User interface design

User & Usability

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Last content

1. Introduction to Design
2. Human – Computer interaction
3. Interactive design
4. Donald A. Norman’s design priciples
5. Class project [4] + Flex tutorial

Content

1. User
    1. Introduction
    2. Human information process model
    3. *Cognitive process*
2. Usability
    1. Concept
    2. Usability components
    3. Usability design guidelines
3. Class project [1]

Content

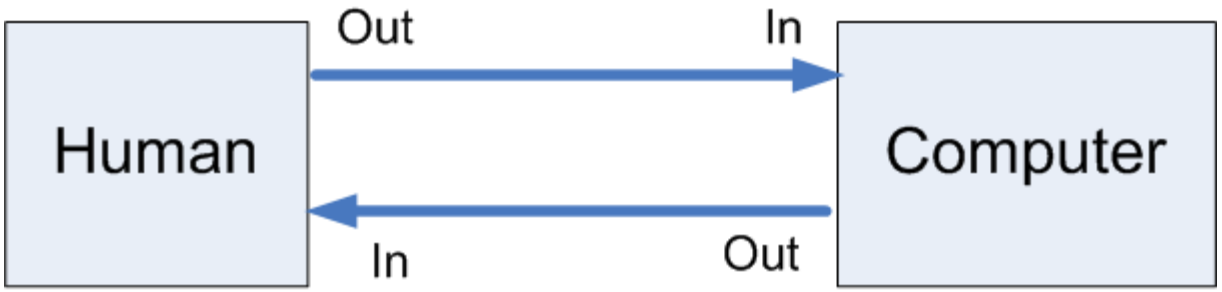
1. **User**
    1. **Introduction**
    2. **Human information process model**
    3. ***Cognitive process***
2. Usability
    1. Concept
    2. Usability components
    3. Usability design guidelines

Users – Introduction

- Human in HCI
- Human: the purpose – ultimate target of all systems.
- Understand users:
  - Ability
  - Habits
  - Errors & mistakes
  - Cognitive process

