HONORS 499Y - RESEARCH REPORT

Steve Jones

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RESEARCH SUMMARY

RESEARCH QUESTION

Is the Android Material Design’s FAB component good or bad UX design?

What is a FAB?

- FAB - Floating Action Button
    - Circular buttons that float above the UI
    - On top of every other UI element

Purpose of the FAB component

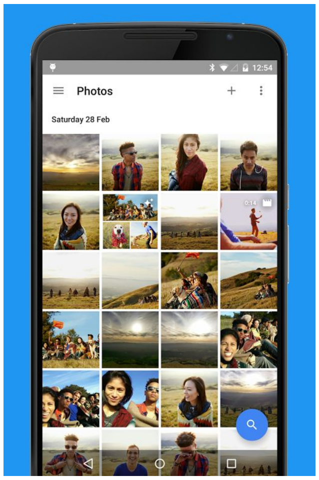
- “Used for a promoted action”
- Call to action buttons
- Meant to represent the single action users perform the most on that particular screen

Benefits of FABs

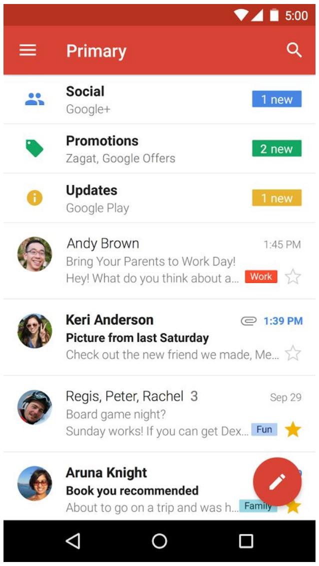
- Make promoted action prominent & always available
- Fitt’s Law
    - Large button
    - Close reach

Issues with FABs

- Material Design - bold visual style → FABs are strikingly hard to ignore and stand out
- Take immersion out of the experience
    - On top of every other UI element
        - Adding FAB - automatically result in a UX that is less immersive
    - Example: Google’s Photos App
        - Gallery view, with a floating search button
        - Primary Purpose - Most users just want to view photos
            - Search FAB thus distracts the user from an immersive photo-browsing experience
        - Google’s Statement:
            - “Not every screen needs a floating action button. A floating action button represents the primary action in an application”
            - “The primary action is to touch images in a gallery, so no button is needed”
- FABs stand out & stand in the way
    - FABs block content
        - Take up real estate on the screen
    - Example: Google’s Photos App
        - FAB blocks ~50% of an image thumbnail
            - Additional scroll needed to look at every 4th thumbnail of the last row on screen
    - Example: GMail’s Inbox App



        - List views - blocks right justified info
        - FAB blocking “favorite” button and time stamp
        - Especially problematic when: last item on list can’t be scrolled up any further
        - Proper usability - Entire column the width of the FAB has to be sacrificed (by repositioning the star button, timestamp, etc.)
            - FAB takes up way more screen real estate than its size suggests
- Promoted actions might not be used that often
    - 80/20 rule - users will use 20% of the features 80% of the time
        - FAB does this if feature is actually in that 20%
    - Example: Google’s GMail App
        - FAB - compose button
            - Suggests primary action users perform - create an email
                - Studies show ~50% of emails are now read on a mobile device
                - Composing emails much less - users still prefer desktop
            - Primary action - reading, not writing



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Primary

Social Google+ 1 new

Promotions Zagat, Google Offers 2 new

Updates Google Play 1 new

Andy Brown 1:45 PM
Bring Your Parents to Work Day!
Hey! What do you think about a... Work

Keri Anderson 1:39 PM
Picture from last Saturday
Check out the new friend we made, Me...

Regis, Peter, Rachel 3 Sep 29
Board game night?
Sunday works! If you can get Dex... Fun

Aruna Knight
Book you recommended
About to go on a trip and was h... Family

Summary

- FABs seem to provide good UX in ideal conditions
    - Users don’t only perform actions on apps, they consume content as well (if not more of the time)
    - In actual practice, widespread adoption of FABs might be detrimental to the overall UX of the app

1 - PRIMARY READING

1.1 - iOS & ANDROID MATERIAL - DESIGN GUIDELINES

1.1.1 - INTRO

Apple

iOS Human Interface Guidelines
“There is a profound and enduring beauty in simplicity, in clarity, in efficiency. True simplicity is derived from so much more than just the absence of clutter and ornamentation—it’s about bringing order to complexity. iOS is a clear representation of these goals.” - Jony Ive

Google

Material Design
“We challenged ourselves to create a visual language for our users that synthesizes the classic principles of good design with the innovation and possibility of technology and science. This is material design. This spec is a living document that will be updated as we continue to develop the tenets and specifics of material design.”

1.1.2 - GOALS

iOS

- Coherent structure applied across entire system
- Create unobtrusive & differential interface
    - Design recedes → Elevates content

Android Material

- Classic design principles + innovation & possibility with new technology
- Underlying system allows unified experience across platforms and device sizes
    - Mobile precepts are fundamental, but touch, voice, mouse, and keyboard are all first-class input methods

1.1.3 - THEMES / PRINCIPLES

iOS

Defer to content

- UI helps users understand and interact with the content, but never competes with it
- Subtle & unobtrusive
- Look past UI to the app’s core functionality and affirm its relevance
- Add details and embellishments with care and never gratuitously
- How to implement
    - Take advantage of the whole screen
        - Ex: Weather - Instantly conveys most important info
    - Reconsider visual indicators of physicality & realism
        - (AKA "F you Android Material Design" & "Sorry about the whole skeuomorphic thing")

  - Bezels, gradients, and drop shadows
    - Can lead to heavier UI elements
      - Overpower/compete w/content
  - Focus on content - let UI play supporting role
- Let translucent UI elements hint at content behind
  - Ex: Control center
  - Provide context
  - Help users see there is more content available
  - Can signal transience (control center is only up temp.)

Clarity

- Text legible at every size
- Icons precise and lucid
- Adornments are subtle & appropriate
- Sharpened focus on functionality motivates the design
- Use negative space
  - Make important content & functionality more noticeable/understandable
  - Imparts sense of calm - vs overwhelming
    - App looks more focused & efficient
- Let color simplify the UI
  - Key color highlights important state info & subtly indicates interactivity
  - Gives app consistent visual theme
- Ensure legibility by using system font
  - San Francisco - works with Dynamic Type - auto adjust letter spacing & line height
- Embrace borderless buttons
  - Bar buttons default = borderless
  - Content areas - Indicate interactivity using: borderless button uses context, color, call-to-action title

Depth

- Visual layers & realistic motion
  - Convey hierarchy & position
  - Help user understand relationships among onscreen objects
    - Translucent background
      - Floats above screen
      - Separates content from background
  - Impart vitality
  - Heighten delight and understanding
  - 3D Touch Device
    - Peek, pop, & quick actions
    - Give users access to important functionality without losing context
- Layered planes + new approaches to animation and motion, create sense of depth and vitality
  - Distinct functional layers help establish hierarchy and order
  - Use of translucency gives sense of your context

Additional

- Design UI to adapt to various devices and modes
- Use themes of iOS to inform the design of the UI and the UX
- Defy precedent
- Question assumptions
- Let a focus on content and functionality motivate every design decision

iOS APP ANATOMY

UI Elements

- Four Broad Categories
  - Bars
    - Contain contextual info
      - Tell users where they are
      - Controls to help navigate or initiate actions
  - Content Views
    - Contain app-specific content
  - Controls
    - Perform actions or display info
  - Temporary Views
    - Give users important info or additional choices & functionality
- Manage hierarchy of views
  - Using *view controller*
  - Coordinates display of views
  - Implements functionality behind user interactions
  - Manage transitions from screen to screen

