SFWR ENG 4HC3

Kemal Ahmed

Fall 2015

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**Gustation**: chemical reception (sweet, salty, bitter, sour)

**Flavour**: gustation + smell

Composite range:

**Special Interest Group on Computer Human Interfaces (SIGCHI)**:

**Human error** is mostly because of **design induced error**

**Interaction error**: physical properties of controllers

Hard: designed for a purpose that cannot be changed

Soft: interfaces created in software

**Psychophysics**: Relationship between human perception and physical phenomena

Give user feedback, like progress bars

## Learnability

* **Generalizability**: generalize existing knowledge of the system to other as-yet untested interactions
  + **Skeumorphism**: parts of the UI emulate real-world objects
    - Isn’t always best design
* **Predictability**: predict the outcome of interactions based on their previous interactions
* **Synthesizability**:
* **Robustness**:

# Norman’s Design Principles

**Affordances**: perceived or actual ways the UI (or parts of it) can be used

**Mappings**: how controls are mapped to actions/ Control-display relations:

* Spatial relationships
  + Natural/learned
* Dynamic relationships
* Physical relationships

**Conceptual Models**: how the user will understand the usage of the system

**Visibility**: are aspects of the controls (, displays, affordances, mappings, etc.) apparent to the user?

**Feedback**: do these systems provide adequate feedback upon performing an operation to indicate something has been done?

**Constraints**: how do parts of the UI constrain the user (i.e. limit the possible actions) to avoid errors?

* Physical
* Semantic: knowledge of situation
* Cultural
* Logical: natural mappings

Schneider’s 8:

1. **Consistency**: is the UI consistent within itself? What about to other UIs–can users draw upon past experience to use these systems?
   1. **Logical**: terminology, abbreviations, representations of symbols
   2. **Semantic**: operation should be valid on all objects, e.g. cancel, undo, help, etc.
   3. **Syntactic**: don’t change command ordering in different contexts, e.g. place errors in same place
2. **Shortcuts**:
3. **Feedback**:
4. **Yield Closure**: beginning, middle, end to experience
5. **Error handling**: easy to avoid and fix errors
6. **Reversible**: easy to reverse all actions
7. **Users should initiate movement**:
8. **Reduce short-term memory load**:

**Learned Helplessness**: when people fail too many times, then give up

**Widget**: interactive object

* Windows
* Canvas: drawing
* Menus
* Dialog Boxes
* Control Objects: list box, forms, etc.

## Table Mapping

|  |  |  |
| --- | --- | --- |
| DOF | Control | Display |
| x |  |  |
| y |  |  |
| z |  |  |
| θx |  |  |
| θy |  |  |
| θz |  |  |

Draw a line that maps the control section to the display that it alters.

Hints:

* put +/– beside the beginnings/ends of lines to denote positive/negative correlation
* Use Right Hand Rule to determine which axis is rotating for the θ’s

# Task Organization

**Hierarchical Task Analysis (HTA)**: a way to break down tasks into smaller tasks

* overall task is #0
* underline boxes that have no children
* You should have 4-8 subtasks

e.g.

0. in order to clean the house

1. get the vacuum cleaner out

2. fix the appropriate attachment

3. clean the rooms

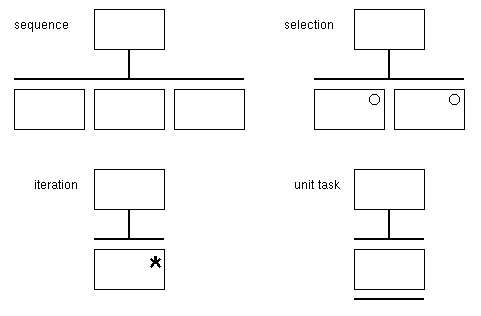
3.1. clean the hall

3.2. clean the living rooms

3.3. clean the bedrooms

4. empty the dust bag

5. put vacuum cleaner and attachments away



**sequence**: must do all in order

**selection**: choose one method or the other

**iteration**: star is a variable representing number of loops

**Goals Operators Methods Selectors (GOMS)**:

**(CCT)**:

Chunk: 7 ± 2

**Fitt’s Law**: corners are the best location for a button



**Hick-Hyman**:

[n]: number of response

Reaction Time = a + b log2(n + 1)

# Hypothesis Testing

**ANalysis Of VAriance (ANOVA)**: if experiment has standard deviation > 1?

**F Ratio**: Σ (n (μi – μ)2)

Research Must Be Published

**Sum of Squares of Error (SSE)**: Σ(y – y^)2

**Squares Regression (SSR)**: Σ (y^ – y-)2

**Sum of Squares (SST)**: SSR + SSE

**Impact**: number of citations to paper

Methods:

* **Observation**: purely real world surveys
* **Experimental**: lab
* **Correlation Method**: non-experimental; surveys with controlled situation, somewhat like experimental

**Measurement Scales**: Nominal, Ordinal, Interval, Ratio, Absolute

**Statistical Tests**: using

|  |  |  |
| --- | --- | --- |
| Measurement Scale | Appropriate Statistics | Statistical Tests |
| Nominal | Mode, frequency | Non Parametric: Chi Square test |
| Ordinal | Median, percentile | NP: Mann-Whitney U, Wilcoxon Signed-Rank, Kruskal-  Wallis, and Friedman tests |
| Interval | Mean, Standard deviation | Parametric: e.g. ANOVA |
| Ratio | geometric mean, variance |

**Chi-Square Test**:

[T]: overall total

[Ti]: total from each group

[a]: number of groups



Take your degrees of freedom and significance threshold (α) and look up the maximum acceptable X2 in a table.

**Experimental Variable**: independent variable that you’re focusing on

**Confounding Variable**: a variable that affects the relationship between one/more independent and dependent variables

e.g. how does gender affect your results?

**Internal validity**: captured the affect of confounding variables

**External validity**: if your results are applicable to real world

# Personas

How do you describe every single type of person who may want to use the system? You can’t describe everyone at once because nobody wants all use cases.

* Name
* Age

# Common Errors

* Action slips:
  + Mode Error slip
    - e.g. forgetting what mode
  + Description-Similarity slips:
    - acting on an item thinking it is a similar item
  + Capture Slip:
    - acting on an item thinking it is an item you use more frequently
* Inadequate knowledge
* Memory lapse

**Keystroke Level Model (KLM)**:

**Computer Supported Cooperative Work (CSCW)**:

**Groupware**: software to help CSCW

Quadrant model: mapping effects of having/not having 2 characteristics

Buxton’s Three-state Model: pressure sensing (z) as well as x,y; 3D touch

Predictive Model: equation