  } in using interactive systems

Users – Processing information system model



Human – Processing information system model

- Input / Output
- Memory
- Processor

Users – Processing information system model

Input

- **Looking**
- Hearing
- Touching

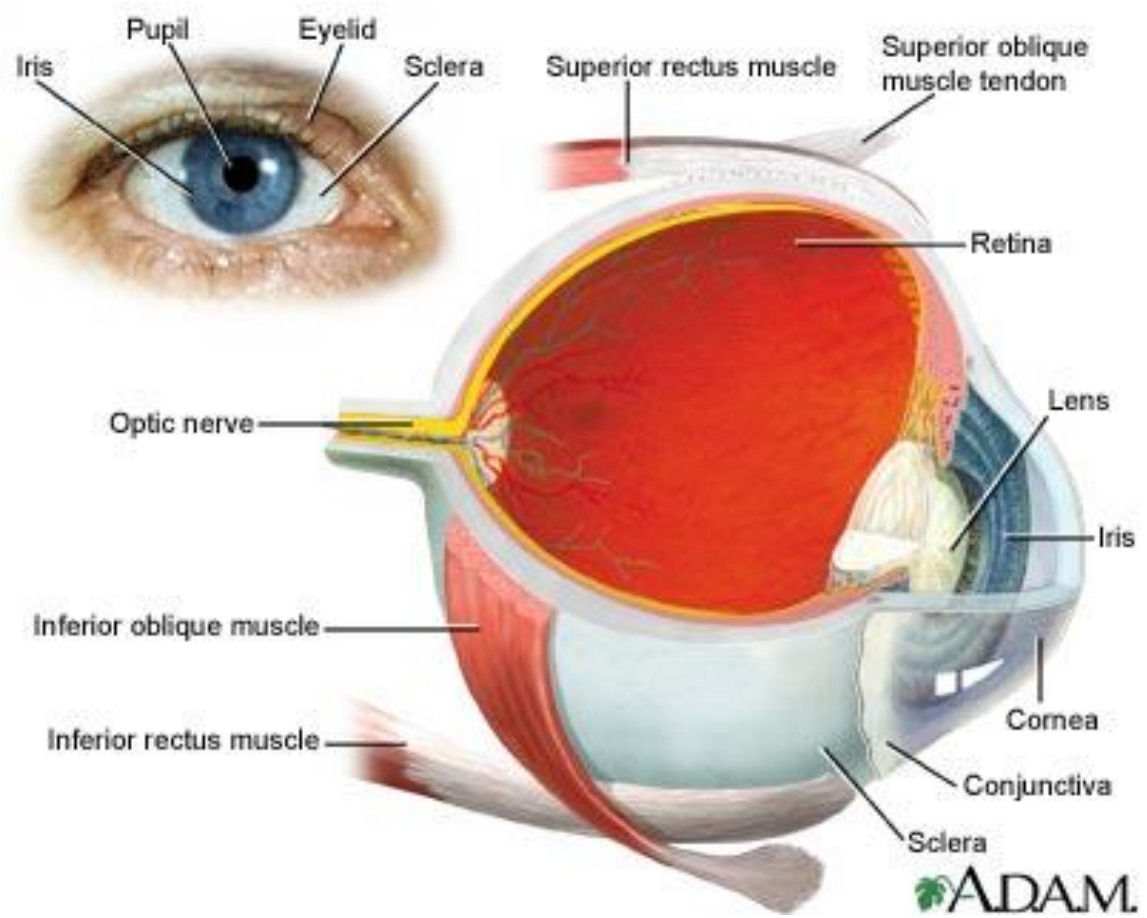
Output

- Hand
- Others

Users – Processing information system model

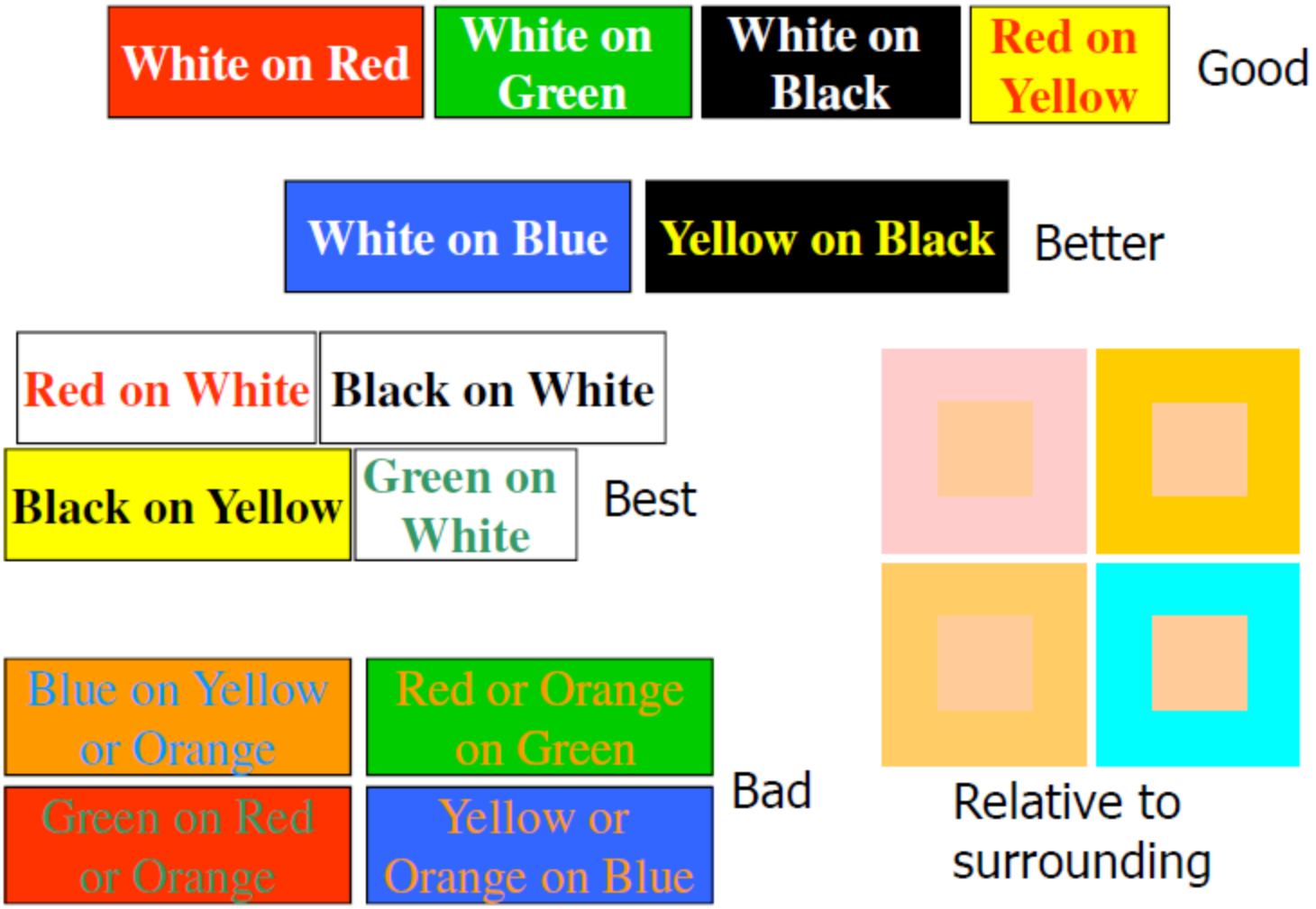
Looking:

