Comp 341/441 - HCI - Slides

Spring Semester 2018 - week 10

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Gestalt Laws of Perception

Max Wertheimer

- 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

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

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*

Image - Gestalt Laws of Perception

Proximity

Source - Web Designer Depot

Gestalt Laws of Perception

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

Image - Gestalt Laws of Perception

Similarity

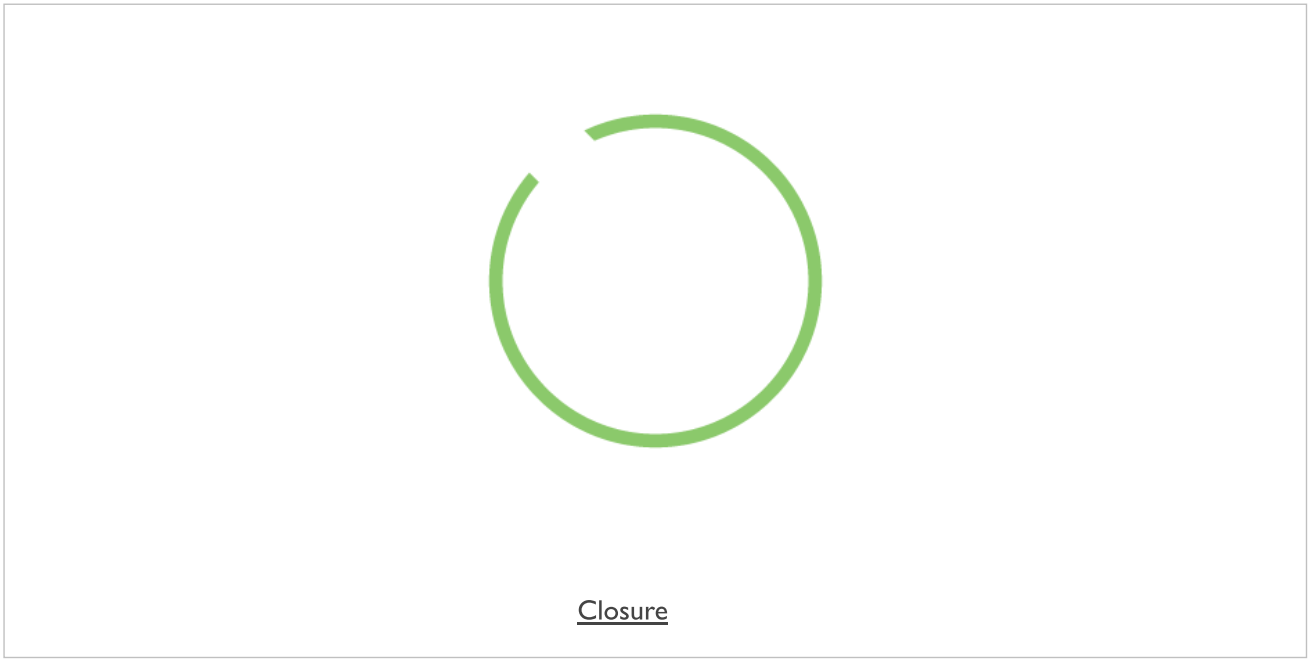
Source - Web Designer Depot

Gestalt Laws of Perception

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

Image - Gestalt Laws of Perception



Closure

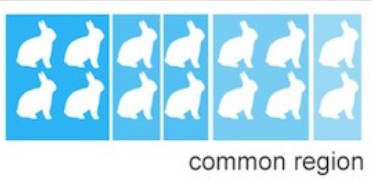
Source - APRK Topics

Gestalt Laws of Perception

Law of Common Fate

- 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

Image - Gestalt Laws of Perception



Common Fate/Region

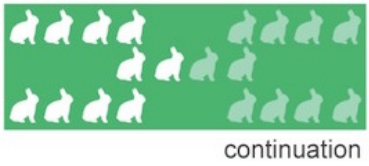
Source - Web Designer Depot

Gestalt Laws of Perception

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...

Image - Gestalt Laws of Perception



Continuation

Source - Web Designer Depot

Gestalt Laws of Perception

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...*

Image - Gestalt Laws of Perception

Good Gestalt

Source - APRK Topics

Video - Gestalt Laws of Perception

Visual Attributes

contrast

- 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

size

- **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

colour

- **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

shape, direction, and angularity...

- 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

weight, text styling, texture...

