Comp 388/441 - Human-Computer Interface Design

Week 7 - 3rd March 2016

Dr Nick Hayward

Processing Visual Information - 7

Eye tracking 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 - 8

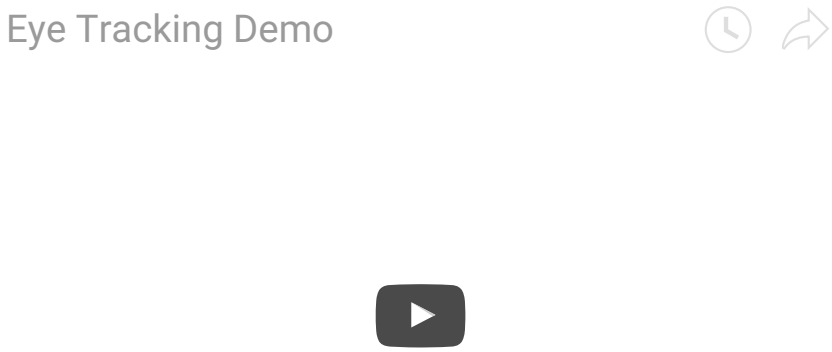
Eye tracking web usability - Part 2

- 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.

Processing Visual Information - 9

Demo of Eye Tracking



Eye Tracking Demo - Source: YouTube

Gestalt Laws of Perception - I

- Gestalt concept allows us to explain how humans perceive and comprehend visual information
- as interface designers such laws can be exploited
    - *create visual layouts and representations to improve communications, concepts, relationships...*
- Gestalt: **form**, **shape**...
    - *refers to the notion of a whole, a body, more than the mere sum of its parts...*
- Gestalt in psychology
    - *notion that humans seek sense of the world by imposing concepts of structure, order...*
- **Gestalt effect** suggests that our mind will naturally attempt to recognise coherent, whole forms...
    - *instead of perceiving individually smaller constituent parts that form the whole*

Gestalt Laws of Perception - 2

Source - Gestalt Principles

Gestalt Laws of Perception - 2

Source - World Wildlife Fund

Gestalt Laws of Perception - 3

- 1923, Max Wertheimer's paper *Laws of Organisation in Perceptual Forms*
- suggested a number of principles or laws that describe how the mind tends to perceive visual information
- for example, there are certain laws useful for consideration relative to design
    - *Law of Prägnanz*
    - *Law of Proximity*
    - *Law of Similarity*
    - *Law of Closure*
    - *Law of Common Fate/Region*
    - *Law of Continuation*
    - *Law of Good Gestalt (or Good Continuation)*

Gestalt Laws of Perception - 4

Law of Prägnanz

- basic law proposed by Wertheimer
    - *the other laws are derived from this basic law*
- Prägnanz can be roughly translated as **concise** in nature, or a sense of **simplicity**
- when we perceive a visual scene we try to interpret it,
    - *in the simplest, most concise, and easily recognisable form*
- the mind tries to perceive the scene as a whole
    - *rather than the sum of its constituent parts*
- consider an image of a square or rectangle
    - *not four sides*
    - *two horizontal and two vertical*

Gestalt Laws of Perception - 5

Law of Proximity

- items located in close proximity will be perceived as a single entity or group
- items in a group will also be perceived as distinct and different from other items
    - *eg: an electronic board with individual lights, bulbs...*
- close proximity causes the interpretation in our vision and brain
- change the proximity, and our perception will change as well
- interface design
    - *separate and isolate similar elements and user's perception of the whole will change*
    - *eg: keep form elements together to avoid isolation and false perception*
    - *coherent presentation of like elements to form the required whole*

Gestalt Laws of Perceptions - 6

Source - Web Designer Depot

Gestalt Laws of Perception - 7

Law of Similarity

- visual elements that share properties or attributes are perceived as belonging together
- conversely, visual elements with differing properties or attributes will be perceived as belonging to different groups
- eg: jumble elements together - squares, circles, triangles, rectangles...
    - *our vision and brain will try to organise and sort these shapes*
    - *colour will also act as a varying factor*
    - *we will try to group based upon multiple attributes - shape, colour...*
- file managers are a good example of this principle in interface design
- highlighting and other sort options naturally help our users

Gestalt Laws of Perception - 8

Source - Web Designer Depot

Gestalt Laws of Perception - 9

Law of Closure

- lines, or similar representative grouped elements
    - *more likely to be perceived as a common group if they appear to form*
        - the outline or *closure* of a given shape or surface

- still considered true if that outline is not complete
- our mind will fill in any gaps in these incomplete shapes
    - *eg: an incomplete circle*
    - *simpler to see as a circle than an arc of 330 degrees...*