- Has most effect on GUI



Users – Processing information system model

Looking: design with colors

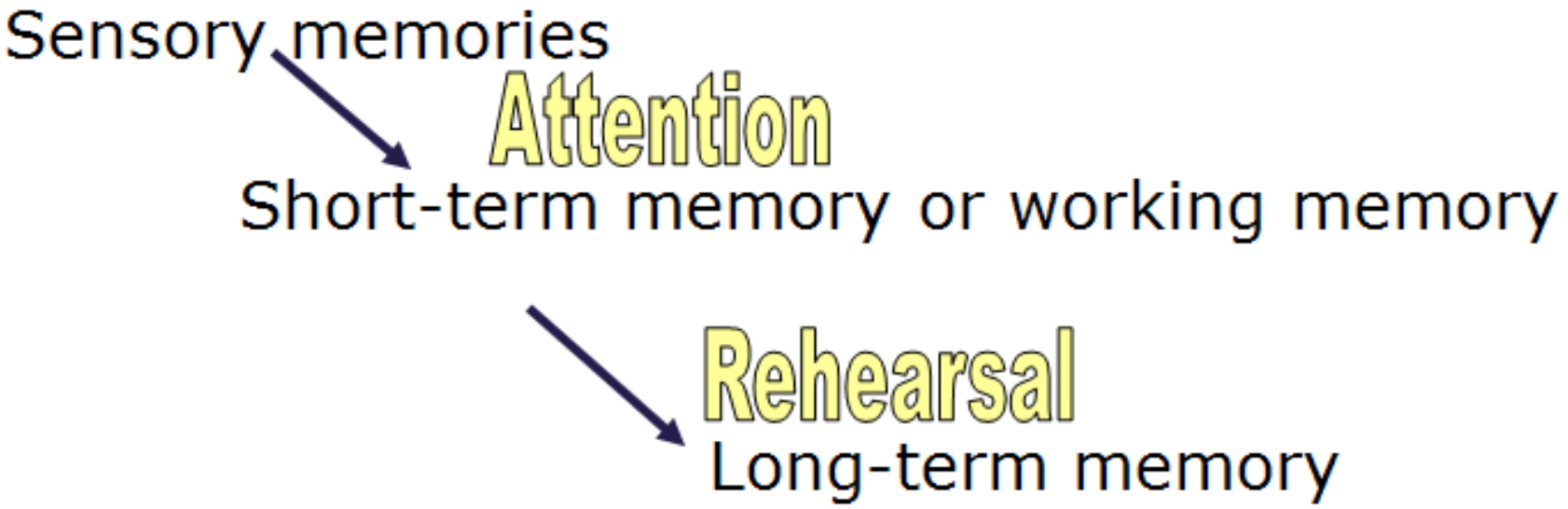


Users – Processing information system model

Looking: design with colors

Users – Processing information system model

Memory



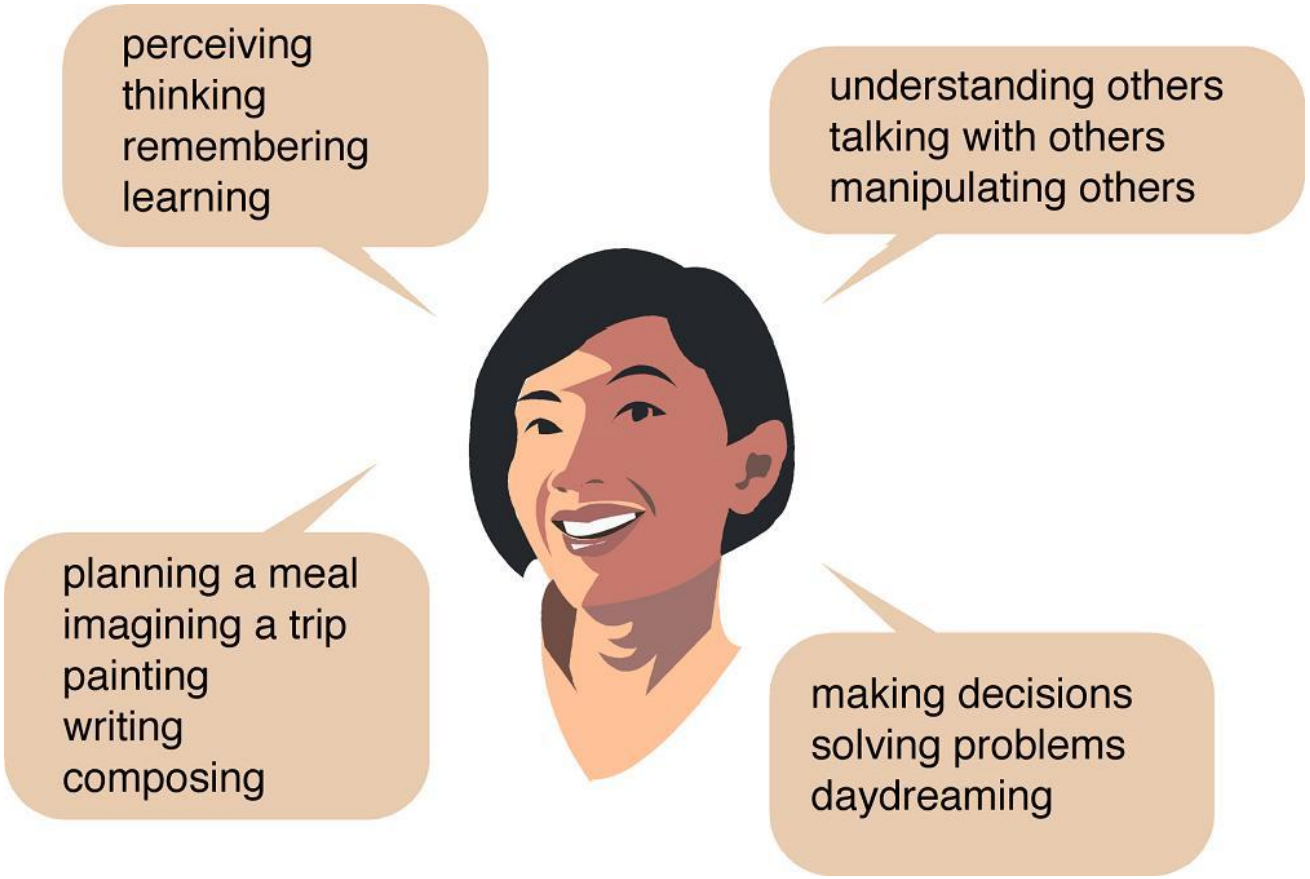
Users – Processing information system model

Processor

- Reasoning
- Problem solving
- Skills training
- Error processing

→ Think → Cognition

Users – Cognition



Users – Cognition

- Cognition: the process by which we become acquainted with things, or how we gain knowledge.
- Core cognitive processes for HCI:
  - ***Attention***
  - ***Perception***
  - ***Memory***
  - ***Learning***

Users – Cognition : attention

Attention:

- Selecting things to concentrate within multi-things
- Involve visual senses
- Enable to focus on relevant information but limit users to notice all events.

Users – Cognition : attention

Windows XP Control Pannel Categorization

Why do you think printers were singled out?

→ User experiments show that printer configuration was a very common reason for visiting the Control Panel

→ Support users find the links quickly.

Users – Cognition : attention

Users pay attention to:

status bar ?

mouse cursor ?

There’s an amusing story about a user study mainly involving ordinary spreadsheet editing tasks, in which every five minutes the status bar would display “There’s a $50 bill taped under your chair. Take it!”

In a full day of testing, more than a dozen users, nobody took the money.

Users – Cognition : attention

Design for Attention:

- To help users focus on their tasks
- Technique:
  - Color
  - Ordering
  - Spacing
  - Animation
  - Audio

  → Avoid over-use
- Use alerts only when necessary

Users – Cognition : Perception

Perception: ~ recognize

- to become aware of (something) through the senses
- uses different sense: vision, hearing, touch

Users – Cognition : Perception

E.g. hotel information

Pennsylvania
Bedford Motel/Hotel: Crinaline Courts
(814) 623-9511 S: $18 D: $20
Bedford Motel/Hotel: Holiday Inn
(814) 623-9006 S: $29 D: $36
Bedford Motel/Hotel: Midway
(814) 623-8107 S: $21 D: $26
Bedford Motel/Hotel: Penn Manor
(814) 623-8177 S: $19 D: $25
Bedford Motel/Hotel: Quality Inn
(814) 623-5189 S: $23 D: $28
Bedford Motel/Hotel: Terrace
(814) 623-5111 S: $22 D: $24
Bradley Motel/Hotel: De Soto
(814) 362-3567 S: $20 D: $24
Bradley Motel/Hotel: Holiday House
(814) 362-4511 S: $22 D: $25
Bradley Motel/Hotel: Holiday Inn
(814) 362-4501 S: $32 D: $40
Breezewood Motel/Hotel: Best Western Plaza
(814) 735-4352 S: $20 D: $27
Breezewood Motel/Hotel: Motel 70
(814) 735-4385 S: $16 D: $18