- 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*

Usability

Intro

- may consider an application, product, software as usable if it fulfills
  - *can be efficiently operated*
  - *provides an overall pleasant usage experience*
  - *can be easily learned*
- often difficult to judge the usability of a product etc
  - *rules are often subjective in nature relative to usability*
- each rule may vary greatly from user to user due to
  - *different skill sets*
  - *existing knowledge*
  - *previous experience*
- user's expectations, opinions, general preferences affect perception of usability
- some users are naturally more curious, patient, and persistent
- user experience may also be influenced by
  - *attitudes and experiences of friends, contemporaries...*
  - *general moods*
  - *stress levels, fatigue, distractions*

Image - Usability

Scissors

Scissors

Source - RightLeftRightWrong

Video - Usability

Left-handed in a right-handed world

What it's like to be left-handed in a right-handed world...
Source - YouTube

Usability

end of learning

- clear functionality and general operations with appropriate visible controls, labels...
- clear navigation options and paths, plus user's current location
- minimum memorisation and recall for sequences, commands, actions
  - *easy to remember and recall*
- product, application encourages exploration and experimentation
- mistakes are easily recoverable, and operations can be retried if necessary
- assistance and help is easily accessed, clear, correct, and relevant
- consistent interaction behaviour, visual layout, terminology
  - *helps encourage correct user mental model*
- limited surprises for application behaviour and usage
  - *less for the user to learn...*
- where possible, a user is guided through steps to complete complex tasks...
- clear feedback is provided when a user performs an action
- current status of the system is clearly presented and labelled
- application, system, or product should form a coherent whole

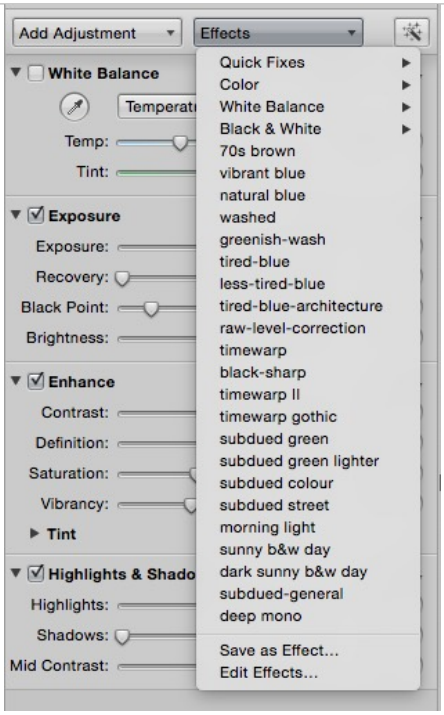
Usability

efficiency

- straightforward, easy for an experienced user to repeat actions or complete tasks
- minimal deliberate or strenuous thinking to perform routine application tasks
- enable and encourage a user to achieve a state of **flow**
- allow a skilled user to achieve a low error rate
  - *clear notification and detection of limited errors and mistakes*
- stable performance and reliability to prevent delays and hindrances
- minimal, if any, surprises and inconsistencies in interaction and design patterns