- logos and other visualisations often use this trick

Gestalt Laws of Perception - 10

Closure

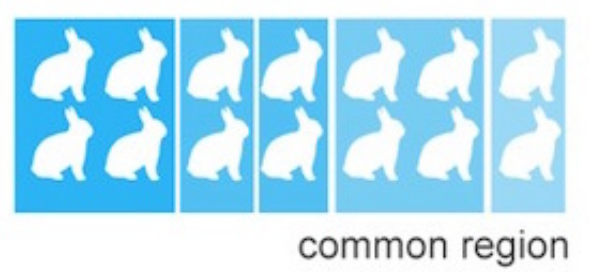
Source - APRK Topics

Gestalt Laws of Perception - 11

Law of Common Fate/Region

- motion, and elements, moving in the same direction simultaneously
    - *still perceived as a similar grouping*
- drag and drop in interfaces
    - *uses this perception of grouping*
    - *act of dragging disparate elements imparts concept of group*
- the trail of the motion imparts a sense of unity to these interface elements

Gestalt Laws of Perception - 12



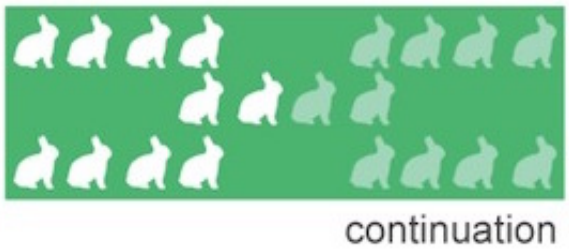
Source - Web Designer Depot

Gestalt Laws of Perception - 13

Law of Continuation

- elements within an interface that appear to be a continuation
    - *perceived by users as belonging together*
- a user's focal point will continue along this line or sequence
    - *until the end or if broken by something else*
- peripheral vision will inform focal point...

Gestalt Laws of Perception - 14



Source - Web Designer Depot

Gestalt Laws of Perception - 15

Law of Good Gestalt (or Good Continuation)

- our perception of smooth continued lines
    - *even if they are broken by an intersection or crossing*
- eg: multiple lines crossing still perceived as separate single lines
    - *we see individual lines*
    - *we rarely see the meeting of two angles*
- our mind has been taught to perceive the crossing of two lines as simpler
- data visualisation is a good example
    - *allows us to present multiple lines and expect our users to differentiate*
    - *multiple data results crossing...*

Gestalt Laws of Perception - 16

Good Gestalt

Source - APRK Topics

Visual Attributes - I

- elements used as components to build a graphical interface
    - *might include buttons, icons, drop-down lists, menus, checkboxes...*
- attributes are properties of these visual elements
    - *attributes as styling for a page's visual elements*
- patterns in design and layout aid a user
    - *reduces cognitive load, creates an aid to vision, perception, recognition...*
- elements with similar function should be style in a similar manner
- **contrast** presents itself as an intentional and easily recognisable difference
    - *eye-catching, attention grabber for a user...*
    - *can provide users with clues to elements, content...*

Visual Attributes - 2

- **size** is another way we can create differentiation in our designs
  - *generally easy for a user to discern and understand*
- size has been used for centuries in print design
  - *Lombardic capitals in mediaeval manuscripts and books*
- size is often perceived as visual dominance
  - *a sense of greater importance*
  - *size can make a difference within certain aspects of interface design*
- size has been applied in the use and development of grid layouts in web design
  - *allow us to easily define relative sizes for content, blocks...*
  - *larger centre panels often perceived as more important than headers, sidebars...*
- data visualisation uses this principle for differentiation
  - *quickly and effectively communicate larger data values*
  - *relative weights of data*
- assigning size attributes needs to consider relative weighting of importance
  - *relative value of elements to task at hand...*

Visual Attributes - 3

- **colour** can play a vital role in the presentation of an interface
  - *also plays important role in user perception*
- after size, colour is perceived as next important attribute
  - *aids user differentiation*
- colour can help guide a user to certain aspects of an interface
- elements that share identical colours often perceived as in the same group
  - *contrasting colours present a useful juxtaposition of elements*
- cultural pre-conceptions aside
  - *certain colours have perceived inherent meaning*
  - *red for danger, errors...*

Visual Attributes - 4

- users are often able to quickly and easily differentiate shapes and patterns
    - *Gestalt principles in practice*
    - *easily differentiating squares from circles and triangles*
- easily differentiate content and elements
    - *apply shapes as outlines, borders, content differentiation...*
- elements placed at an angle to one another perceived as jarring and mis-matched
- grid design and layouts further heighten this issue of angles
- angles perceived as creating a sense of **visual tension**
    - *often distracting for a user*
- angles can, however, be used to highlight and contrast elements

Visual Attributes - 5

- weight in interface design
    - *refers to the thickness of a line, font...*
    - *its relative presentation within a design*
- can be a quick and easy differentiating factor within our designs
- a variation on the concept of **contrast**
- text styling can be a very useful and practical difference in designs
- texture can also play a useful role in our designs
- texture has a broad use in graphic design
    - *often perceived relative to the overall visual look and feel of a block of text*
    - *its overall visual effect*

References

- Card, S.K., Moran, T.P. and Newell, A. *The psychology of human-computer interaction.* Lawrence Erlbaum Associates. 1983.
- Nielsen, J. and Pernice, K. *Eyetracking web usability.* New Riders. 2009.
- Wertheimer, M. *Laws of Organisation in Perceptual Forms.* 1923.