Users – Cognition : Perception

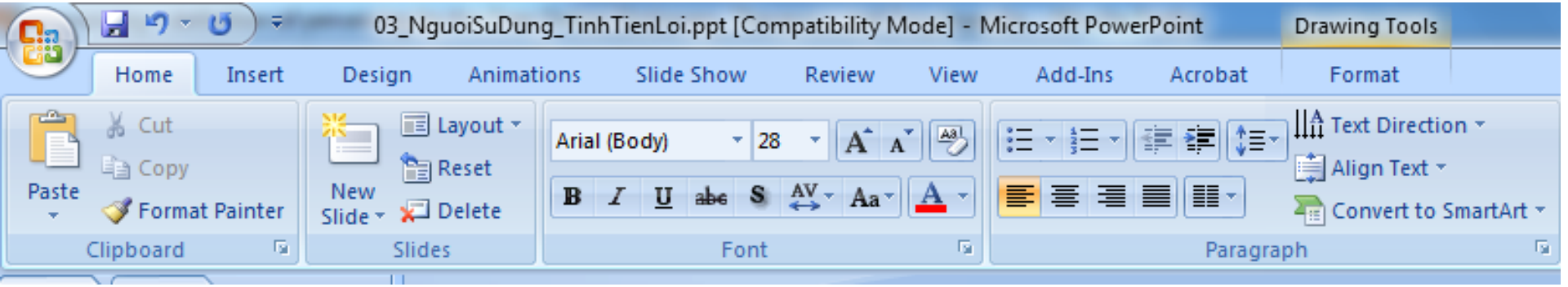
E.g. hotel information

South Carolina

City	Motel/Hotel	Area code	Phone	Rates Single	Rates Double
Charleston	Best Western	803	747-0961	$26	$30
Charleston	Days Inn	803	881-1000	$18	$24
Charleston	Holiday Inn N	803	744-1621	$36	$46
Charleston	Holiday Inn SW	803	556-7100	$33	$47
Charleston	Howard Johnsons	803	524-4148	$31	$36
Charleston	Ramada Inn	803	774-8281	$33	$40
Charleston	Sheraton Inn	803	744-2401	$34	$42
Columbia	Best Western	803	796-9400	$29	$34
Columbia	Carolina Inn	803	799-8200	$42	$48
Columbia	Days Inn	803	736-0000	$23	$27
Columbia	Holiday Inn NW	803	794-9440	$32	$39
Columbia	Howard Johnsons	803	772-7200	$25	$27
Columbia	Quality Inn	803	772-0270	$34	$41
Columbia	Ramada Inn	803	796-2700	$36	$44
Columbia	Vagabond Inn	803	796-6240	$27	$30

Users – Cognition : Perception

E.g. similar icons



Users – Cognition : Perception

Design for perception

- Text should be readable
- Icons & graphical objects should allow users to distinguish their meanings.
- Sound should be audiable and meaningful
- Bordering & spacing are effective techniques.

Users – Cognition : Memory

Memory:

- Recalling knowledge that allow users to act rightly
- Users do not remember everything but filter & memorize what they attend & perceive.
- Context is important in affecting memory
- Human is better at recognizing then recalling
  - Images better than words
  - DOS vs Windows

Users – Cognition : Memory

e.g. bad

How can users follow this guide after closing the dialog box?

Users – Cognition : Memory

Design for Memory:

- Do not overload users with complicated procedures
- Support recognition by using consistent menus, icons, and functions
- Provide various ways to help users organize & remember information. (e.g. color, flagging, category)

