

# CS449/649: Human-Computer Interaction

Spring 2019

Lecture XVI

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Anastasia Kuzminykh and Edward Lank



## Prototype Design

### Designing User Interface

Elements &  
characteristics

Elements  
composition

Spatial  
organisation

Information  
processing

Interaction

Color Perception

Shape Perception

Visceral Reaction  
Triggers

The Von  
Restorff effect

**Gestalt Principles**

Fitts' Law

Rule of Thirds

Types of vision

Free space

Dual-coding theory

Patterns matching

Social & Emotional  
info

Manipulation

Locomotion

Conversation

Elements & characteristics

Elements composition

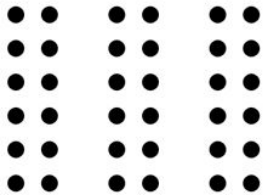
Spatial organisation

Information processing

Interaction

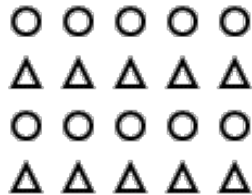
## Gestalt Principles

Proximity



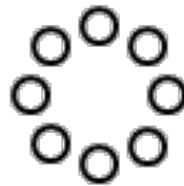
Objects in close proximity are seen as a group

Similarity



Objects that look the same are seen as a group

Closure



Shape is seen as a whole even if not fully closed

Continuity



Line is seen as a whole - natural eye movement

Symmetry



Objects are seen as symmetrical and formed around center

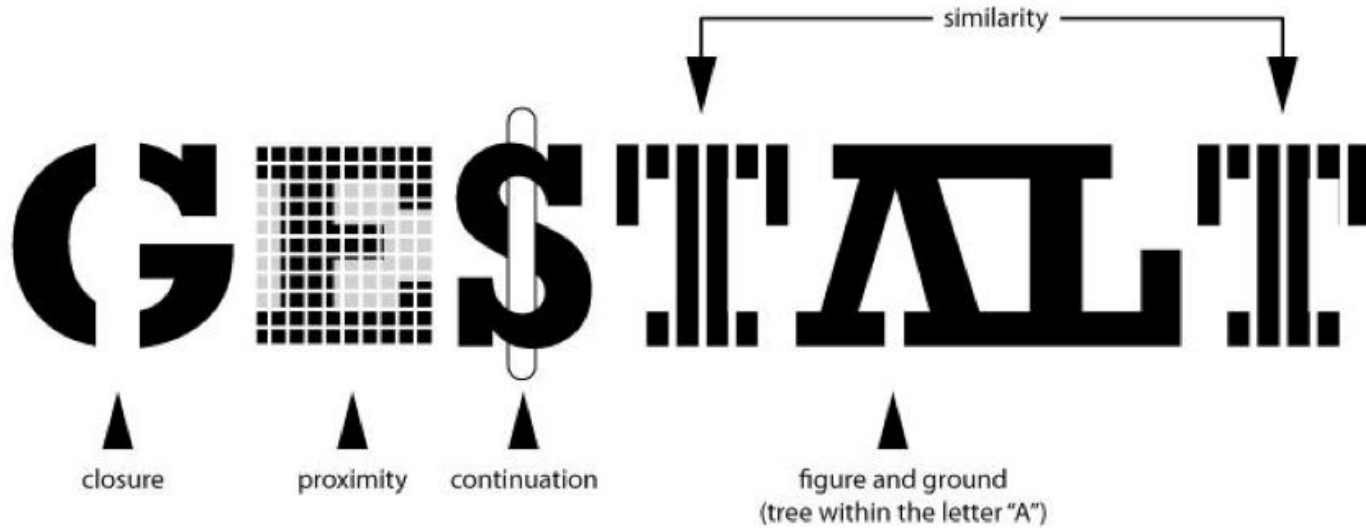
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Gestalt Principles for Information Design



