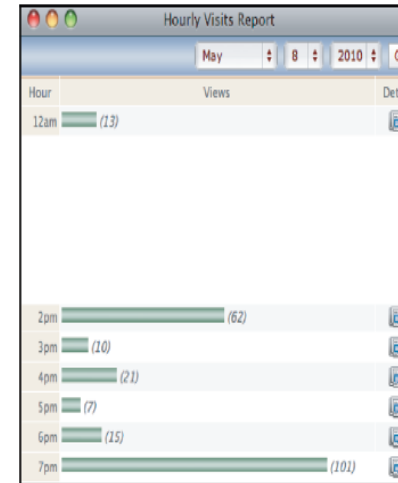


Figure 15.5 Clicking on May 8 provides an hourly report from midnight until 10.00 p.m. (only midnight and 2.00 p.m.–7.00 p.m. shown)

Source: <http://www.visistat.com/tracking/monthly-page-views.php>

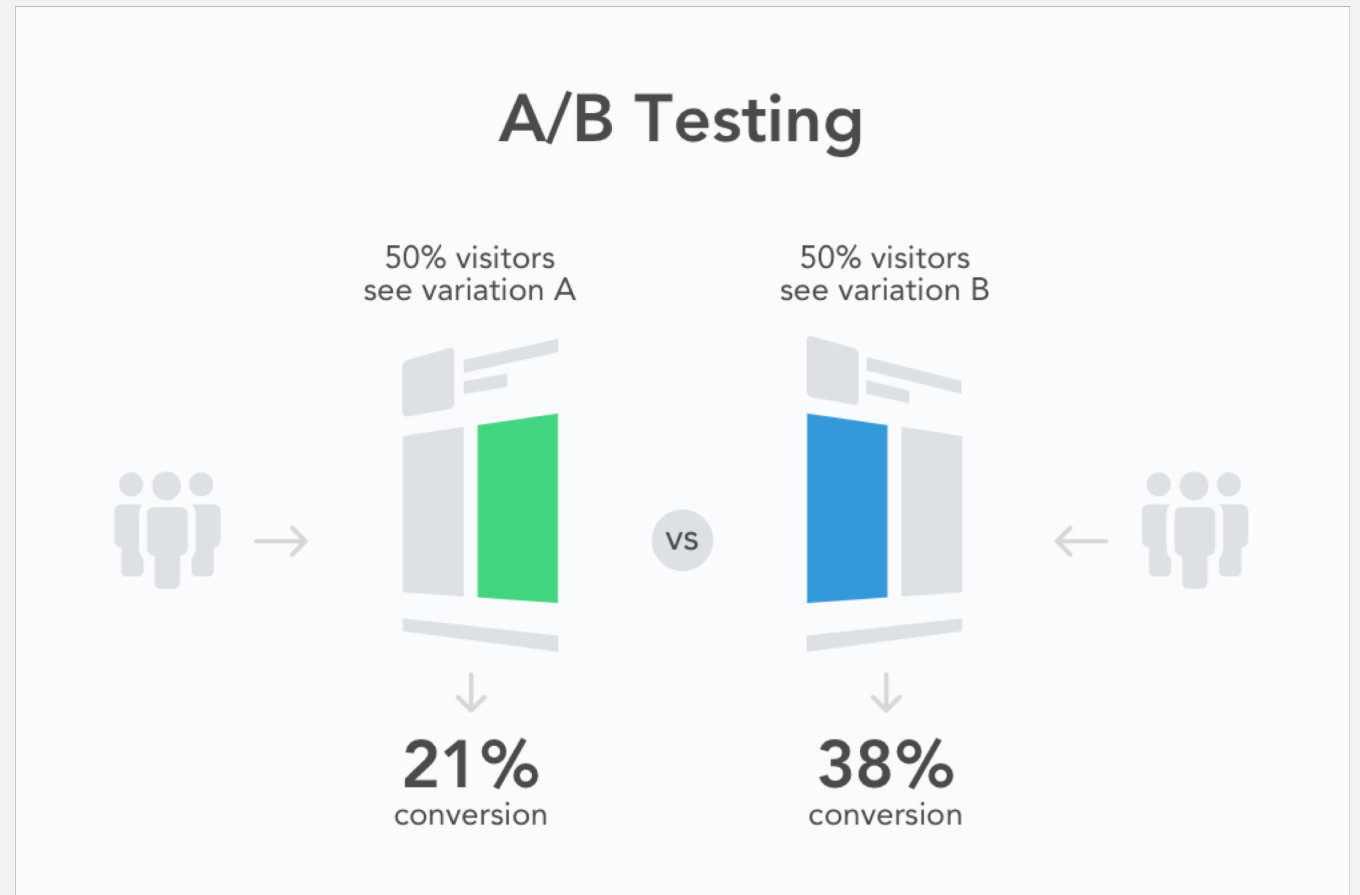
| Display By: Geographic Location | | | |
|---------------------------------|-------------------------|-------|--------|
| | Unique Visitor | Views | Detail |
| 1. | Los Angeles, California | 6 | |
| 2. | Sharpsburg, Maryland | 1 | |
| 3. | Phoenix, Arizona | 3 | |
| 4. | Lemesos, Limassol | 2 | |
| 5. | Targu-mures, Mures | 1 | |