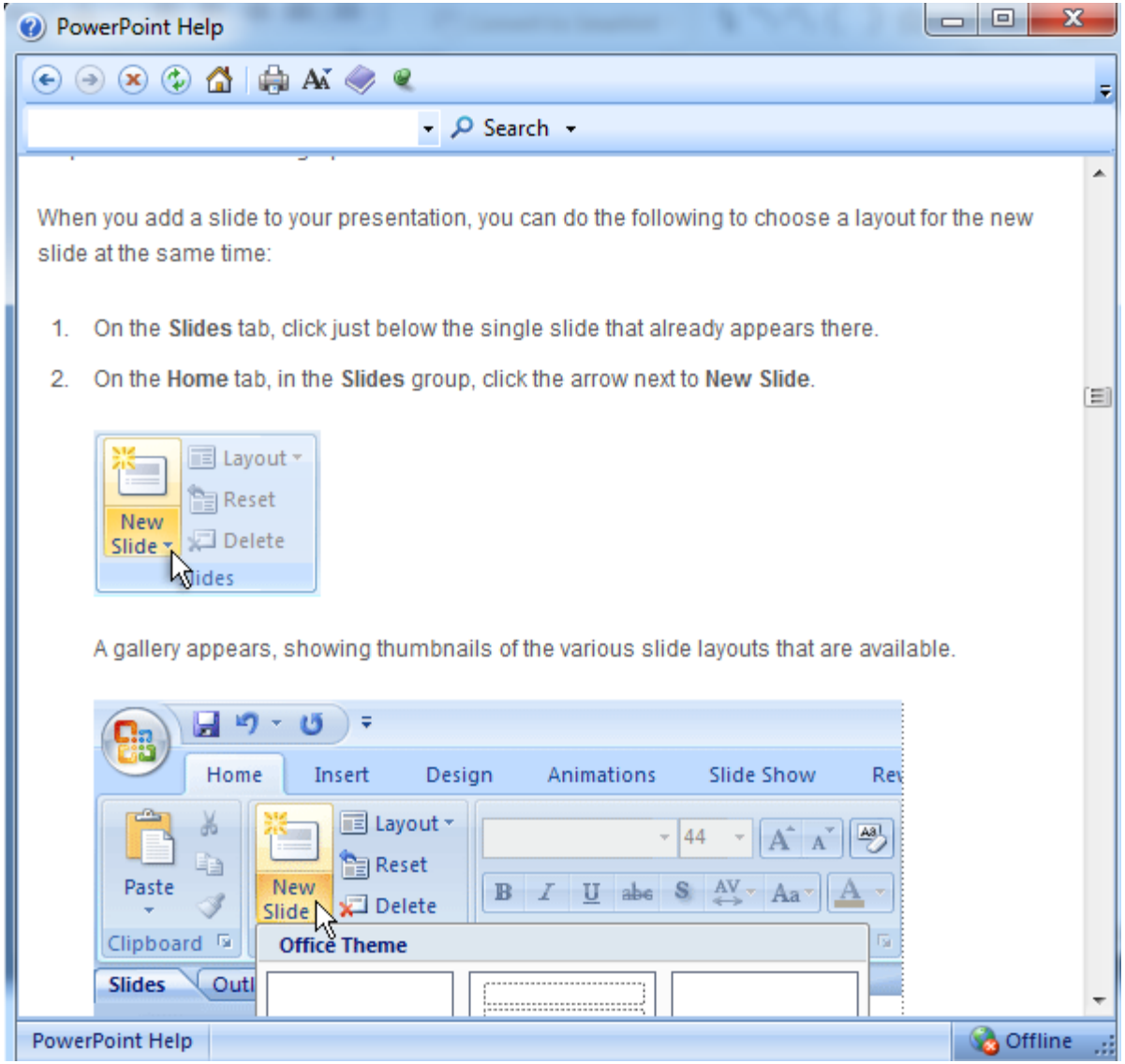
Users – Cognition : Learning

Learning:

- how to use computer application to complete the task
- users feel hard to learn from manuals (& usually ignore)

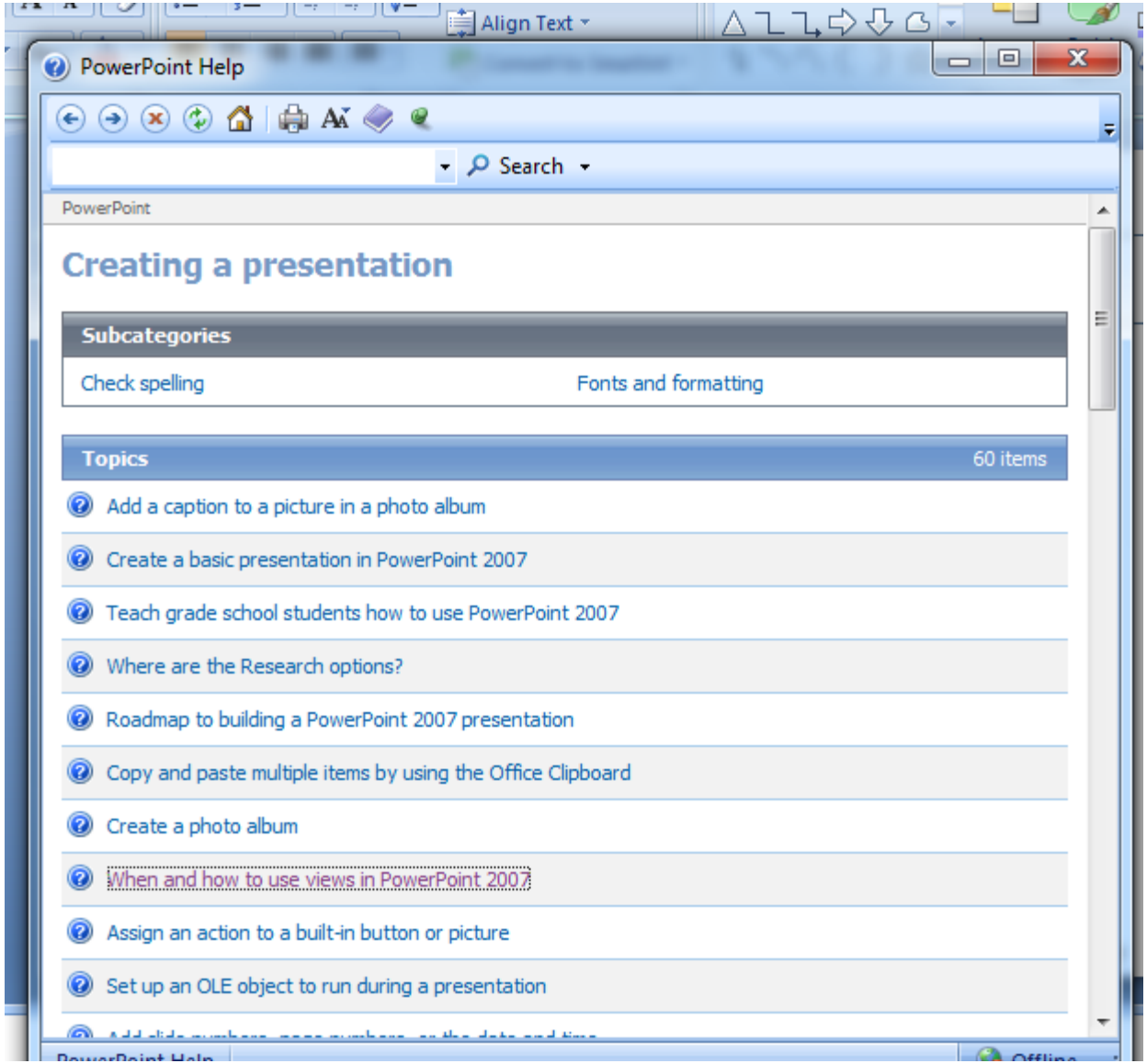
Users – Cognition : Learning

e.g. good



Users – Cognition : Learning

e.g. **?**



Users – Cognition : Learning

Design for Learning:

- Multimedia help
- Learning through doing
- UNDO is important
- Design interface that encourage exploration
- Design interface that constrain errors

Users

- Human – User is center of all systems
- Understand users to design for users
- Apply cognitive psychology into interactive design: emerging & important science.