Adaptivity & Layout

- Build In Adaptivity
  - Design apps for multiple devices, contexts, orientations

Provide a Great Experience in Each Environment

- Maintain focus on primary content
- Avoid gratuitous changes in layout
  - Maintains usage patterns across devices & orientation

Use Layout to Communicate

- Make easy to focus on main task - elevate important content or functionality
- Use visual weight & balance to show users relative importance of onscreen elements
  - Large items catch eye - easy to tap
- Use alignment to ease scanning & communicate groupings or hierarchy
- Make users understand primary content at default size
  - Shouldn't have to scroll for important content
- Prepare for changes in text size
  - Accessibility
- Avoid inconsistent appearances in UI
- Make easy to interact with content & controls
  - Give elements ample spacing
  - Hit target 44x44

Starting & Stopping

- Start instantly
  - Avoid splash screen / startup experience
- Avoid asking for setup info
  - Focus on needs of 80% of users
  - Import info from other sources
  - Settings in app vs. global settings
- Delay login requirement long as possible
  - Ex: App store only needs login upon purchase
- Avoid onboarding experience if possible

        - Not substitute for good app
        - Use animation to engage users & help learn by doing
        - Make easy to dismiss onboarding
    - Avoid asking users to rate app too soon
    - Launch in device's current orientation
    - Provide launch file
    - Avoid disclaimer at start
    - When app restarts - restore state
    - Always Be Prepared to Stop
        - iOS app never displays Close/Quit option
        - Save user data ASAP
        - Save current state when stopping
        - Never quit iOS app programmatically
        - If app features are unavailable display screen describing situation & suggest correction

Navigation

- 3 main styles
    - Hierarchical
        - Nav 1 choice per screen until destination
        - Ex: Settings, Mail
    - Flat
        - Nav directly between primary categories
        - All categories accessible from main screen
        - Ex: Music, App Store
    - Content or experience-driven
        - Nav defined by content / experience
- Users should always know their location and how to reach next destination
- Use nav bar to give easy way to traverse hierarchy
- Use tab bar to display peer categories of content/functionality
- Use page control when each app screen represents individual instance of same type of item/page
- Give users one path to each screen

Modal Contexts

- Different screen modes
- Gives users way to complete task without distractions
- Temporarily prevents interaction with rest of app
- Keep modal tasks simple short and narrowly focused
- Provide obvious way to exit modal task
- Reserve alerts for delivering essential actionable info
- Respect users' preferences for receiving notifications

Interactivity & Feedback

- Interactive Elements Invite Touch
    - Signal interactivity using cues (pressure, color, location, context, icons & labels)
    - 3D Touch - background blur when force touch app icon
    - Key color gives visual indicator of interactivity
    - Back button uses cues - Displays "<", uses key color, label describes previous screen
- In Content Area - Add Button Border Only if Necessary

Users Know Standard Gestures

- Use complex gestures as power user shortcuts
- Avoid defining new gestures

- Consider using multifinger gestures

Feedback Aids Understanding

- Helps users know what app is doing & results of their actions
- Integrate status into UI
  - “6 unread” in bottom bar
- Avoid unnecessary alerts

Inputting Info Should Be Easy

- Make it easy for user to make choices
  - Date picker > text field
- Get info from iOS
  - Contacts, calendar, etc
- Balance request for input with useful result

Animation

- Subtle animation makes app experience more engaging & dynamic
- Communicate status & provide feedback
- Enhance sense of direct manipulation
- Help users visualize result of actions
- Avoid excessive animation

Branding

- Incorporate brand’s asset’s in refined unobtrusive way
- Don’t take space away from content people care about
- Don’t display logo throughout app

Color & Typography

- Color Enhances Communication
  - Indicates interactivity, imparts vitality, provides visual continuity
  - If creating multiple custom colors - make sure work well together
  - Pay attention to color contrast in different contexts
  - Take bar translucency & app content into account when using custom bar tint
  - Be aware of color blindness
  - Chose key color to indicate interactivity & state
  - Avoid same color in both interactive & noninteractive elements
  - Don’t let colors distract users
- Great Typography Enables Clear Communication

Icons & Graphics

- App Icon
  - Important for apps brand
- Small Icons
  - Use built in task icons
- Graphics
  - Support Retina
  - Display at original aspect rations

Terminology & Wording

- Make users feel comfortable
- User terminology users understand
- Give controls short labels or good icons

Integrating with iOS

- Make app feel at home on platform
  - Follow themes & guidelines

- Use Standard UI Elements Correctly
    - Comfortable for users
- Downplay File & Document Handling
- Be Configurable if Necessary
- Take Advantage of iOS Technologies

Android Material

Material metaphor

- Unifying theory
    - Rationalized space
    - System of motion
- Tactile reality
    - Familiar tactile attributes help users understand affordances
    - Inspired by study of paper & ink
    - Open to imagination & magic
- Surfaces and edges
    - Visual cues grounded in reality
- Light, surface & movement
    - Key to convey how objects move, interact & exist in space in relation to other objects
    - Realistic lighting shows seams, divides space & indicates moving parts

Bold, graphic, intentional

- Use foundational elements of print-based design
    - Typography, grids, space, scale, color, and use of imagery
    - Creates hierarchy, meaning, and focus
- Emphasis on user actions
    - Makes core functionality obvious

Motion provides meaning

- User actions initiate motion → transform whole design
    - In a way that does not break continuity of experience
- Focusses attention and maintains continuity
    - Feedback is subtle yet clear
    - Transitions are efficient yet coherent

Elevation & Shadows

- Objects in MD possess qualities of objects in physical world
    - Form spatial model familiar to users
- Elevation
    - Relative depth / distance between surfaces along z-acis
    - Measured in density-independent pixels (dp)
        - All material is 1dp thick
    - Resting Elevation
        - Default elevation of object
        - If changes → returns to resting
    - Component Elevations
        - Consistent for component type across apps

- Ex: FAB always 6dp
- Responsive Elevation & Dynamic Elevation Offsets
  - Dynamic Elevation Offsets
    - Components elevation can change - response to user input
    - Normal, focused, pressed
    - Elevation changes consistent
      - All components that lift on press - same elevation change
    - Avoiding Elevation Interference
      - Components may hit other components during elevation change
      - Materials can't pass through each other
      - Ex: FAB moves off screen before user picks up a card
- Shadows
  - Visual cues of object depth & directional movement
  - Component Reference Shadows

Object Relationships

- Object Hierarchy
  - Parent / child materials

ANIMATION

Authentic Motion

- Watching object move demonstrates - light, heavy, flexibly, rigid, small, large
- Mass & Weight
  - Real world connection: forces applied to object to move naturally
    - Strength & duration dictate object acceleration
    - Embraces familiarity with real-world object behaviors
  - Natural Acceleration & Deceleration
    - Smooth - Starts slowly accelerates - decelerates before stop
  - Entrances & Exits
    - Speed & direction changes draw user attention

Responsive Interaction

- Encourages deeper exploration of app
  - Creates timely logical & delightful screen reactions to user input
- User Input
  - Apps responsive to user input
  - Touch, voice, mouse & keyboard - all equally important methods
  - UI elements appear tangible
    - Communicates visual & tactile responses
- Surface Reaction
  - Upon input event - provides instant visual confirmation at point of contact
    - Under finger touch
    - At microphone for voice
  - Touch Ripple
    - Articulates method & duration of touch event (also voice amplitude & touch pressure)
- Material Response

