Course: Human Computer Interface (HCI)

Week 5: Psychological and Social Interactions

Lecturer: Martha Gichuki

Lecture Learning Outcomes

At the end of this lecture, the learner will be able to:

(i) Define mental and conceptual models
(ii) Describe how best to communicate with users
(iii) Discuss the basic usability principles that should be followed to make systems user-friendly.

Introduction: Basic Science of Psychological and Social Interaction

Psychology as a Science of Design.

Human Computer Interaction (HCI) studies the link between psychology and social sciences; and on the other hand, computer science and technology[1]. HCI provides a test domain where we can apply and develop psychological and social theory in the context of technology development and use.

HCI researchers analyze and design specific user interface technologies such as pointing devices and display devices. They then study and improve the processes of technology

[1] Human-computer interaction (3rd ed.), Dix, A., Finlay, J., Abowd, G., & Russell, B. New Jersey: Prentice Hall. ISBN-10: 0130461091, ISBN-13: 978-0130461094, (2004). Pg 43

development e.g., task analysis and system design principles. New applications of technology such as word processors, digital libraries are then developed and evaluated.

In the recent past, HCI has progressively integrated its scientific concerns with the engineering goal of improving the usability of computer systems and applications, which has resulted in a body of technical knowledge and methodology.

Communicating with Users: The importance of interaction design

Software designers face the challenge of understanding user requirements and they need basic understanding of mental models and other psychological theories and their application to software design.

Users interact with computer systems to accomplish tasks; hence, software interfaces are crucial to meet user goals and tasks. The interfaces normally contain most of the software product code and the designer must consider the implications of how the software influences and anticipates user thought processes during interactions.

Mental and Conceptual Models

Mental models are psychological representations of real or imaginary situations. The mind constructs small-scale models of reality in order to reason and anticipate events. The mental model structure is a reflection of what it represents, and users acquire their mental models through interaction and explanation. User's mental model of a software product and their interactions with it, is defined by the way in which users perceive the jobs they want to do and how the software program helps them to do them[2].

Mental models often take into consideration existing conventions commonly used by humans to interpret the world and these conventions should be followed while designing interactive systems.

[2] Designing for Effective Human/Computer Interaction (4th ed.), Schneiderman, B., Plaisant, C.: Pearson Education, Inc.: ISBN 0-321-19786-0, (2005). Pg. 104-105

System Usability

- ✓ Usability determines whether a system is good enough to be acceptable by the end users and other stakeholders and the systems' ability to satisfy user needs and requirements. Usability answers the following questions: -
  - i. Is the system easy to learn?
  - ii. Can users efficiently utilize the system after learning how to use it?
  - iii. Is the system pleasant to use?[3]

Basic attributes that contribute to usability[3]

i. **Learnability** - users should promptly start performing their tasks with the system.

ii. **Efficiency** – after learning the systems, users should achieve a high level of productivity.

iii. **Memorability** - Casual users should be able to return to the system after not having used it for some time, without having to re-learn everything.

iv. **Error Occurrence** - users should not make many errors while using the system, and if they do, they should be able to recover from the errors easily.

v. **Satisfaction** - users should like using the system and should be subjectively satisfied when using it. The system should be pleasant to use[4].

Systems with the above attributes are said to be user-friendly and in order to design user-friendly systems the following basic usability principles should be followed[5].

1. **Simple and natural dialogues**

- ✓ Dialogues should not contain irrelevant or rarely needed information since each additional information item competes with and obstructs more relevant information.
- ✓ Interfaces should naturally match the user's task as required.

[3] Designing for Effective Human/Computer Interaction (4th ed.), Schneiderman, B., Plaisant, C.: Pearson Education, Inc.: ISBN 0-321-19786-0, (2005). Pg. 34

[4] Designing for Effective Human/Computer Interaction (4th ed.), Schneiderman, B., Plaisant, C.: Pearson Education, Inc.: ISBN 0-321-19786-0, (2005). Pg. 34

[5] Designing for Effective Human/Computer Interaction (4th ed.), Schneiderman, B., Plaisant, C.: Pearson Education, Inc.: ISBN 0-321-19786-0, (2005). Pg. 34

- ✓ Good graphic design is crucial for a simple and natural interaction.

2. Speak the language of the user

- ✓ Dialogues should be expressed clearly using familiar language and concepts, instead of using technical jargon.
- ✓ Real-world conventions should be used to present information in a natural and logical order.
- ✓ The conceptual model of the system design should match users' mental model as closely as possible.

3. Minimise user memory load

- ✓ Use recognition rather than recall by making objects, actions and options visible.
- ✓ Users should not have to remember information between parts of the same dialogue.
- ✓ Instructions on how to use the system should be visible or easily retrievable whenever appropriate.

4. Consistency

- ✓ Users should not have to wonder whether different actions mean the same thing.
- ✓ Users feel more confident in exploring the system if they know that the same command or action will always have the same effect.
- ✓ Platform conventions should be followed in system design.

5. Feedback

- ✓ The system should let users know what is happening through appropriate immediate feedback.

6. Clearly marked exits

- ✓ If a user selects an unwanted function by mistake, there should be a clearly marked exit point without having to go through an extended dialogue.
- ✓ Undo and redo actions should be supported.

7. Provide Shortcuts

- ✓ Provide accelerators to allow expert users speed up their interactions.
- ✓ The system should be able to cater for both novice and experienced users.
- ✓ Allow users to customise frequently-accessed options.

8. Good error messages

- ✓ Error messages should be phrased in a clear language and avoid obscure codes.
- ✓ Error messages should be precise and not vague or general.
- ✓ Error messages should constructively help the users to solve their problems.
- ✓ Error messages should be polite and not intimidating or explicitly blaming the user.

9. Error prevention

- ✓ Design the system such that users cannot make serious errors
- ✓ Provide help and error documentation for user reference[6]

Content Covered in Week 5: Psychological and Social Interactions

(i) We have defined mental and conceptual models

(ii) We have described how best to communicate with users

(iii) We have discussed the basic usability principles that should be followed to make systems user-friendly.

[6] Designing for Effective Human/Computer Interaction (4th ed.), Schneiderman, B., Plaisant, C.: Pearson Education, Inc.: ISBN 0-321-19786-0, (2005). Pg. 93

References

1. Human-computer interaction (3rd ed.), Dix, A., Finlay, J., Abowd, G., & Russell, B. New Jersey: Prentice Hall. ISBN-10: 0130461091, ISBN-13: 978-0130461094, (2004).
2. Designing for Effective Human/Computer Interaction (4th ed.), Schneiderman, B., Plaisant, C.: Pearson Education, Inc.: ISBN 0-321-19786-0, (2005).
3. The design of everyday things, Norman, D. A. New York: Basic Books. ISBN-10: 0465067107, ISBN-13: 978-046506710, (2002).
4. Designing the user interface: Strategies for effective human-computer interaction (5th ed.), Shneiderman, B., Plaisant, C., Cohen, M., & Jacobs, S. New Jersey: Prentice Hall. ISBN-10: 0321537351, ISBN-13: 978-0321537355, (2009).