SFWR ENG 4HC3

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Contents

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

Schneiderman'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?
   a. **Logical**: terminology, abbreviations, representations of symbols
   b. **Semantic**: operation should be valid on all objects, e.g. cancel, undo, help, etc.
   c. **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		
θ_x		
θ_y		
θ_z		

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

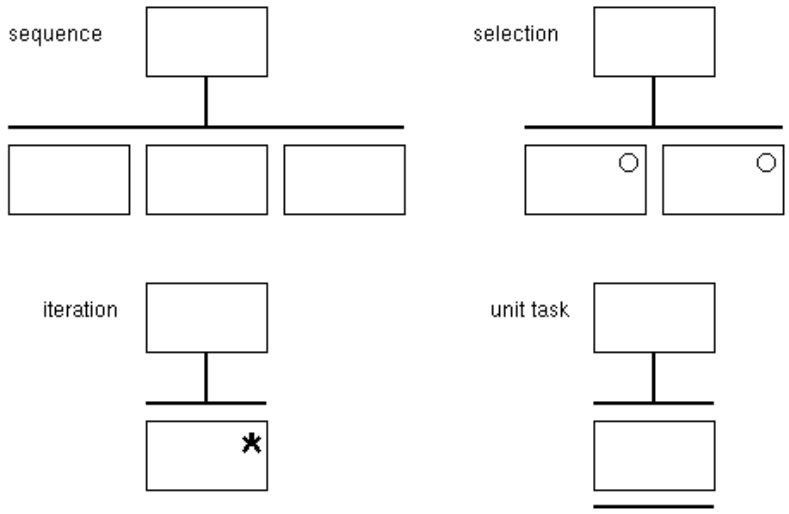
- put +/– beside the beginnings/ends of lines to denote positive/negative correlation
- Use Right Hand Rule to determine which axis is rotating for the θ's

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
$ID = \log_2\left(\frac{2D}{W}\right)$

Hick-Hyman:
[n]: number of response
Reaction Time = a + b $\log_2(n + 1)$

Hypothesis Testing

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

F Ratio: $\Sigma\ (n\ (\mu_i - \mu)^2)$

Research Must Be Published

Sum of Squares of Error (SSE): $\Sigma(y - y\hat{})^2$
Squares Regression (SSR): $\Sigma\ (y\hat{} - \bar{y})^2$
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
[T_i]: total from each group
[a]: number of groups

$$T_i = \sum_{j=0}^{n} A_{ij}$$

$$C_{ij} = T_j \times \prod_{i=0}^{a} \frac{T_i}{T}$$

$$X^2 = \sum_{j=0}^{n} \sum_{i=0}^{m} \frac{\left(A_{ij} - C_{ij}\right)^2}{C_{ij}}$$

Take your degrees of freedom and significance threshold (α) and look up the maximum acceptable X^2 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