        - Material can lift up when touched - indicates active state
        - Point of Origin
            - User triggers new material - grows starting at point of input
        - Lift on Touch
            - When card or separable element activated → lift to indicate active
    - Radial Action
        - The visual ripple of ink spreading out from point of input
        - Input Events are Visual
            - Connect input event & on-screen action to tie together

Meaningful Transitions

- Motion design can guide users attention to inform & delight
    - Transports users between navigational contexts
    - Explains changes in arrangement of elements
    - Reinforces element hierarchy
- Visual Continuity
    - Transitions between visual states = clear, smooth & effortless
        - Tells user where to focus attention
    - Considerations - Animations should:
        - Direct user attention
        - Connect transitions visually
        - Use movement with precision
- Hierarchical Timing
    - Make important elements appear first
- Consistent Choreography
    - Make all groups of moving stuff move similarly

Delightful Details

- Animation can be used for icons changing

STYLE

Color

- Summary
    - Bold hues juxtaposed with muted environments, deep shadows, bright highlight
- UI Color Application
    - Choose your palette
        - 3 hues from primary palette
        - 1 accent color from secondary palette
    - Use opacity for text, icons, & dividers
    - Accent color
        - Use for primary action buttons & components (Ex: switches & sliders)
        - Use for web links

Icons

- Product Icons
    - Express brands product
    - Design Approach
        - Inspired by tactile physical quality of material

Imagery

- Bold, graphic, and intentional imagery engages user
- Principles
    - Choose images that express personal relevance, information, & delight
    - Appreciate Context
- Best Practices
    - Stay away from stock
    - Have a point of focus
    - Build narratives
- UI Integration
    - Resolution
    - Introduce scale
        - Levels of importance
    - Text protection
        - To make typography legible on top of imagery - apply scrims (lightweight translucent materials)
    - Avatars & Thumbnails
        - Tap targets - lead to primary view of content
        - Can represent people
    - Hero Images
        - Anchored in prominent position (banner)
        - Draw user in
        - Provide context about content
    - Gallery

Typography

- Roboto - standard typeface
- Font stack
    - Roboto, Noto, and then sans-serif

Writing

- Clear accurate & concise text makes interfaces more usable & builds trust
- Language
    - Speak to the user as “you”
    - “I agree to terms & conditions” & “My music”
    - Be Concise
    - Try to write in the present
    - Write simply & directly
    - Use simple words everyone knows
    - Omit unnecessary phrases
    - Use consistent verbs across arch of an action
    - Lead with goal not method
    - Reveal detail only as needed
    - Never say “never”
- Tone
    - Be friendly, respectful & focus on user
    - Be humble
    - Be inviting

        - Be positive
        - Be essential
    - Capitalization & punctuation
        - Use sentence-style caps
        - Capitalize product names only when referring to product as a product
        - Skip periods and other unnecessary punctuation
        - Use Contractions
        - Avoid exclamation points
        - “1, 2, 3” not “one, two, three”

1.2 - Usability 101: Introduction to Usability

Nielsen Norman Group - Jakob Nielsen

What is Usability: **quality attribute** that assesses how easy user interfaces are to use

- 5 Quality Components
    - Learnability
        - How easy to accomplish task first time encountering design
    - Efficiency
        - Once design learned → How quick to perform tasks
    - Memorability
        - When returning to design after while → How easy to reestablish proficiency
    - Errors
        - How many errors do users make - how bad - how easy to recover
    - Satisfaction
        - How pleasant is using the design
- Utility vs. Usability
    - Utility: design provides features users need
    - Usability: how easy & pleasant these features are to use
    - Useful = usability + utility

Why is Usability Important

- People leave difficult designs
- Employee productivity
    - more usable software → less time wasted
- Usability increases ROI

How to Improve Usability

- User testing
    - Get representative users
    - Have users perform representative tasks
    - Observe users activity
        - Where users succeed
        - Where users have difficulties
        - Let users talk
    - Test users individually
    - Let them solve problems on their own (don’t contaminate test)
    - Testing 5 users is enough for most important usability problems
        - http://www.nngroup.com/articles/why-you-only-need-to-test-with-5-users/
        - Then revise & fix flaws (iterative design)

1.3 - When to Use Which User-Experience Research Methods

Nielsen Norman Group - Christian Rohrer

UX research methods answer wide range of questions

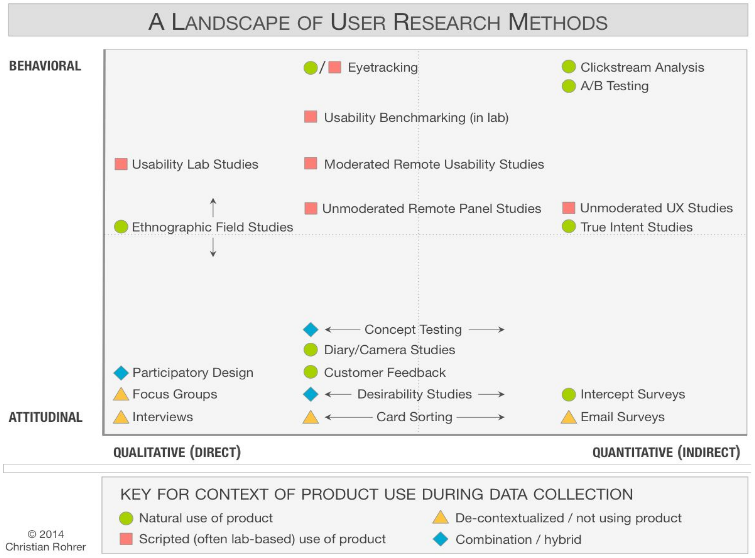
Map 20 methods to decide when to use which

- Map across 3 dimensions and over time
  - Attitudinal vs. Behavioral
    - "What people say" vs "what people do"
  - Qualitative vs. Quantitative
    - Qualitative studies - observe/gather data behavior directly
      - Why or how to fix problem
    - Quantitative studies - observe behavior indirectly
      - How many
  - Context of Use
    - **Natural** or near-natural use of the product
      - minimize interference from the study
    - **Scripted** use of the product
      - focus the insights on specific usage aspects
    - **Not using** the product during the study
    - **Hybrid** of the above

20 UX Methods

- Usability-Lab Studies
  - Participants in lab - one on one with researcher
  - Given set of scenarios that lead to tasks using product
- Ethnographic Field Studies
  - Researchers meet & study participants in their natural environment
- Participatory Design
  - Participants given design elements to construct ideal experience in way to express what matters most & why
- Focus Groups
  - Groups of 3-12 participants
  - Led through discussion & exercises
- Interviews
  - Researcher meets with participant 1 on 1 - discuss opinions of topic
- Eyetracking
  - Measure where participants look while performing tasks
- Usability Benchmarking
  - Tight scripted usability studies
  - Multiple participants
  - Precise & predetermined measures of performance
- Moderated Remote Usability Studies
  - Screen sharing
- Unmoderated Remote Panel Studies
  - Panel of trained participants
  - Use video recording & data collection software on own devices
  - Use product & think aloud
- Concept Testing

    - Researcher value proposition of product
- Diary/Camera Studies
    - Participants record & describe aspects of their lives relevant to product
- Customer Feedback
    - Info provided by self-selected sample of users
    - Feedback link, button, form
- Desirability Studies
    - Participants given visual design choices
- Card Sorting
    - Users organize items into groups & assign categories
    - Create or refine info architecture
    - Exposes uses mental models
- Clickstream Analysis
    - Analyze record of screens/pages user clicks/sees
- A/B Testing
    - AKA: “multivariate testing,” “live testing,” or “bucket testing”
    - Test how users interact with each design
    - Measure effect on user behavior
- Unmoderated UX Studies
    - Automated - use research tool to capture behaviors & attitudes (embedded survey questions)
    - Give participants goals / scenarios to accomplish
- True-Intent Studies
    - Ask random site visitors their goal/intention upon entering site
    - Measures subsequent behavior
    - Asks if were successful upon exit
- Intercept Surveys
    - Survey triggered during use of site
- Email Surveys
    - Survey recruited participants via email