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2. **Usability**
    1. **Concept**
    2. **Usability components**
    3. **Usability design guidelines**

Usability

- Usability: a quality attribute that assesses how **well** users can learn and use a product to accomplish their tasks and how satisfied they are with that process.
- Usability is combination of many quality components:
  - Effective
  - Efficient
  - Safe
  - Learnable
  - Memorable
  - User satisfied
  - …

Usability is hard

- Poor usability:
  - Decrease productivity
  - Make errors & mistakes
  - Make users angry & frustrated

→ Failed product

Usability is hard

- Users are all different & unpredictable and they **use** systems via user interface.
- User interface account ~50% of:
  - Design time
  - Implementation time
  - Maintenance time
  - Code size
- Usability depends on users:
  - Novice users need learnable
  - Infrequent users need memorizable
  - Experts need efficient

Usability is hard

- Programmers are (usually) poor at usability:
  - Do not think as “normal” people
  - Know the technology/software internals first
  - Enjoy systems more than people
  - Arrogant & stubborn (“This is my software!”)

Usability is hard

- Usability is only one attribute of the system:

Functionality	Reliability
Usability	Security
Performance	Compatability

→ Tradeoffs among different attributes

Usability components

- Effectiveness
- Efficiency
- Safety
- Learnability
- Memorability
- Satisfaction – User experience goals

Usability goals - Effectiveness

- Provide enough functions for users to complete their tasks
- How accurately and completely users can accomplish tasks
- Directly linked to user needs

Usability goals - Efficiency

- How quickly users complete tasks
- If users have learned how to use a system, they should gain high productivity
- Minimal steps
- Time constraint

Usability goals - Safe

- Prevent users from making errors
- Undo mechanism
- Data security

Usability goals - Learnability

- Sufficient user manual & tutorials
- Easy and quick to learn
- Ten-minute rule

Usability goals - Memorability

- How easy to remember procedures of systems
- Should follow conventions
- Clues for infrequently-used functions

Usability goals – Satisfaction – User experience goals

- Designs affect users' emotions
- Less clearly defined → hard to assess
- Example:
  - Fun; Enjoyable; Pleasure; Motivating; Creative
  - Boring; Annoying; Frustrating

→ Might become key advantage in design

Usability design guidelines

1. Donald A. Norman: 6 Principles of Design

2. Shneiderman: 8 Golden Rules of Interface Design

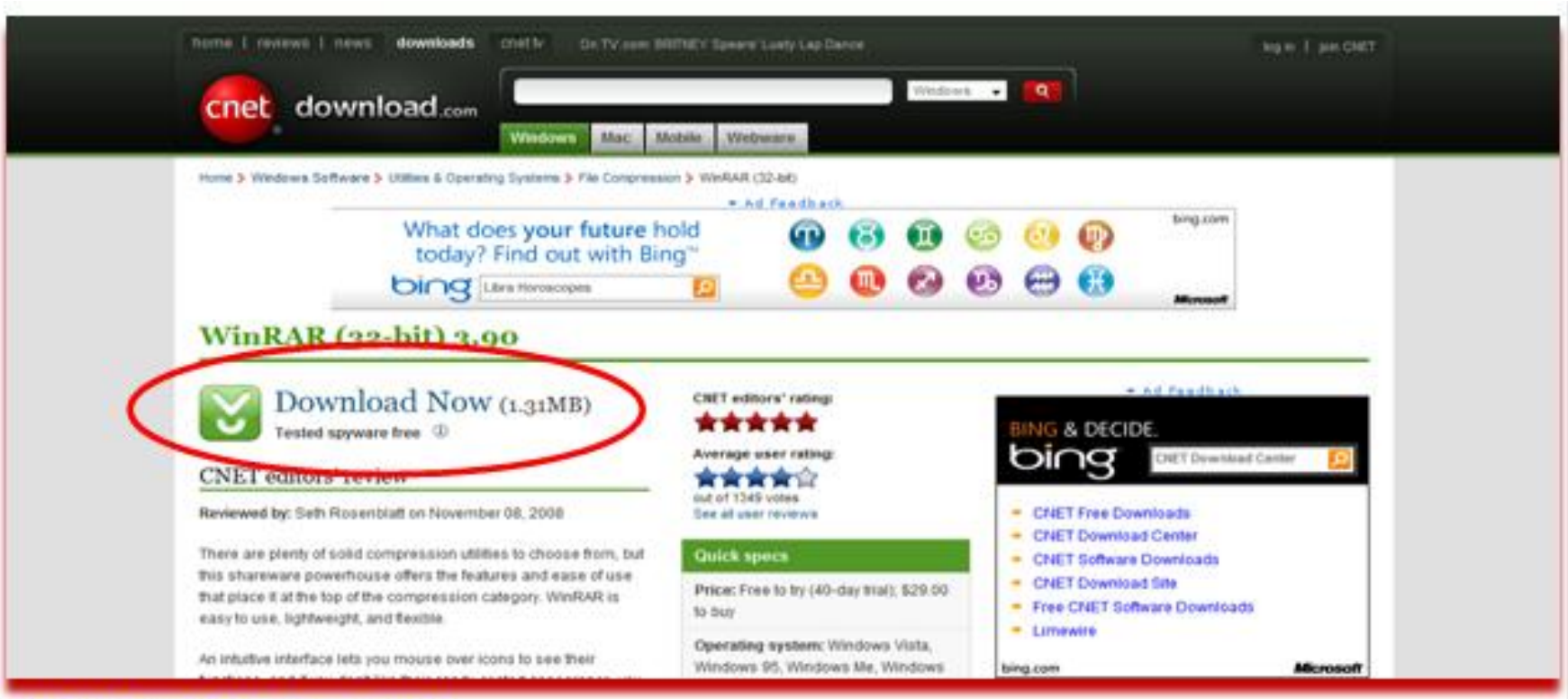
3. Jacob Nielsen: 10 Usability Heuristics

