Comp 388/441 - Human-Computer Interface Design

Week 3 - 4th February 2016

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Users & Interaction - 1

Consideration of interaction

- GUIs tend to present graphical controls for user interaction
  - *buttons, drop-down boxes and menus, sliders...*

- users interact either directly or indirectly
  - *gesturing on a touchscreen...*
  - *pointing device such as a mouse, keyboard...*

- inherent assumption users know required actions for a given application

Users & Interaction - 2

Hierarchical breakdown

- normally a predictable model involving a hierarchical breakdown
    - **goals**: *user's high-level goal for interaction with application*
        - write a letter, take a photo, read a book, book a holiday...
        - goals become **what** the user wants to do
        - instead of **how** they will do it

    - **tasks**: *allow a user to fulfill their goals*
        - perform some general steps
        - follow a structured path of activities

    - **actions**: *user carries out their tasks by performing interface actions*
        - specific operations in the user interface
        - click a button, select a menu item, drag and drop an element, text entry...

Users & Interaction - 3

Example - user editing of photo metadata within image library application

- users wants to edit some metadata for a photo in their image library application
    - *open the required image document in image application*
    - *select a menu item to view the current metadata record*
    - *edit existing text entries in the metadata record*
    - *enter new text for missing data*
    - *spell check user input*
    - *preview the updated image metadata*
    - *tag or categorise the image*

Users & Interaction - 4

Example - user editing of photo metadata within image library application

- click a menu item to select metadata record
- click on *edit* option to start modifying record
- delete some data from the record
- enter some new text data
- click on *update* button to save and close the metadata record

Users & Interaction - Video

Filter photographs based on metadata

Source: Adobe Lightroom Tutorials

Stages of Action

- tends to be easier and quicker for experienced users
  - *tasks are known to achieve goal*

- new users more hesitant at first
  - *uncertain of the required actions to accomplish a task*
  - *may be uncertain of the tasks necessary to achieve their goal*

- some users consult documentation, online tutorials, help forums...
- many simply begin with exploratory approach
- user may continue cycle of exploration through application
- continue until goal completed satisfactorily
  - *or, until the user gets stuck and can't move on*

Users & Interaction - Video

Super Mario Bros. Speed Run - 4:58.89

Super Mario Bros. Speed Run - 4:58.89 - Source: YouTube

Users & Interaction - Video

NES Game: Super Mario Bros. (1985 Ni...

NES Game: Super Mario Bros. (1985 Nintendo) - Source: YouTube

Seven-Stage Action Cycle Model

- formalised model named **Seven-Stage Action Cycle Model**
    - *Norman, D. The Design of Everyday Things. Basic Books. 2013.*

- the model consisted of the following steps:
    1. *Identifying an immediate goal*
    2. *Forming an intention to act*
    3. *Determining a plan of specific actions*
    4. *Carrying out the actions*
    5. *Observing the results by perceiving the state of the system and the world*
    6. *Interpreting the results*
    7. *Evaluating whether the actions had the desired results*

Users & Mental Models - 1

- mental models formed as a user learns tasks within an application
- conceptual representation in our user's mind of how a system works
  - *how to operate an application's interface*

- naturally reflects a user's current stage of learning and understanding
- this understanding is subject to change
  - *changes to reflect new learning, experience...*
  - *may diminish or disappear as a user forgets details over time*

- a user relies on a mental model for an application, scenario..,
- user's will also develop expectations based upon such models
- compare a user's mental model to a system's implementation model
  - *can begin to explain usability issues and problems*

Users & Mental Models - 2

Elements of a mental model relative to applications & user interfaces

1. interface appearance
2. interface concepts, syntax, general rules...
3. navigation map
4. plans and strategies for accomplishing tasks and reacting to problems etc
5. heuristics, conventions...
6. perception of application's implementation model

Users & Mental Models - 3

1. interface appearance

   - users form visual images of the **places** they encounter and repeatedly use within an interface

     - *eg: various pages, screens, tabs, windows...*

   - for most users, recall of mental images will be vague and inherently imperfect

     - *excluding those with eidetic memories*

   - interface familiarity leads to familiarity with general layout

     - *frequency of use is also important*

   - a user is unlikely to be able to sketch in detail an application's interface from a mental model

Users & Mental Models - Mario Kart through the years...