1.4 - The State of Mobile User Experience

Nielsen Norman Group - Raluca Budiu

Summary

- New research shows improvement in mobile UX
    - 2009, Jakob Nielsen deemed mobile usability an oxymoron
    - Medium / devices are better
    - More focus on designing experience tailored for mobile
- Responsive-design trend inspired sites/apps to prioritive content over UI elements
    - mobile content cannot be arbitrarily limited
    - content must be prioritized over “chrome” (UI elements: buttons, menus, links) on mobile
        - Ex: Hide nav under hamburger
- Still need to learn
    - Just because it’s responsive doesn’t mean more usable
    - Mobile content must be layered
        - Prioritize gist - defire details to secondary pages
    - Fit desktop based info architecture into 2 level nav that’s usable on mobile
        - Deep info arch doesn’t translate well on mobile
            - Ex: Cascading menus
- What it means for Desktop Users
    - quite catastrophic for the desktop

1.5 - How Many Test Users in a Usability Study?

Nielsen Norman Group - Jakob Nielsen

Summary

- Answer is 5... Except when it’s not
- Most arguments for using more are wrong
- Some tests should be bigger - some smaller

Test 5 Users - http://www.nngroup.com/articles/why-you-only-need-to-test-with-5-users/

- Elaborate usability tests - waste of resources
- Best results come from testing no more than 5 users
- Iterating & running as many small tests as affordable

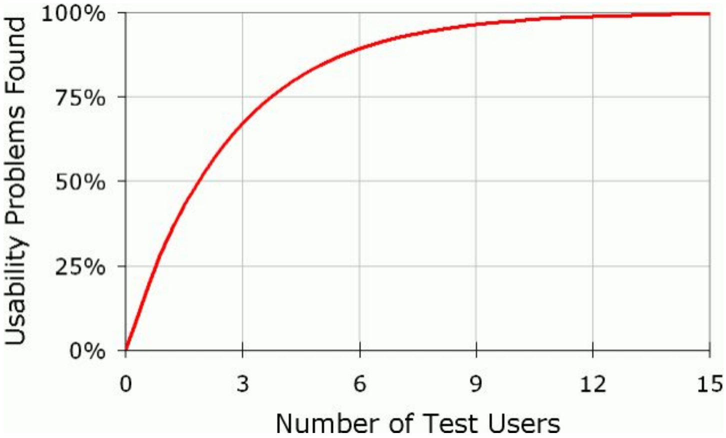
Exceptions

- Quantitative studies - http://www.nngroup.com/articles/quantitative-studies-how-many-users/
    - Aimed at stats not insights
    - Test 20+ users to get statistically significant numbers
- Card sorting
    - Test 15+ users
- Eyetracking
    - Test 39 users for stable heatmaps

Exceptions shouldn’t worry you

- Majority of research should be qualitative - http://www.nngroup.com/articles/accuracy-vs-insights-quantitative-ux/
    - Better to accept a wider margin of error in usability metrics than to spend the entire budget learning too few things with extreme precision
- Insights to drive design - more important than - numbers to impress people in PowerPoint

- Small test = better ROI
    - Testing cost ^ each participant → number of findings reaches point of diminishing returns past 5 users



1.6 - Planning a Usability Test

Usability.gov

Purpose:

- document what to do
- how to conduct test
- what metrics to capture
- how many participants
- what scenarios to test

Elements of a Test Plan

- Scope
    - Indicate what to test
        - Name of product
        - How much of product test will cover
- Purpose
    - Identify concerns questions & goals for test
    - "Can users navigate to important information from the prototype's home page?"
- Schedule & Location
    - When & where to perform test
- Sessions
    - Describe session
    - Length
- Equipment
    - Device choice and info
    - Recording audio/video
    - Testing software
- Participants
    - Number & types of participants
    - Describe how they will be recruited
- Scenarios
    - Number & types of tasks to test

  - Typically ~10 tasks for 60 min session
- Metrics
    - Post task completion - ease & satisfaction questions
- Quantitative Metrics
    - Ex: successful completion rates, error rates, time on task
- Roles
    - List of staff who participates in testing & roles

Identifying Test Metrics

- Successful Task Completion
    - May want to give participants multiple choice questions
- Critical Errors
    - Deviation at completion from targets of scenario - can’t finish task
- Non-Critical Errors
    - Recovered by participant
    - Make task less efficient
    - Ex: Opening wrong menu and going back
- Error-Free Rate
    - Percentage of participants who complete task without any errors
- Time On Task
- Subjective Measures
    - Reported by participant
    - Satisfaction, ease of use, ease of finding info, etc
        - Use Likert scale
- Likes, Dislikes & Recommendations

1.7 - Recruiting Usability Test Participants

Usability.gov

How many participants are enough?

- NNG Study (above)

Screening Participants

- Questions to help rule in/out target audience

Costs of Recruitment

- Recruiters charge fee for participants recruited
- Incentives for participants

1.8 - Recruiting Participants & the Legend of “General Public”

Usability.gov

- Age Range
- Gender
- Ethnicity
- Education
- Language
- Familiarity
- Previous Usage
- Technology qualifications
- Internet Usage

1.9 - Running a Usability Test

Usability.gov

Moderating Technique

- Concurrent Think Aloud (CTA)
    - Used to understand participants thoughts as they interact
    - Encourage stream of consciousness
    - Pros:
        - Understand thoughts as occur
        - Real-time feedback & emotional responses
    - Cons:
        - Can interfere with usability metrics (ex: time on task)
- Retrospective Think Aloud (RTA)
    - Moderator asks participants to retrace steps upon completion of session
        - Often watch video replay of actions
    - Pros:
        - Does not interfere with usability metrics
    - Cons:
        - Overall session longer
        - Tough & less accurate to recall thoughts → poor data
- Concurrent Probing (CP)
    - As participants work on tasks - when they say something interest or do something unique - researcher asks follow-up question
    - Pros:
        - Understand thoughts as they work
    - Cons:
        - Interferes with natural process / flow
- Retrospective Probing (RP)
    - Upon completion of session - ask participant about thoughts & actions
    - Often used in conjunction of other methods
    - Pros:
        - No interference with usability metrics
    - Cons:
        - Tough & less accurate to recall thoughts → poor data

Best Practices

- Make participants feel comfortable & respected
- Test site not users - make them understand they are helping test site
- Remain neutral
    - If asked question: “What do you think?” / “Im interested in what you would do.”
- Don’t help / lead participants
- Measure both performance & subjective (preference) metrics
    - Performance & preference don’t always match
    - Performance measures: success, time, errors, etc.
    - Subjective measures: users satisfaction & comfort ratings

1.10 - Reporting Usability Test Results

Usability.gov

http://www.usability.gov/how-to-and-tools/methods/reporting-usability-test-results.html

Quantitative Data

- Record
  - Success rates
  - Task time
  - Error rates
  - Satisfaction questionnaire ratings
- Add participant demographic data - see if data differs based on demo variables

Qualitative Data

- Record
  - Observations of paths users took
  - Problems experienced
  - Comments/recommendation
  - Answers to open-ended questions

Reporting Severity Levels of Problems

- How severe is problem
  - Does this problem have implications on other pages?
  - Note on 3 or 4 point scale
    - Critical: if not fixed users can't complete task
    - Serious: many users will be frustrated → may give up
    - Minor: users annoyed - still can complete task