Image - Usability

preset effects



Aperture Effects

Source - Aperture

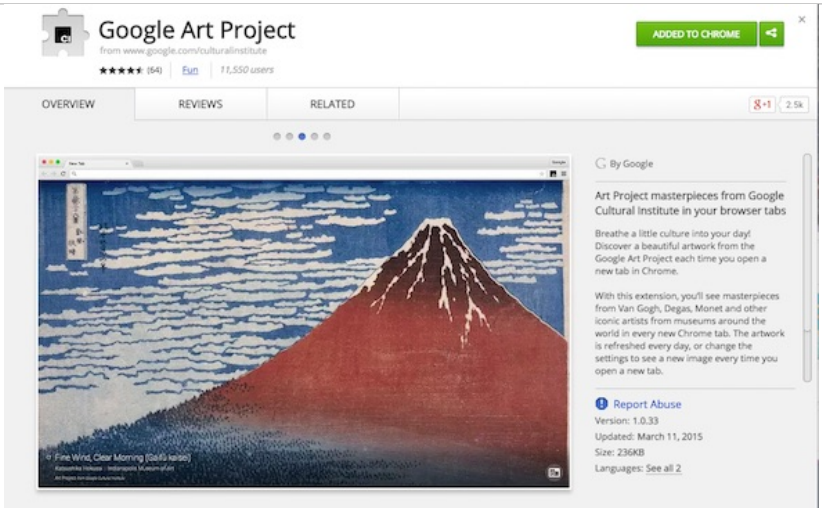
Usability

experience

- possible to consider a product or application relative to its experience
  - *whether it is a pleasant experience or not...*
- is the application's design and interface pleasant and appealing for its users
- does it promote and encourage positive productivity
- eg: if we consider games, does the application's experience
  - *provide enjoyment for its users*
  - *challenge them relative to their abilities*
  - *provide general entertainment and distraction*
- does the user feel rewarded and positive for tasks and actions completed
- again, is the product stable, reliable, and trusted by users
- likewise, are the delays sufficiently limited to avoid frustrations for users
- is the product free of unnecessary annoyances and frustrations
  - *help promote user satisfaction, reduce cognitive overload, and help achieve and maintain a sense of flow for users*

Image - Usability

pleasing concepts



Chrome Art

Source - Google Art Project

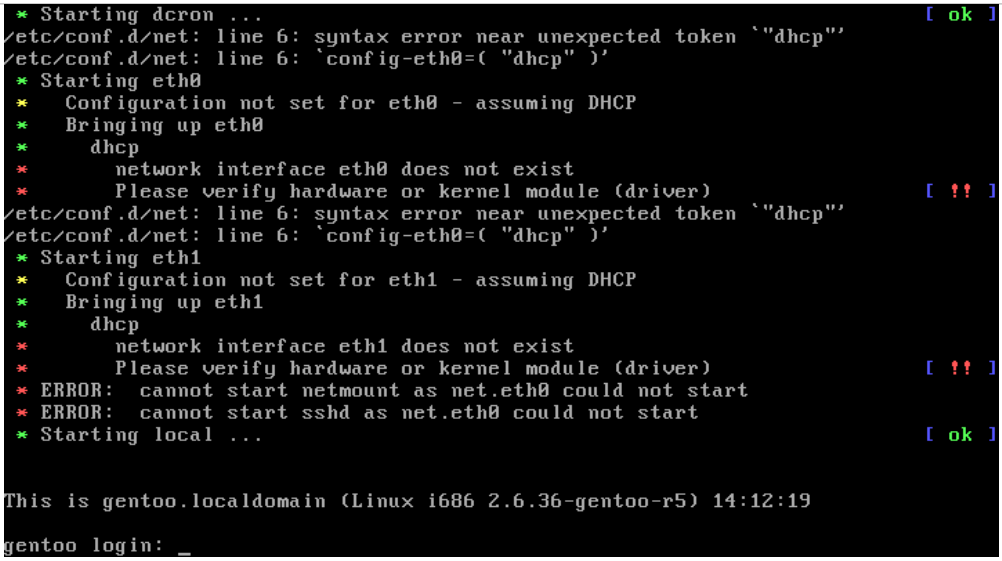
User Experience (UX)

overview - part 1

- broad and over-arching concept
- need to consider many disparate concepts
  - *user's reaction, both positive and negative*
  - *user's general experience with the application including*
    - design and interface
    - potential results and outcomes
  - *general functionality and what an application can do for a user*
  - *does the application, product etc solve a defined problem?*
  - *what can an application help a user to achieve?*
  - *what entertainment value does the application etc provide?*
- software application UX also influenced by acquisition
  - *was it easy to find, download, install, update?*

Image - User Experience (UX)

Linux installs



Gentoo Linux

Source - Gentoo Linux

User Experience (UX)

overview - part 2

- user's identification of an **acceptable** product
  - *sense of usability and product preferences*
- Shackel, B. 1991.
  - *product's utility, usability, attraction relative to involved costs...*
- product considered not acceptable vast majority of users seek market alternatives
- UX inherently important aspect of goal to develop and provision successful application...

Image - User Experience (UX)

Windows

Windows

Source - Windows Comparison

References

week 10

- Card, S.K., Moran, T.P. and Newell, A. *The psychology of human-computer interaction.* Lawrence Erlbaum Associates. 1983.
- Robinson, W.L. *Conscious competency - the mark of a competent instructor.* Personnel Journal, 53. PP. 538-9. 1974.
- Shackel, B. *Usability - context, framework, design, and evolution.* Human factors for informatics usability. Cambridge University Press. PP. 21-38. 1991.
- Wertheimer, M. *Laws of Organisation in Perceptual Forms.* 1923.