2017-2 Human Computer Interaction Cognition And Usability

7069 characters in 1078 words on 213 lines

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1 interaction design

1.1 goals

efficiency
allow common tasks to be done fast

safety
make human error not dangerous

utility
is the right functionality included

learnability
is it easy to learn

memorability
can it be easily remembered

1.2 design principles

visibility
find appropiate control for task (like correct icon)

feedback
always provide feedback to actions executed

contraints
restrict user to prevent malicious interaction

mapping
map effects of real world (like arrows)

affordance
reuse known techniques or invent intuitive new ways

consistence
reuse as much as possible

2 "Gestalt" Theory

2.1 A group is formed by objects which are

proximity
close to each other

similar
look similar

symmetry
symmetrical to each other

2.2 Figure - Ground

Identify a figure from the background

2.3 Law of closure

perceptual completing of incomplete objects
Gibson's Affordance Theory
perception is designe dfor action
first think about the action, we look at the interface with a clear action we want to execute

3 approaches

top down
if you expect what you see its faster to process. Learned interfaces (such as maps) are easy to understand even if they are very complex.

bottom down
if you just get the data, and now have to make sense from it.

seven design principles
most important in line of view
most frequent in line of view
displays used for a single task close
grouped infos
close goes together
consistency
clutter avoidance

4 cognitive walkthrough

performed by analyst
examines specific user task
focus on easy of learning

4.1 preparing phase

define inputs
what users (backgorund, population)
tasks (what functionalities)
action sequences (correct action sequence for each task)
interface description (how the interfaces reacts to inputs)

4.2 analysis phase

walking through the actions

each step ask yourself
will user try to archieve the right effect
will user notice that correct action is available
will user associate correct action with the effect it archieves
will user see progress made towards a solution to the task

construct success (users fulfil all requirements to fulfill task) and failure stories (one of the question is no)

4.3 bad

focus on only one attribute of usability (easy of learning)
no "real" user asked
negative score for features which increase productivity

4.4 difficulties

choosing tasks difficulties
first question of analysis difficult
analyist performs more of a user test than a cognitive walkthrough

5 heuristic evaluation

performed by user
use usability principles to save on time and money

5.1 general

interative process

5.2 preparation

choose different evaluators (performance will differ)
choose if observer present (answer questions, speed up process, formualte questions in a usable way)
choose appropiate heuristics (analysis of existing products, abstraction from common issues)

5.3 steps

each evaluator will inspect interface alone
1-2h per session, multiple inspections
use list of heuristics
can ask questions, add other elements

then discussion
specify feelings about problems (find precise explanation why something is

broken)
build up consensus of the analysis

then build final usability report
written / spoken
presented to developers

5.4 good

cheap
lots of freedom
explains why there are flaws

5.5 bad

no systematic fixes for flaws (may miss some)
may finds a lot of false positives (problems which are none)

5.6 example heuristics

visibility of system status (red/green)
match between system & real world (known words / tools)
user control and freedom (can go back if necessary)
consistency and standards (buttons always similar)
recognition rather than recall (use icons)
prevention of errors (make clear interface)
flexibility and efficieny of use (can adapt to user preferences)
aestetics and minimalist design (fibonaccy)
help users with errors (allow to go back)
help and documentation (explanation text)

5.7 example heuristic (The center for universal design 1997)

equitable use (everyone can use it)
flexibility of use (accomodates individual preferences)
simple use (easy to understand regardless of experience and knowledge)
perceptile information (effective transfer of information)
tolerance of error (minimizes hazard)
low physical effort (efficent and comfortable use)
size and space for approach and use (appropiate size for buttons regardles of user ability)

6 heuristic walkthrough

performed by both users and analysts
combines heuristic evaluation and cognitive walkthrough

phase 1
task oriented evaluation
prepare set of thought-provoking questions (how can I assign events)
prepare set of priorized tasks which should be evaluated (assign events)
walk through product using questions and tasks
document usability problems

phase 2
free form evaluation
walk thorugh the interface using checklists
expert can use tools he want (heuritcs he chooses or adapts to the product) and will document usability problem

phase 3
assign severity rating to problems
contact developers

good
replies both on users and experts
quick, and can be made by amateurs
probably finds local, global, minor problems
good mis between users & expers

bad
requres skilled evaluators (product dependent)
moderator needs to be able to cover all important questions and tasks

7 assessing usability experience

7.1 user based testing

formative testing
early in dev, get qualitative feedback (brainstorm) on low fidelity (less details) prototype

summative testing
after high-level decisions made, get quantitative feedback (specific) on high fidelity prototype

validation testing
shortly before release, get comparisations (to other products) on final product

7.2 necessary steps

develop study plan
prepare environement
find subjects
conduct tests
debrief participants
analyze data
report findings

7.3 most common measures

efficiency
time spent

effectiveness
correctness, successful tasks

user satisfaction
use standardized survey tool (recommended is System Usability Scale - SUS)

7.4 likert scale

state level of agreement
questions and then agree or disagree with it
example is scan.co.uk

7.5 semantic differential scale

presenting pairs of bipolar or opposite scale
"the checkout was straightforward _ _ _ _ _ confusion"

7.6 guidelines for rating scales

include negative AND positive statements
use an odd number of raiting points
use unmodified versions of adjective (not EXTREMLY or similar)
be careful about different words in semantic scales

8 GOMS

Goal
what you want to archieve
splitted in subgoals

Method
what you actually do to archieve subgoal
splitted in operations (like move mouse, click)
operations can be formulated as subgoals if more granularity is needed

9 different GOMS models

9.1 Keystroke Level Model (KLM)

decompose task
measure time for each task
sum up to determine whole length of task performed
only good for simple tasks

9.2 CMN

adds goals, subgoals, selection rules to KLM
useful because there may be different subgoals one can use interchangebly to archive same goal
calculate time for each subgoal

9.3 Natural GOMS Language (NGOMSL)

formel language with restricted english syntax
can use selection rules (selecting different methods, recursive)
can include working and longtime memory in model

9.4 CPM-GOMS

HPM based (Human Processor Model)
PP Perceptual Processor (perceives environement)
CP Cognitive Processor (takes decisions)
MP Motor Processor (perform actions, channels for hands, eyes, ...)
different processors can be parallelized