Writing Usability Test Report

- Templates: http://www.usability.gov/how-to-and-tools/resources/templates.html
- Background Summary
  - What you tested
  - Where/when test held
  - Equipment info
  - What was done during test
  - Testing team
  - Descriptions of problems of running the test & what worked well
- Methodology
  - So others can recreate test
  - Describe test sessions
  - Type of interface tested
  - Metrics collected
  - Overview of task scenarios
  - Describe participants
    - Provide background/demographic data
- Test Results
  - Analysis of what facilitator recorded
  - Describe tasks with highest & lowest completion rates
  - Summary of successful task completion rates by:
    - Participant
    - Task
  - Average successful task rate

- Findings & Recommendations
    - List all findings - back each with data/rationale

Incorporating Visuals to Illustrate Specific Points

- Screenshots visualize what was tested
- Short video clips to illustrate specific points

1.11 - Not Your Parent’s Mobile Phone: UX Design Guidelines For Smartphones

Tim R. Todish

Summary

- Mobile realm presents new unique constraints & offers interesting opportunities

Mobile Constraints

- Form Factor
    - Desktop → Mobile
        - Screens smaller
        - Different optimal screen space
            - Action buttons in lower third - Easily tappable
- Input Methods
    - No mouse
        - No click
        - No hover states
        - Exciting opportunities to take advantage of touch & gestures
- Technical Constraints
    - Battery life
    - Processing power
- Data Transfer & Pricing
    - Not unlimited data

Good General Practices

- Mobile First Methodology
    - Prioritize most important features & content
    - Take advantage on non-desktop abilities
- Behaviors & Archetypes
    - Build on behaviors users accustomed to
    - Use design patterns specific to target devices
- Encourage Exploration
    - Teach users how to be quicker & more efficient
- Provide Immediate Feedback
    - No tactile response - Must give touches feedback
- Context
    - Ex: On the go apps - design for speed
    - Device - Tablets = mostly home use

2 - ADDITIONAL READING

The following books will also be used as resources. I may not read them fully but I will go through each and find anything relevant and helpful to my project. If I find the book is not very useful I will just read relevant parts. If I find it very useful I will read the complete book thoroughly.

2.1 - Don't Make Me Think, Revisited: A Common Sense Approach to Web Usability

Steve Krug

http://www.amazon.com/Dont-Make-Think-Revisited-Usability/dp/0321965515/ref=asap_bc?ie=UTF8

Premise

- ❖ Common sense approach to web usability
- ❖ Good software program or web site should let users accomplish their intended tasks as easily and directly as possible

Lessons

- ❖ Laws of Usability
  - ➢ Nothing important should be more than 2 clicks away
  - ➢ Speak the users language
  - ➢ Be consistent
  - ➢ Don’t make the user think
  - ➢ Does not matter how many times I have to click, as long as each click is a mindless, unambiguous choice
  - ➢ Delete ½ words on each page - then delete ½ of what’s left
- ❖ A Web Page Should Be
  - ➢ Self-Evident
  - ➢ Obvious
  - ➢ Self-Explanatory
  - ➢ User shouldn’t have to expend effort to get what app is and how to use it
- ❖ Question Marks
  - ➢ Get rid of question marks
  - ➢ User shouldn’t have to devote even a millisecond of thought to whether things are clickable or not
  - ➢ Every question mark adds to cognitive workload → Distracts from task at hand
- ❖ Designer vs. User Perspective
  - ➢ Designer: creating web pages - “great literature”
  - ➢ User: Reality - “Billboard going by at 60mph”
- ❖ Facts of Life
  - ➢ Users don’t read pages - scan them
  - ➢ Users don’t make optimal choices
    - ■ Little penalty for guessing wrong
  - ➢ Users don’t try to figure how things work
- ❖ To Make Users Understand...
  - ➢ Create clear visual hierarchy on page
  - ➢ Take advantage of conventions
  - ➢ Break pages up into clearly defined areas
  - ➢ Make obvious what’s clickable

    - Minimize visual noise
- Unambiguous Clicks
    - Users don’t mind many clicks as long as each is painless & gives continued confidence they are on the right track
    - Rule of thumb: “3 mindless unambiguous clicks = 1 click that requires thought
- Instructions
    - Instructions must die
    - People won’t use website if can’t figure it out
    - 2 types of web users
        - Search-dominant
        - Link-dominant
- Homepage
    - Important concept 0 comparatively fixed places
    - Homepage - “North Star”
    - Click “Home” - fresh start
- Purpose of Navigation
    - Help find destination
    - Tell where we are
- Persistent Navigation
    - Nav elements that appear on every page of site
    - Should include:
        - Site ID (logo)
        - Way to Home
        - Way to Search
        - Sections
- Page Names
    - Pages need names
    - Names need to be prominent
    - Match what user clicked
    - Right location - names should frame content
- Breadcrumbs
    - Put at top
    - Use ‘>’ between levels
    - Use tiny type
    - Boldface last item
- Homepage
    - Must accommodate
        - Site ID & Mission
        - Site hierarchy
        - Search
        - Teases
        - Timely Content
        - Deals
        - Shortcuts & registration
- Testing
    - Have to test to have a great site
    - Testing 1 user is 100% better than none
    - Testing 1 user early - better than 50 near end

-
    - Testing = iterative
    - Ideal number of users - 3-4
- People are good at satisficing, or taking the first available solution to their problem
    - Design should take advantage of this
- Usability Means…
    - Making sure system works well
        - For intended users
- Applications Should Explain Themselves
    - Should be self evident

2.2 - Rocket Surgery Made Easy: The Do-It-Yourself Guide to Finding and Fixing Usability Problems

Steve Krug

http://www.amazon.com/Rocket-Surgery-Made-Easy--Yourself/dp/0321657292/ref=asap_bc?ie=UTF8

Chapter 1: What DIY Testing Is

- Page - 13:
    - Quantitative tests prove things by measuring others and are rigorous
    - Qualitative tests simply acquire insights to improve what you're building
- Page - 16:
    - Serious problems are usually easy to find - so focus on those
    - Can get rid of “hidden” ones when you have more resources.
- Page - 19:
    - Web analytics can tell you what people are doing on your site
        - Can't tell you why

Chapter 3: A Plan You Can Follow

- Page - 24:
    - Test 1 morning a month
        - Shortness simplifies recruiting
        - Recurrence eliminates deciding when to test - test whatever you have.
- Page - 28:
    - Do all the tests back-to-back half day
        - Debrief can be conducted with details still fresh in mind

Chapter 4: The Hardest Part Is Starting Early Enough

- Page - 32:
    - Worse shape something is in - the less want to show it, but more you can benefit if you do
- Page - 33:
    - Test on other sites with the similar content / features you'll implement
        - Learn from their mistakes
- Page - 35:
    - If you sketch on a napkin, ask someone what they think it is, but not their opinion or their feedback
- Page - 37:
    - Visual design can introduce usability problems
        - Test “comps,” or visual treatments of your wireframes

Chapter 5: Who To Test And How To Find Them

- Page - 41:
    - Requiring participants with domain knowledge excludes first-time and new users
        - Instead, recruit loosely and grade on a curve
- Page - 43:
    - Need 3 participants
        - More yields diminishing returns
        - More increases tedium
        - More surfaces more nits that make triaging difficult
- Page - 47:
    - Screen testers - meet your qualifications & comfortable talking out-loud
- Page - 49:
    - Don't re-use participants again at a later round
        - They know too much already

Chapter 6: Picking Tasks And Writing Scenarios

- Page - 55:
    - Phrase tasks without using uncommon or unique words that appear on the screen
        - Eliminates simple game of word-finding