Figure 15.6 Clicking on the icon for the first hour in Figure 15.5 shows where the IP addresses of the 13 visitors to the website are located

Source: <http://www.visistat.com/tracking/monthly-page-views.php>

Evaluative Analytics: AB Testing

- <https://www.youtube.com/watch?v=RHWVWiIW8DQ>
- <https://uxdesign.cc/how-netflix-does-a-b-testing-87df9f9bf57c>



Predictive models

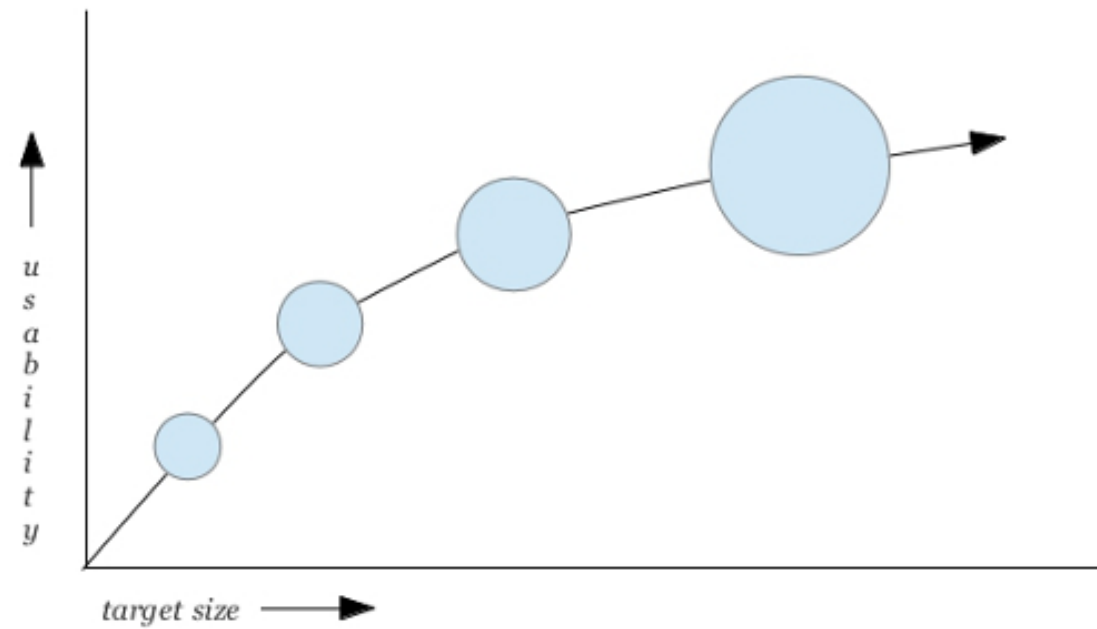
- Provide a way of evaluating products or designs without directly involving users.
- Less expensive than user testing.
- Usefulness limited to systems with predictable tasks - e.g., telephone answering systems, mobiles, cell and smart phones.
- Based on expert error-free behavior.

Fitts' Law (Fitts, 1954)

Fitts' Law predicts that the time to point at an object using a device is a function of the distance from the target object & the object's size.

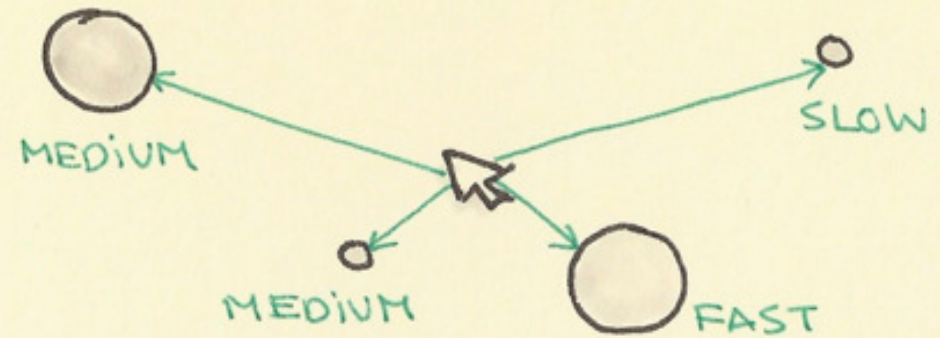
The further away and the smaller the object, the longer the time to locate it and point to it.

Fitts' Law is useful for evaluating systems for which the time to locate an object is important, e.g., a cell and smart phones, a handheld and mobile devices.



sketchplanations.com

FITTS' LAW



THE TIME TO A TARGET DEPENDS
ON THE RATIO OF $\frac{\text{DISTANCE}}{\text{SIZE}}$
or $T = \log_2 \left(\frac{D}{S} + 1 \right)$

Key points

- Inspections can be used to evaluate requirements, mockups, functional prototypes, or systems.
- User testing & heuristic evaluation may reveal different usability problems.
- Design guidelines can be used to develop heuristics
- Walkthroughs are focused so are suitable for evaluating small parts of a product.
- Analytics involves collecting data about users activity on a website or product
- Fitts' Law can be used to predict expert, error-free performance for clearly defined tasks with limited key presses, eg. data entry and smart phone use.