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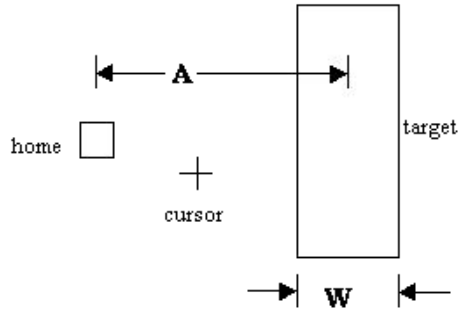
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## Fitts' Law

$$MT = a + b \log_2(2A/W)$$



- **MT** - movement time
- **a** and **b** - empirically determined constants, device dependent.
- **A** - the distance of movement from start to target center
- **W** - the width of the target
- $\log_2(2A/W)$  is called the index of difficulty (ID)

Big targets at close distance are acquired faster than small targets at long distance

ID provides a single combined measure of two main physical properties of movement tasks

Provides information only through an experiment - a comparative tool for devices, tasks, interaction techniques, etc.

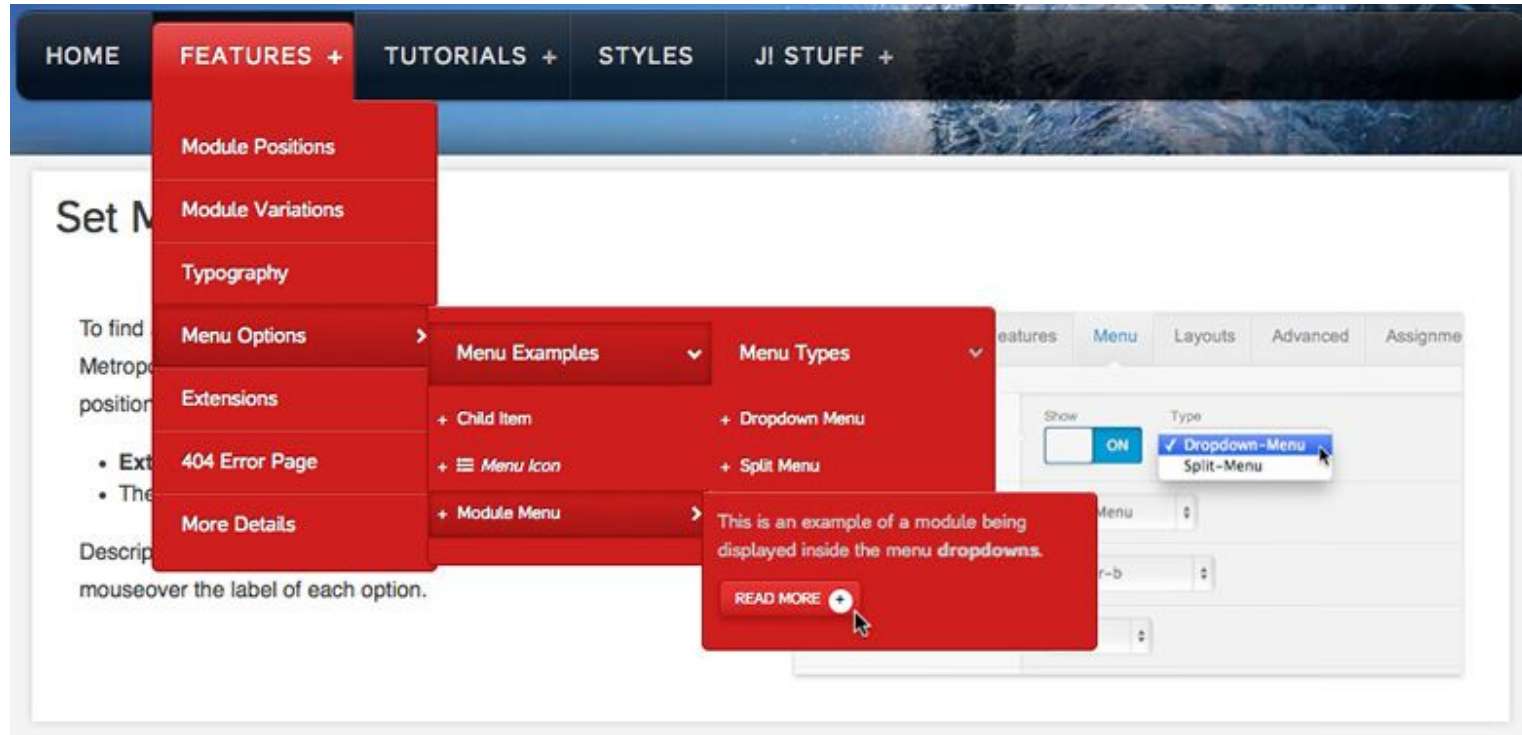
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<http://demo.rockettheme.com/live/joomla/cerulean/features/menu-options>