Chapter 7: Why You Should Use Boring Checklists

- Page - 57:
    - On the day of testing - checklists get mundane details out of your head so you can give full attention to the participant

Chapter 8: Conducting The Test Session

- Page - 63:
    - Facilitator must tell participants what to do
        - Keep them moving without answering questions
        - Enact the think aloud protocol / Have them verbalize their thoughts
- Page - 67:
    - Set screen resolution to something the average user likely has - not what a developer uses
- Page - 69:
    - Turn off software that might interrupt the test
    - Add bookmarks for any pages you'll need to open
    - Clear all browsing data
- Page - 75:
    - Start by asking them what they make of the home page
        - What you can do there
        - Don't ask for their opinion of it
- Page - 77:
    - If participant is miserable - task is taking too long
        - You aren't learning anything more → move on to the next task
- Page - 78:
    - Ask substantial questions
        - Why participant made particular choices at the end after the tasks are completed
            - Don't interrupt the flow or accidentally give clues
- Page - 79:
    - Users aren't designers
        - Don't always know what they need, or even what they want
- Page - 82:
    - Ask what participant is thinking only if you're not entirely sure

- - - Don't make it a function of time and interrupt the user while reading or making progress
- Page - 86:
    - It's okay to be persistent and a bit ruthless
        - You're paying the participant for their time
        - If you don't get what you need, you're wasting everyone's time

Chapter 9: What Observers Should Look For

- Page - 92:
    - Have key stakeholders watch tests live instead of recordings
        - More compelling
        - Benefit from the shared group experience and comparing observations
- Page - 93:
    - Observers should take notes, find 3 most important usability problems seen
        - Suggest questions for the facilitator to ask the participant
- Page - 100:
    - Only time a team should be troubled by testing is when it's done so late in development that there's no time to fix any problems

Chapter 10: Comparing Notes And Deciding What To Fix

- Page - 104:
    - You'll have more usability problems than resources to fix
        - Focus on most serious problems
- Page - 106:
    - In debriefing, list all observed problems
        - Identify the ten worst → discuss simple fixes to make within month

Chapter 11: Why Doing Less Is The Best Way To Fix Things

- Page - 111:
    - Make smallest and simplest change you can
        - Spend time to implement the perfect solution later
- Page - 115:
    - If tweak doesn't work → try a stronger version
        - If that doesn't work → try another tweak before resorting to redesigning
- Page - 117:
    - If adding something to address a usability problem, question it
        - Usually removing anything distracting is better

Chapter 12: Common Problems And How To Fix Them

- Page - 123:
    - Someone who starts off lost on your web site will stay lost
        - Don't let stakeholders add too many disorienting bits
- Page - 124:
    - Subtle visual distinctions that work in print don't work on the web
        - Focus on making important parts really stand out

Chapter 13: Playing Nicely With Others

- Page - 132:
    - If need buy-in from key stakeholders
        - ROI arguments are weak
        - Make them observers in a live usability test

Chapter 14: Remote Testing

- Page - 138:

        - You can't ask questions or probe with unmoderated remote testing
            - Cheap and still helpful
- Page - 139:
    - Don't try any form of remote testing until you have some in-person tests under your belt

2.3 - Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Rules

Jeff Johnson

http://www.amazon.com/Designing-Mind-Simple-Understanding-Interface/dp/012375030X?&tag=rnwap-20

The Psychological Basis for UI Design Rules

UI Design Guidelines□ (Shneiderman)

- Strive for consistency
- Cater to universal usability
- Offer informative feedback
- Design task-flows to yield closure
- Prevent errors
- Permit easy reversal of actions
- Make users feel they are in control
- Minimize short-term memory load

UI Design Guidelines□ (Nielsen & Molich)

- Visibility of system status
- Match between system & real world
- User control & freedom
- Consistency & standards
- Error prevention
- Recognition rather than recall
- Flexibility & efficiency of use
- Aesthetic & minimalist design
- Help users recognize, diagnose, & recover from errors Provide online documentation & help 3

UI Design Guidelines□ (Stone)

- Visibility:
    - First step to goal should be clear
- Affordance:
    - Control suggests how to use it
- Feedback:
    - Should be clear what happened or is happening
- Simplicity:
    - As simple as possible & task-focused
- Structure:
    - Content organized sensibly
- Consistency:
    - Similarity for predictability
- Tolerance:
    - Prevent errors, help recovery
- Accessibility:

        - Usable by all intended users, despite handicap, access device, or environmental conditions

Applying Usability Guidelines

- UI Guidelines are based on how people perceive, think, learn, act
- UI designers want reasons for rules
- UI guidelines are not rote recipes
- Applying them effectively requires understanding their scientific basis
- Determining rule applicability & precedence
- Balancing trade-offs between competing rules

Facts about Human□ Perception & Cognition

- We perceive what we expect
- Our vision is optimized to see structure
- We seek and use visual structure
- Reading is unnatural
- Our color vision is limited
- Our peripheral vision is poor
- Our attention is limited
    - Our memory is imperfect
- Limits on attention shape our thought & action
- Recognition is easy
    - Recall is hard
- Learning from experience & performing learned actions are easy
    - Problem-solving & calculation are hard
- Many factors affect learning
    - We have real-time requirements

We Perceive What We Expect

- Our perception is biased by:
    - Our experience
    - The context
    - Our goals

Our Vision is Optimized□ to See Structure

- Gestalt Principles of Visual Perception
    - Proximity
    - Similarity
    - Continuity
    - Closure
        - We tend to see whole, closed objects, not collections of fragments
        - Overlapping circles & triangles, not odd fragments
    - Symmetry
        - We tend to see simple figures rather than complex ones
        - Ex: two overlapping diamonds; not other, more complex
    - Figure/ground
    - Common fate

We Seek & Use Structure

- Structured info is easier to perceive
- Visual hierarchy gets people to goal faster

Reading is Unnatural

- We’re pre-wired for language

- Brain learns language easily in childhood
- Nearly everyone learns a language
- We are not pre-wired for reading
- Brain has no special facility for reading
- Learning reading is like learning other skills: Writing, arithmetic, reading music, kung fu
- Same brain areas mediate
- Many people never learn to read well, or at all
- Poor text presentation can disrupt reading
- Unfamiliar words: Bailiwick, penultimate, heretofore, defragment
- Difficult typefaces TEXT IN ALL CAPS, ESPECIALLY IN A FANCY FONT
- Patterned background or poor contrast
- Poor text presentation can disrupt reading

Our Color Vision is Limited

- Our color vision is based on differences
- Our vision is optimized to see contrasts -- edges & changes, not absolute levels
- We have trouble discriminating:
    - pale colors
    - small color patches
    - separated patches
- Some people have color-blindness
    - ~ 8% of males
    - ~ 0.5% of females
    - Ex: colors that would be hard for red-green colorblind people to distinguish
- Don't rely solely on color
- Use redundantly with other cues

Our Peripheral Vision is Poor

- Common methods of getting seen
    - Put where users are looking
    - Put near the error
    - Use red for errors
    - Use error symbol
    - Heavy artillery: use sparingly
    - Popup in error dialog box
    - Audio: beep
    - Flash or wiggle briefly (not continuously)

Our Attention is Limited - Our Memory is Imperfect

- Short-term memory (STM)
    - Represents conscious mind
    - Attention: what we're attending to NOW
    - Not a separate store
    - Capacity: 3-5 unrelated items
        - "Magical number 7" was over-estimate
        - Goals, numbers, words, objects (actually features)
    - New items can "grab" attention from old
    - Easy to forget goals or info
- Long-term memory (LTM)
    - Memories = broad patterns of neural activity
    - Experiences trigger patterns corresponding to features