Donald A. Norman: Principles of Design

1. Visibility
2. Affordance
3. Constraint
4. Mapping
5. Feedback
6. Consitency

Donald A. Norman: Principles of Design

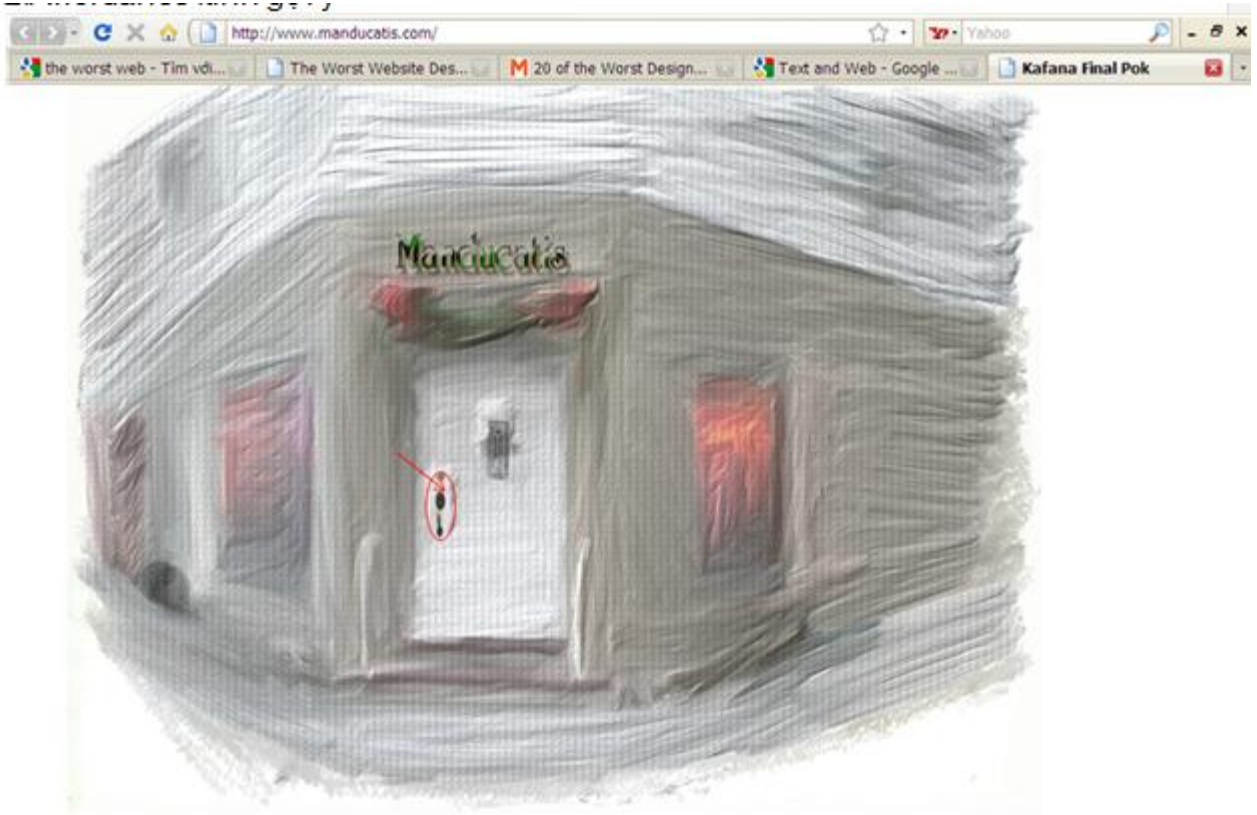
1. Visibility : vd tốt : …



http://download.cnet.com/

Donald A. Norman: Principles of Design

2. Affordance: vd kém : …



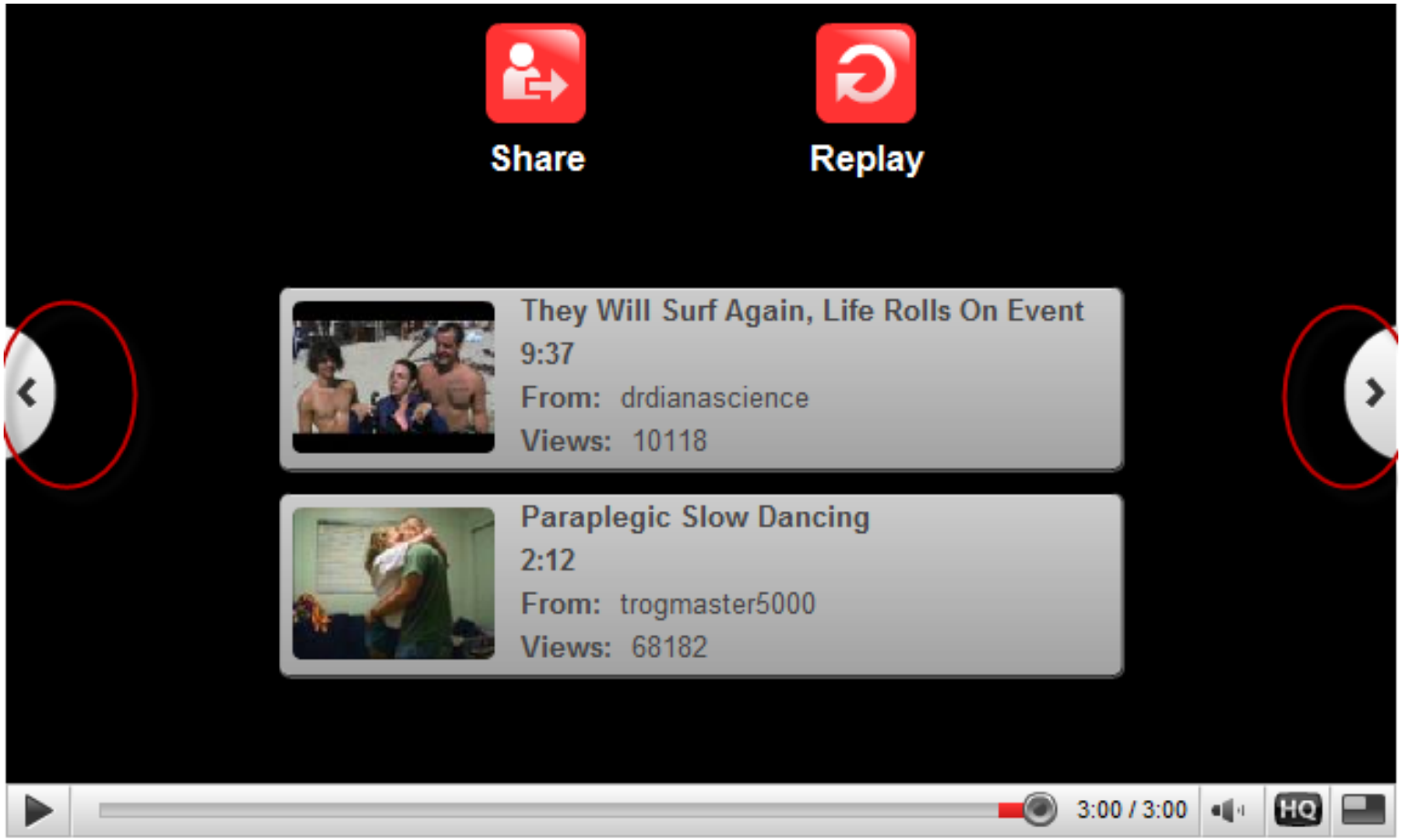
Phản ví dụ : người dùng không biết phải click vào đâu để vào trang kế tiếp (thực tế là click vào ổ khóa nhỏ xíu)
http://www.manducatis.com/