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## Rule of Thirds

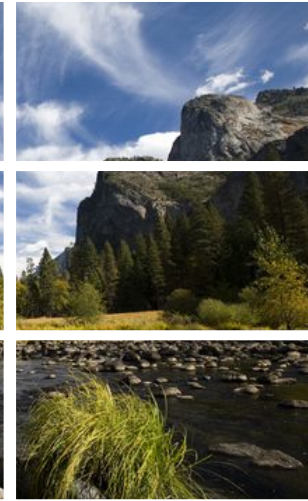
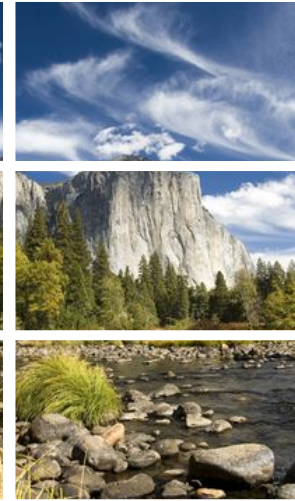


Image: <http://www.nationalgeographicexpeditions.com/expeditions/yosemite-sequoia-tour/detail>



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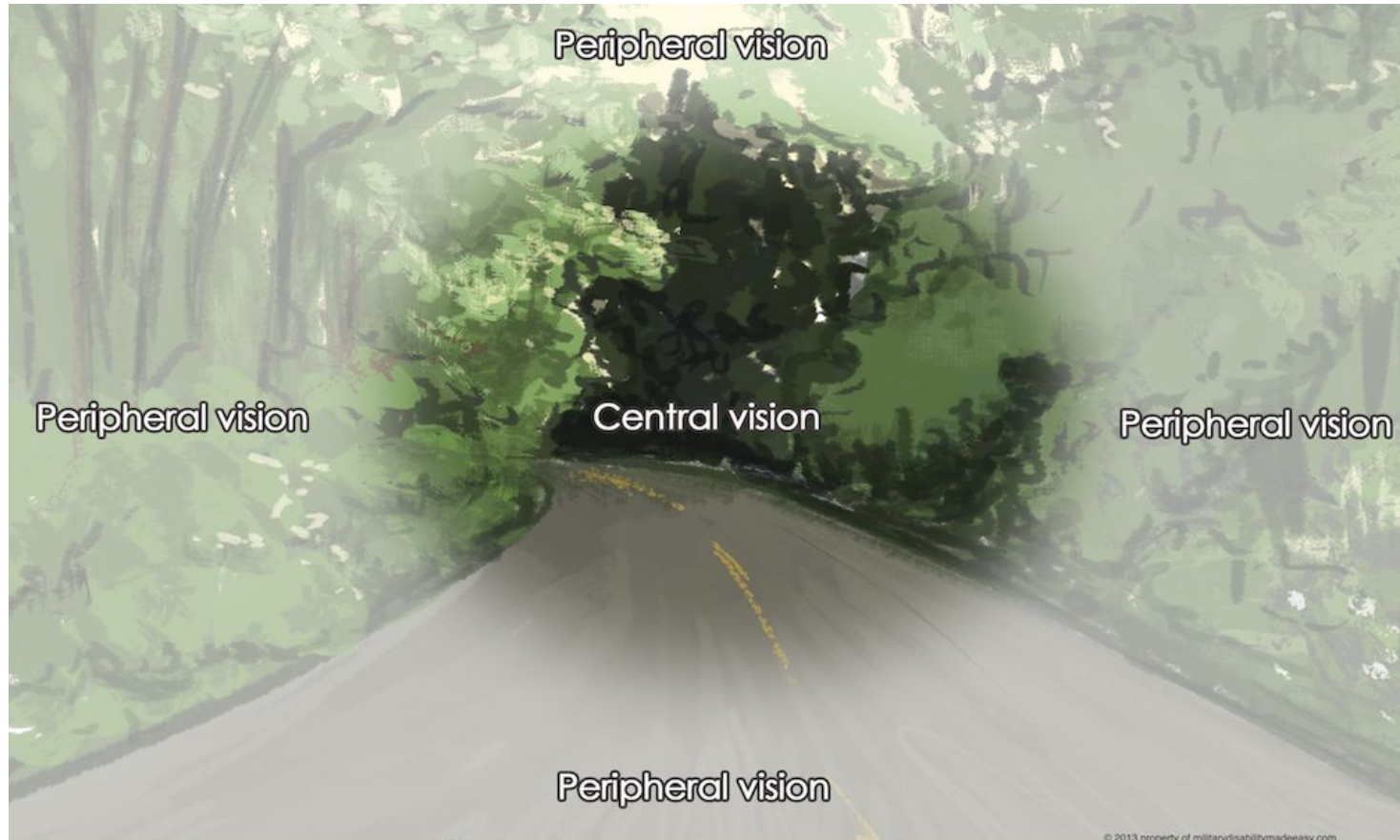