    - Similar experience triggers same pattern~recognition
    - Internal neural activity triggers pattern~recall
    - Stores a lifetime of experience, but…
        - error-prone, impressionist, free-associative, easily biased
    - Memories change when features are dropped or added
    - Seldom-followed routines hard to recall
    - Don’t burden long-term memory

Limits on Attention Shape Our Thought & Action

- We barely pay attention to computer tools
- Focus attention on own goals, data
- Think about computer, UI very superficially
- Krug: Don’t Make Me Think (about your software)
    - Focused on achieving goal
    - Prefer familiar paths over exploration
- Keeping track of features in STM is work
- We track only features crucial to task ~ We are often “blind” to changes
- Keeping track of things in STM is work
- When we reach goal, we often let everything related to it fall out of STM
    - We often forget “loose ends” of tasks:
        - Turning car headlights OFF
        - Switching device or software back to normal mode
    - Therefore: Systems should remind users of loose ends
    - Modes should revert to “normal” automatically

Recognition is Easy;▯ Recall is Hard

- We evolved to recognize things quickly
- We assess situations very fast
- We recognize faces blindingly fast 50
- We did not evolve to recall arbitrary facts
- Tricks for memorizing use recognition to stimulate recall
    - Ex: Greek “method of loci”
- Developed writing to avoid memorizing
- We rely on external memory aids: calendars, PDAs   Implication for UI design:

Easy: Learning from Experience▯ & Performing Learned Actions

- Generalizing from experience is easy
- Main fault is overgeneralization
- Performing well-learned actions is easy
- Automatic routines don’t require STM or conscious awareness
- It’s “compiled mode, parallel” processing
- Can multi-task (many processors)
- Brains have done both for hundreds of millions of years

Hard: Problem Solving & Calculation

- Problem solving is evolutionarily new
- Only a few mammals & birds can do it - We’re the best
- Cerebral cortex is where conscious reasoning happens
    - Lets us write programs for ourselves & run them in monitored, emulated mode, rather than compiled mode
    - But monitored thought runs slowly, uses up STM, can’t be multi-tasked (only one processor)

    - Calculation is extremely new
    - Originated only ~5K years ago
    - Expensive: mainly done in controlled, monitored mode
- Only small problems don't tax memory & attention
    - 9 x 10 = ?
- Most exceed STM or require retrieval from LTM
    - 93.3 x 102.1 = ?
- Diagnosing computer problems
- Requires systematic testing of possibilities
- We invented writing, numbers, arithmetic, calculators & computers to overcome our brain's limitations

Easy: Generalizing & Learned Actions□ Hard: Problem Solving & Calculation

- Implications for UI design:
    - Don't make people deduce things
        - "It wants my 'member ID'. Is that the same as my 'username'? It must be."
        - Explain explicitly & exactly what to do, or explicitly & exactly what happened
        - Don't make people reason by elimination
        - Debug complex computer malfunctions
            - Ex: faulty Internet connection
        - Optimize combinations of many settings
        - Don't make people calculate what software can calculate

Many Factors Affect Learning

- We Learn Faster When
- Vocabulary is familiar & task-focused
- Vocabulary is consistent
- Risk is low

Human Real-Time Characteristics

- Shortest audible silent gap in sound: 0.001 sec
- Briefest visual stimulus that affects us: 0.005 sec
- Shortest noticeable lag in ePen ink: 0.01 sec
- Threshold for auditory fusion of clicks: 0.02 sec
- Threshold for visual fusion of images: 0.05 sec
- Speed of (involuntary) flinch reflex: 0.08 sec
- Lag in full awareness of visual event: 0.1 sec
- Limit on perception of cause/effect: 0.14 sec 62
- Time for skilled reader to comprehend a word: 0.15 sec
- Time to subitize 1-5 items: 0.2 sec
- Time to identify (name) visual object: 0.25 sec
- Time to count items in visual field: 0.5 sec/item
- Minimum visual-motor reaction time: 0.7 sec
- Average conversational gap: 1 sec
- Length of unbroken attention to task: 6-30 sec
- Applicability to UI Design
    - Controls must react within 0.14 sec to clicks, or perception of cause/effect is broken

Conclusion:

- Applying Design Rules in UI Designs is Not Simple & Mindless
- UI design is a skill; not something anyone can do by following guidelines
- Knowing cognitive basis helps us prioritize

- Recognize which rules to follow in each design situation

2.4 - The Design of Everyday Things

Don Norman

http://www.amazon.com/The-Design-Everyday-Things-Expanded-ebook/dp/B00E257T6C/ref=dp_kinw_strp_1

Design Basics

- “Design must convey the essence of a device’s operation; the way it works; the possible actions that can be taken; and, through feedback, just what it is doing at any particular moment. Design is really an act of communication, which means having a deep understanding of the person with whom the designer is communicating.”
- “Each time a new technology comes along, new designers make the same horrible mistakes as their predecessors. Technologists are not noted for learning from the errors of the past. They look forward, not behind, so they repeat the same problems over and over again. Today’s wireless devices are appalling.”
- “Whenever the number of possible actions exceeds the number of controls, there is apt to be difficulty.”

Overview

- Why are some everyday things difficult to understand and use?
- What are Don Norman’s principles and how do they apply to the design of everyday things?
- How can we apply Norman’s principles to the design of computer interfaces?

Psychopathology of Everyday Things

- We are surrounded by many everyday things that have poor usability
    - Programming a VCR
    - Telephone features we can’t remember how to use
        - How to change the remote access code?
    - Photocopiers and fax machines
        - Face down or face up?
- Many of these things can be difficult to interpret and frustrating to use if they provide no clues or false clues as to how they operate

What is usability?

- Usability is a measure of the effectiveness, efficiency and satisfaction with which specified users can achieve specified goals in a particular environment

Norman’s Principles of Design

- Visibility
    - The correct parts must be visible and they must convey the correct message
    - Natural signals are naturally interpreted
    - Visibility problems occur when clues are lacking or exist in excess
    - Just by looking the user should know
        - State of the system
        - Possible actions
    - Don’t violate these principles to make something “look good”!
- Affordances
    - The affordances of an object determine, naturally, how it can be used
        - Button affords pushing
        - Handle affords grasping

        - Chair affords sitting
        - Knob affords turning
    - Just by looking at the object, a user should know how to use it
        - Example: The doors with handles to push
- Mapping
    - Controls and displays should exploit natural mapping
    - Natural mapping takes advantage of physical analogies and cultural standards
        - Physical: Steering wheel
        - Cultural: red means stop, green means go
- Constraints
    - Constraints limit the ways in which something can be used
    - Constraints can be
        - Physical
        - Semantic
        - Cultural
        - Logical
- Feedback
    - Feedback is sending back to the user information about what action has actually been done
    - Visibility of the effects of the operation tell you if something worked correctly
    - Systems should be designed to provide adequate feedback to the users to ensure they know what to do next in their tasks

Why is usability important?

