Comp 341/441 - Human-Computer Interface Design

Spring Semester 2017 - Week 9

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flow

Concept of **Flow** by **Mihaly Csikszentmihalyi**

- user's creativity and productivity are high
  - *performance of activity occurs naturally and unconsciously*
- user experiences deep concentration and immersion in their current activity
  - *user is effectively both alert and relatively relaxed*
- living in the moment
  - *sensation of being so engrossed in an activity a user is unaware of the passage of time*
- balancing interest and challenge
- user is confident and exhibits a sense of control over their current situation
- user is working progressively towards achieving a specific goal
  - *eg: in games this might be as simple as getting to the next level*

TED 2004 - Flow, the secret to happiness

Video - Concept of Flow

working memory and the concept of flow

TED 2013 - Peter Doolittle: How your "working memory" makes sense of the world

Reducing Cognitive Load

flow states and software

- unusual for beginners to be able to gain a sense of **flow**
  - *normally requires some level of comfort or familiarity*
  - *ease with the general operation and control of the application*
- acquiring a state of **flow** is quite difficult
  - *focused concentration is often not enough*
  - *reducing cognitive load in apps can aid in the process*
- interruptions in the real world can break a user's sense of **flow**
  - *visual clutter and noise in interfaces can have the same effect*
  - *interface distractions can also break a user's sense of **flow***

Reducing Cognitive Load

interface suggestions for flow

- reduce interruptions in the interface unless intentional for warnings, errors...
  - *non-important modal popups, notifications should be avoided*
- keep visual presentation simple
  - *bright, loud colours and images are jarring to the user's eye*
  - *unnecessary, prolonged or repetitive animations are distracting*
- sequential navigation should be obvious
  - *do not require the user to search the interface for **next**...*
- avoid switching between tabs, windows, pages for related information
- saving a document, work etc should be easy and intuitive for a user
- output and display progress reports for ongoing activities
  - *progress bars, spinning wheels, timers...*
- offer feedback in a prompt and consistent manner within the interface
- multi-tasking for users is difficult
  - *don't ask your users to perform too many interface tasks at once...*

Incentives, offers, and games

motivating our users

- consider motivation, persuasion, or helpful *nudging* in our designs
- design our interfaces to encourage and help increase productivity
- particularly useful for certain types of applications and sectors
  - *user participation apps*
  - *productivity tools*
  - *community related apps*
- compare this type of application to gaming
  - *often adept at engaging and keeping a user's attention*
- consider how and where games are compelling and addictive
  - *adapt applicable concepts for our own design*

Incentives, offers, and games

compelling and addictive nature of gaming

- current trend in design to apply addictive qualities of gaming to application design
  - *known as **gamification***
- most games have some goals and rewards, which encourage and incentivise a user
  - *often a built-in incentive to reach the next level, a sense of satisfaction*
- games may include elaborate systems of player rankings
  - *rankings act as system of validation, offers easily quantified feedback to users*
- multiplayer games offer an element of direct competition
  - *user's sense of skills, standing, and validation enhanced by opportunity to compete and win*
  - ***high scores** on a leaderboard help this sense of competition*
- multiplayer games also offer sense of **social** connection and community
  - *head-to-head gaming, group playing, or simply ability to share, compare, discuss...*
- online role-plaing games a good example of social awareness and collaboration

Incentives, offers, and games

examples of gamification

1. Good examples of the use of gamification within social context

   Source - Yu-Kai Chou & Gamification

2. Khan Academy Knowledge Map

   Source - Khan Academy

3. Play to Learn with Khan Academy

   Source - GCO

4. Scratch Programming Language

   Source - MIT

Games and Simulations

changing the brain game...

> *The immense amount of time spent with games during a child's formative years has led them to be literally 'hardwired' in a different way than those who came before.*

Carstens, A., and Beck, J. *Get ready for the gamer generation.* Tech Trends 49. PP.22-25. 2005.

> *Immense changes in technology over the past thirty years, of which video games are a major part, have dramatically and discontinuously changed the way those people raised in this time period think, learn, and process information...The change has been so enormous that today's younger people have, in their intellectual style and preferences, very different minds from their parents and, in fact, all preceding generations.*

Prensky, M. *Digital game-based learning.* McGraw-Hill. P.17. 2001.

Games and Simulations

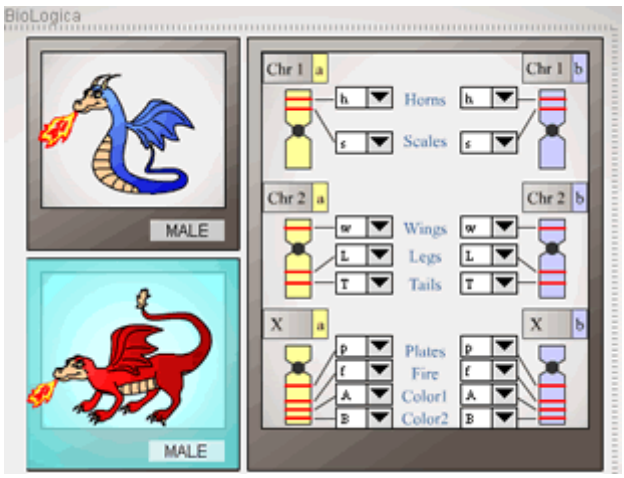
what are simulations?