Super Mario Kart - 1992

Users & Mental Models - Mario Kart through the years...

Mario Kart 64 - 1996

Users & Mental Models - Mario Kart through the years...

Mario Kart 7 - 2011

Users & Mental Models - Mario Kart through the years...

Super Mario Kart - 1992

Mario Kart 64 - 1996

Mario Kart 7 - 2011

2. interface concepts, syntax, general rules...

- application is designed to solve a problem or meet a specific requirement
- syntax and rules required known as either
  - *application domain*, *business domain*, *or* *problem domain*

- **problem domain** may actually be pretty small
- user may only need to know a handful of concepts
- more complex and involved applications can be designed with inherent assumption of
  - *experience and prior-knowledge*
  - *a thorough understanding and awareness of required domain*

- awareness of problem domain gained via
  - *education, training, experience...*

- other applications may need to communicate and highlight their domain's concepts
  - *games, eg: role-playing and fantasy, often seen as extreme example*

- simpler games also require adaptation to their domain's objects, goals...

2. interface concepts, syntax, general rules...cont'd

    - many scenarios only require a user's cursory understanding of an application

        - *eg: users may not need to know about URLs to use a web browser*

    - semi-automated apps following pre-defined paths reduce user learning curve

        - *online ticket sites, package delivery...*

    - many complex applications, eg: MS Word, still allow a user to get started quickly

        - *users may be unaware, or even care, about advanced options*

        - *learning can be built upon initial, cursory understanding and usage*

3. navigation map

- many applications include the notion of places

  - *pages, screens, tabs, windows...*

- a **navigation map** will be formed by a user

  - *allows a user to differentiate between these places*

  - *return quickly to common places*

- navigation becomes a regular action for users in applications

- maps often applied to comparative applications

  - *expectation of similar usage and interaction*

- multiple options for same location

  - *users may not always be aware of competing routes*

  - *preferred routes often take precedence*

4. plans & strategies for accomplishing tasks & reacting to problems...

- users often memorise **plans of action** for given tasks
- an **action plan** might reflect a simple sequence of required user steps
- a more experienced user may internalise a required conceptual structure
  - *this mental depiction may not be complete or accurate*
- user may not be aware of why a sequence works or not
  - *simply memorised the sequence*
- taught users may know how but not why
- success by trial and error

5. heuristics, conventions...

    - general heuristics may be included in a user's mental model
        - *rule of thumb style guidelines*
        - *other conventions acquired from a broader context*

    - learned and added from experience
    - subsequently applied to a given system
    - common UI elements between disparate applications
        - *application and operating system*
        - *allows a user to infer interaction patterns for an application*

6. perception of application's implementation model

- users infer patterns for behaviour within an application
- an application's code and implementation will often remain hidden to a user
- does not prevent a user from recognising usage patterns
  - *not always a bad thing for an application*
  - *such patterns can be beneficial for a designer*
- content output and rendering a good example of pattern forming
  - *user adds content to table*
  - *notices data added to top*
  - *infers table output pattern*

Users & Mental Models - 10

Communicating a mental model

- mental models are also part of the initial design process
- designers naturally form a conceptual mental model for our own application
- our goal is to ensure a user's mental model matches our own
- we can provide structured learning and education
    - *documentation, training, demos...*

- many users may not read the documentation or follow tutorials
- many users still rely on trial and error
- visual presentation of UI provides cues and guidance to users
- application behaviour provides feedback to the user
- Don Norman refers to the **design model** and **user's model**
    - *refers to product's interface as **system image***

- design model and system image need to align

References

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