- Poor usability results in
    - Anger and frustration
    - Decreased productivity in the workplace
    - Higher error rates
    - Physical and emotional injury
    - Equipment damage
    - Loss of customer loyalty
    - Costs money

How People Do Things – The 7 Steps

1. Forming the goal
2. Forming the intention
3. Specifying an action
4. Executing the action
5. Perceiving the state of the world
6. Interpreting the state of the world
7. Evaluating the outcome

- Repeat back to #1 based on what has happened as a result of actions

Gulf of Execution

- Arises when there is a difference between the intentions and the allowable actions provided by a system
    - Ex: if you want to open the sunroof, but there are no buttons to be found that might allow you to open the sunroof
    - Alternatively, a long sequence of actions may be required that are unintelligible to you, so you just don't open the sunroof

Gulf of Evaluation

- Arises when a great amount of effort is required to interpret the physical state of a system and/or determine how well expectations and intentions have been met
- Ex: CD player where it is impossible to tell whether there is a CD in the player or not
- A system that provides no feedback
    - i.e. you click a button and nothing happens affirmative or negative

Questions to Evaluate Design Based on How People Do Things

- How easily can one determine the function of the device?
- How easily can one tell what actions are possible?
- How easily can one tell if the system is in the desired state?
- How easily can one determine mapping from intention to physical movement?
- How easily can one determine mapping from system state to interpretation?
- How easily can one perform an action?
- How easily can one tell what state the system is in?

3 foundations to good design serve to answer these seven questions

- A good conceptual model
    - Designer provides a good conceptual model for the user, with consistency in the presentation of operations and results and a coherent, consistent system image
- Good mappings
    - Possible to determine the relationships between actions and results, between the controls and their effects, and between the system state and what is visible
- Feedback
    - User receives full and continuous feedback about the results of actions

What Knowledge Does Your User Have?

- Common and instinctive visual knowledge is easily retrievable and visible/audible
- There is no learning required and ease of use at first encounter is high
- Challenges are that the user may need to try to interpret the design since information is not communicated explicitly
- Design may not be aesthetically pleasing given a common need to maintain a lot of information
- Remembered or learned knowledge makes for efficient use and minimalist design
    - Requires learning to use, particularly before initial use

How Does the User Know What to Do?

- Placing constraints makes it easier for the user to know what to do
    - Physical constraints
    - Semantic constraints
    - Cultural constraints
    - Logical constraints
- Allowing the user too many different ways to use a device by not constraining the controls/functionality is a common cause of poor design
- Make the invisible, visible
    - Have a good display
    - Use sound to enhance visibility

How Do You Keep the User From Making Errors?

- Errors come in two different flavors
    - 1) slips result from automatic behavior
    - 2) mistakes result from conscious deliberations
- Common slip errors
    - Capture error
        - a frequently done activity is swapped with another frequently done activity

        - Description error
            - Intended action has much in common with others that are possible
        - Data-Driven error
            - Data-driven activities can intrude into an ongoing action sequence causing unintended behavior
        - Associate Activation error
            - Internal thought triggers incorrect action – Freudian slip
        - Loss-of-activation error
            - Forgetting to do something
        - Mode error
            - When a device has different modes of operation, and the action appropriate for one mode has different meanings in other modes
        - You need feedback loops in place for the user to detect that there has been a slip!

Summary

- Usability problems are common
- If there are usability problems in everyday "simple" things, the challenge is 100-fold for complex software
- Usability problems can be overcome through attention to design and addressing studies from HCI

2.5 - Emotional Design: Why We Love (or Hate) Everyday Things

Don Norman

http://www.amazon.com/Emotional-Design-Love-Everyday-Things/dp/0465051367

Chapter - 1: Attractive things work better

- Affective system works independently of the conscious thoughts
    - Both are equally important and extremely related
- Decision making that was believed to be a logical, rational process, was proved to be wrong by scientific studies that demonstrated how the affective system influences the decision by giving fast warning of what is good or bad
- Research also showed that when people are relaxed and happy, they become more creative and more imaginative in problem solving situations
- Attractive things work better because they make people feel good, thus people are more tolerant of minor difficulties and they think more creatively
    - They are willing to work harder to find the solution to what they are trying to do

Chapter - 2: The multiple faces of emotion and design

- Norman's studies of emotions suggest that there are 3 level of the cognitive and emotional system for humans:
    - Response mechanisms that analyse and generate physical responses
    - Visceral level
        - Biological level that reacts to certain things like temperature, shapes, lightning, textures, smells, etc.
            - Appearance and touch & feel
    - Behavioural level
        - Directly affected by culture
        - Behavioural is about function, performance and usability
    - Reflective level

        - Reflective is about interpretation, understanding and reasoning
    - How to combine these 3 levels or 3 designs in one product
        - There is no clear answer to that question but it should be take into consideration that no product will never satisfy everyone
    - Products must be attractive and pleasurable but also effective, understandable and appropriately priced
    - Products must strive for balance among the 3 levels

Chapter - 3: Three levels of design: Visceral, Behavioural and Reflective

- Each of the 3 levels of design (Visceral, behavioural and reflective) play its part in shaping the experience of use
- Each is as important as the others, but each requires a different approach by the designer
- Visceral:
    - People learn sometimes to overcome the visceral response of the body (to be in noisy places, to eat spicy food, etc.) when for instance a thing is viscerally negative, but reflectively positive (i.e. to ride a roller-coaster in an amusement parks)
    - Effective visceral design requires the skills of the visual and graphic artists and industrial engineers
- Behavioural:
    - What matters here is function, understandability, usability and physically feel
    - When designing for the behavioural level, the hardest is to understand the unarticulated needs of the user, because they don't know what they need
    - Observation is the appropriate type of research for this situation, instead of focus groups, questionnaires or surveys which rely to much on the user opinion
- Reflective:
    - Nothing practical or biological about the this level
    - Attractiveness is to visceral, what beauty is to reflective
    - Beauty comes from conscious, it looks below the surface
    - The overall impact of a product comes through reflection (again, the example of the roller coaster), that is why customer relationship plays a major role in the reflective level

Chapter - 4: Fun and games

- How to maintain excitement, interest and aesthetic pleasure for a long time?
    - Like in music, literature and art, through the depth and richness of the things
    - That way, it is possible to perceive something different on each experience
- Products that give joy over the pass of time usually follow 3 steps:
    - Enticement (make an emotional promise)
    - Relationship (continually fulfil the promise)
    - Fulfilment (end the experience in a memorable way)

Chapter - 5: People, places and things

- Refers to humans and the natural tendency to interpret emotions in people and objects
- Computer anger is a case in point of how people humanise and interpret as animated something that is not
- Reflective level is the one that relates past events and makes conclusions
- People tend to blame the computer as if it was its fault, similarly to team work relationship
- Fact that computers do not express shame or blame makes it more frustrating

- ❖ People naturally want to trust, but trust comes from experience and it must be earned
    - ➢ Implies reliance, confidence and integrity

Chapter - 6: Emotional machines

- ❖ Norman describes how in this time (back in 2004) machines have reasonable amount of intelligence but no emotions
    - ➢ States that non-verbal feedback, facial expression and body language will be needed in robots in order to understand them better
    - ➢ Machines will not be smart and sensible until they have both intelligence and emotions
    - ➢ Emotions not necessarily similar to humans emotions, but any other way of affective system
    - ➢ Robots should have at least these 3 emotions in order to improve their performance:
        - ■ Pride
        - ■ Fear
        - ■ Frustration

Chapter - 7: The future of robots

- ❖ Norman analyses possible robots and the implications of their role in society
    - ➢ Robots for highly risk missions, educational robots (tutors) and robots for medicine
    - ➢ Increase of the amount of robots doing regular jobs would led to unemployment, among other social problems
    - ➢ If robots combine intelligence with emotions
        - ■ “The positive impact will be enormous. The negative consequences will also be significant”

2.6 - Designing the User Interface: Strategies for Effective Human-Computer Interaction

Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven Jacobs

http://www.amazon.com/Designing-User-Interface-Human-Computer-Interaction/dp/0321537351

2.7 - Human–Computer Interaction: Fundamentals and Practice

Gerard Jounghyun Kim

http://www.amazon.com/Human-Computer-Interaction-Fundamentals-Gerard-Jounghyun/dp/1482233894