- linear interactive tutorial versus a simulation
- model of a real world system
  - *respond in dynamic and rule-based ways to user responses*
- two basic types of simulation
  - *operational and conceptual*
- operational primarily used to teach procedural skills
- conceptual simulations

Games and Simulations

what are games?

- online games include a broad array of formats and features
- common elements such as
  - *competitive activity with a challenge and goal*
  - *set of rules and constraints*
  - *specific context*



Source - BioLogica

Games and Simulations

match game to learning goal

> *Jeopardy-style games, a staple of games in the classroom, are likely to be best for promoting the learning of verbal information (facts, labels, and propositions) and concrete concepts. Arcade-style games...are likely to be best at promoting speed of response, automaticity, and visual processing. Adventure games are likely to be best for promoting hypothesis testing and problem solving. It is critical, therefore, that we understand not just how games work, but how different types of games work and how game taxonomies align with learning taxonomies..*

Van Eck, R.N. "Digital game-based learning." Educause Review 41. PP.17-30. 2006.

- a game can often take over a tutorial
  - *Hays, R.T. 2005.*
- medical simulations
  - *Issenberg, S.B. et al. 2005.*

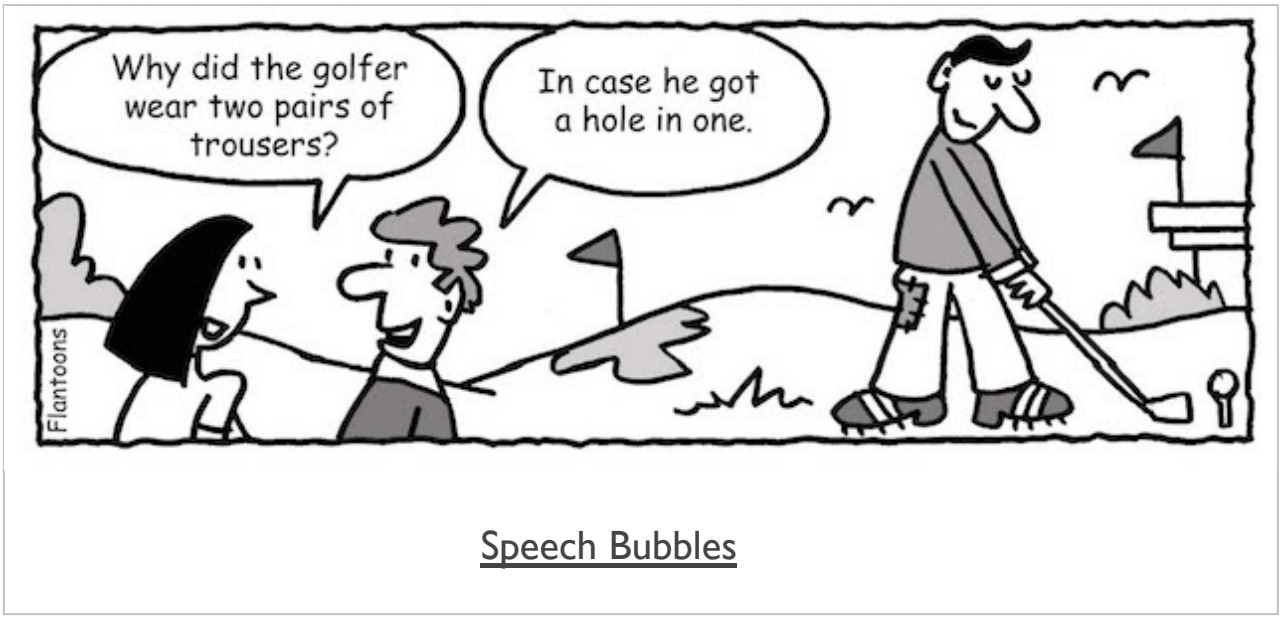
Processing Visual Information

intro

- how do users actually process a page or screen within an application?
  - *designers and developers interested in working out how to guide a user*
  - *optimise viewing experience for user's focal point*
- graphical artists use emphasis and position to draw attention
- cartoonists carefully compose and sketch out cartoons
  - *draw attention to speech-bubbles etc in correct order...*
- we can compose our visual page elements to influence a user's viewing order
- by knowing common patterns for user viewing
  - *we can design our apps to accommodate such usage patterns*
  - *putting relevant information where users actually look*

Image - Processing Visual Information

humour



Speech Bubbles

Source - The Curious Dog Log

Processing Visual Information

how do users read a page?