Image: <http://www.militarydisabilitymadeeasy.com/theeyes.html>

Scene conditions with differing radii in degrees of visual angle

1°

5°

10.8°

13.6°

Window



Scotoma



Equal viewable scene area (40%)

Window

Scotoma



Larson, Adam M., and Lester C. Loschky.

"The contributions of central versus peripheral vision to scene gist recognition."

Journal of Vision 9.10 (2009): 6-6.

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## Types of Vision

What

### Central

- Object recognition
- Element identification
- “Details” attention

### Peripheral

- Scene recognition
- Context identification
- “Danger” attention

Where



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**Free space**

**Makes important  
elements stand out**

**Improves  
comprehension**

**Clarifies relationship  
through proximity**



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Free space

Visual - space around  
graphics, icons, images

Layout - margins,  
padding

Text - spacing between  
lines and letters

Content - spacing  
between content groups

Makes important  
elements stand out

Improves  
comprehension

Clarifies relationship  
through proximity



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**Dual Coding Theory** - human memory operates both with verbal representations and mental images, when both potentiate recall of each other

Allan Paivio, University of Western Ontario, 1971

**Text**

**VS**

**Images**

- Slower
- Verbal message

- Faster
- Illustrating idea

**Combine.**

Use not just images and diagrams, but infographics, visual cues, framing, etc.

### **Plan Heading Structure Early**

Ensure all content and design fits into a logical heading structure.

### **Consider Reading Order**

The reading order should be the same as the visual order.

### **Provide Good Contrast**

Be especially careful with light shades of gray, orange, and yellow. Check your contrast levels with our color contrast checker.

### **Use True Text Whenever Possible**

True text enlarges better, loads faster, and is easier to translate. Use CSS to add visual style.



### **Plan Heading Structure Early**

Ensure all content and design fits into a logical heading structure.



### **Consider Reading Order**

The reading order should be the same as the visual order.

Good  
Bad

### **Provide Good Contrast**

Be especially careful with light shades of gray, orange, and yellow.

Abc

### **Use True Text Whenever Possible**

True text enlarges better, loads faster, and is easier to translate. Use CSS to add visual style.

Image:

<http://3.7designs.co/blog/2012/05/design-copy-and-mental-processing/>



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**Patterns Matching** - the way of  
processing incoming information



- Based on previous experience
- Assesses familiarity
- Stimuli that are difficult to match can be more memorable, but also frustrating



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