Donald A. Norman: Principles of Design

3. Constraint : vd tốt

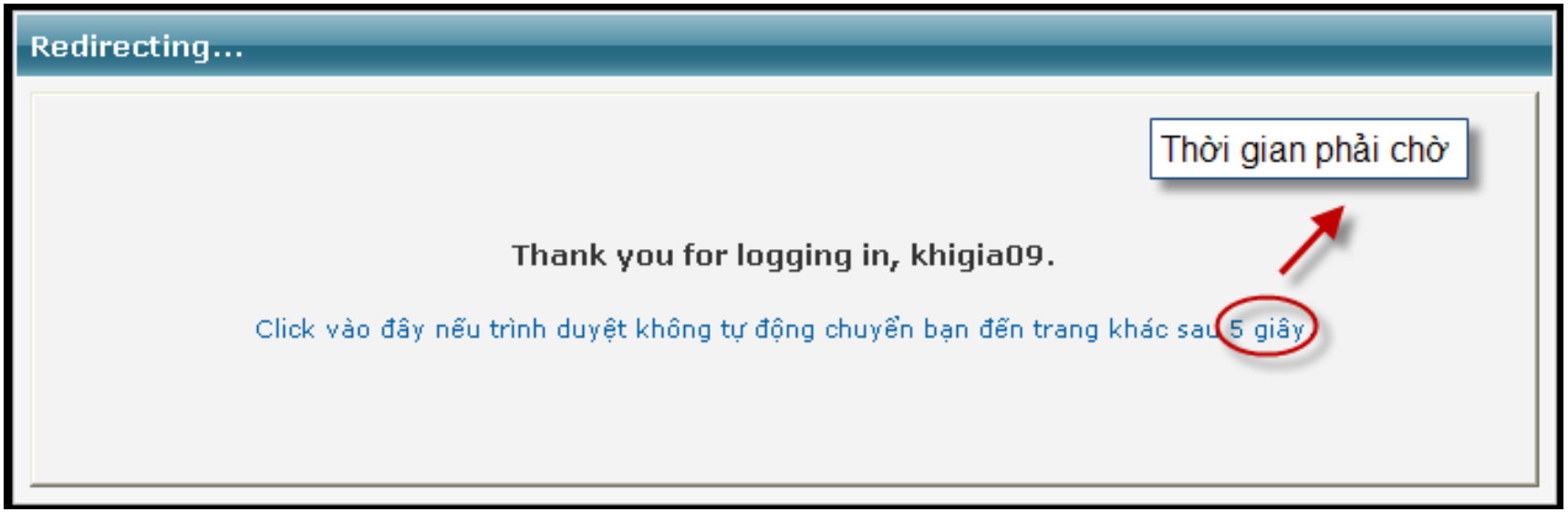
Donald A. Norman: Principles of Design

4. Mapping: vd tốt



Donald A. Norman: Principles of Design

5. Feedback: vd tốt



Donald A. Norman: Principles of Design

6. Consitency: vd kém

Shneiderman: 8 Golden Rules of Interface Design

1. Strive for consistency
2. Enable frequent users to use shortcuts
3. Offer informative feedback
4. Design dialogs to yield closure
5. Offer error prevention and simple error handling
6. Permit easy reversal of actions
7. Support *internal locus of control*
8. Reduce short-term memory load

Jacob Nielsen: 10 Usability Heuristics

1. Visibility of system status.
2. Match between system and real world.
3. User control and freedom.
4. Consistency and standards.
5. Error Prevention.

Jacob Nielsen: 10 Usability Heuristics

6. Recognition rather than recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and Documentation

Reference

- Yvonne Rogers, Helen Sharp, Jennifer J. Preece; Interaction Design: Beyond Human-Computer Interaction (2nd Edition); **Chapter 3: Understanding user**; Wiley Publishing; 2007; http://www.id-book.com/
- http://www.useit.com/
- http://www.usability.gov/
- Good online dictionary: http://dictionary.reference.com/

Thực hành

- Nộp danh sách nhóm + đề tài đã chọn

- Bài tập [1] : Đọc hiểu, dịch & tìm ví dụ/phản ví dụ về ba bộ nguyên tắc thiết kế giao diện:

  BaiTap\BaiTap_1.doc

  Tool chụp màn hình và ghi chú trực tiếp lên ảnh chụp: **Snagit**