- Western readers follow a pattern for reading
  - *look at first word in the top left corner of a page*
  - *then scan across the line from left to right*
  - *read the words*
  - *skip to the beginning of the next line*
- reader's eyes scan across the line of text
  - *not a smooth action*
  - *user's focus jumps rapidly between given spots on the page*
  - *known as **fixation points***
  - *jumps from point to point known as **saccades***
  - *brain does not receive visual information during **saccades***
  - *brain capable of combining images received at each **fixation point***
  - *brain **sees in a line***

Processing Visual Information

perceiving more complicated pages...

- consider page layouts with a more complex design and pattern
  - *slightly harder to discern exactly how a user's eyes move across the page*
- some generalisations we can consider and transfer
  - *users get an initial impression of a page or document*
  - *z-shaped pattern*
  - *upper left, read title, then scan from upper right*
  - *diagonal to lower left, then scan to lower right*
  - *return focal point to areas of interest*
- uncertain how flashy, loud images etc will impact this pattern
  - *tend to break or interrupt a user's pattern of scanning the page*
- user searching a page for something specific will often follow a different pattern

Processing Visual Information

studies

- researchers have conducted eye-tracking studies
  - *using specialised cameras and software*
- capable of identifying where and what a user views on screen
- software can replay a user's **scanpath**
  - *a series of **fixations** and **saccades***
- replay tells us the areas of interest and how long each user viewed
- aggregate **scanpaths** to form a **heatmap** diagram
  - *shows predominant areas of interest to our users*

Video - Processing Visual Information

eye tracking advert

Google Chrome Japan
Source - YouTube

Processing Visual Information

Eyetracking Web Usability - part 1

- websites present a different pattern for users
- user's tend to follow an **F** pattern
  - *read across the top*
  - *continue down the screen*
  - *read lines, at least partial, of text*
  - *tend to read paragraphs nearer the top of the screen*
  - *only scan text near the bottom of the screen*
- at the bottom of the screen
  - *users tend to make an additional quick scan down the left side of the screen*
  - *left sidebar with links draws particular attention*

Source - Nielsen, J. and Pernice, K. *Eyetracking web usability.* New Riders. 2009.

Processing Visual Information

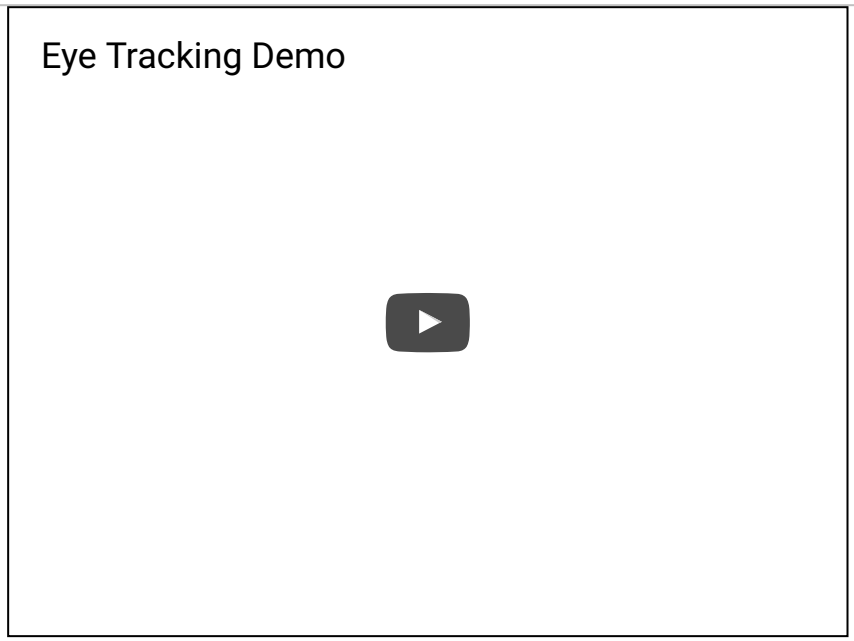
Eyetracking Web Usability - part 2

- images and graphics attract a user's attention
  - *tends to be a strong response and reaction when they are relevant and integral to the content*
  - *users seem able to quickly discern relevant imagery from stock photos*
  - *stock photos quickly overlooked and ignored*
- banner ads now tend to be ignored by users
  - *users start their **F** pattern beneath these adverts*
  - *users begin viewing site beneath these adverts*
- users tend to ignore repetitive elements on multiple pages
  - *eg: logo, navigation bars...*
  - *only look again if they need something...*

Source - Nielsen, J. and Pernice, K. *Eyetracking web usability.* New Riders. 2009.

Video - Processing Visual Information

eye tracking



Website Eye Tracking
Source - YouTube

References

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