

A

Will show that animation is overrated and should be used sparingly

Animation for Data Visualisation

FIT3179 Data Visualisation
Textbook section 6.5

Animation

Latin animare = “to bring life”

Sequences of static graphic depiction (frames), the graphic content of which, when shown in rapid succession, begins **moving in a fluid motion**.

Works because our eyes are not very fast

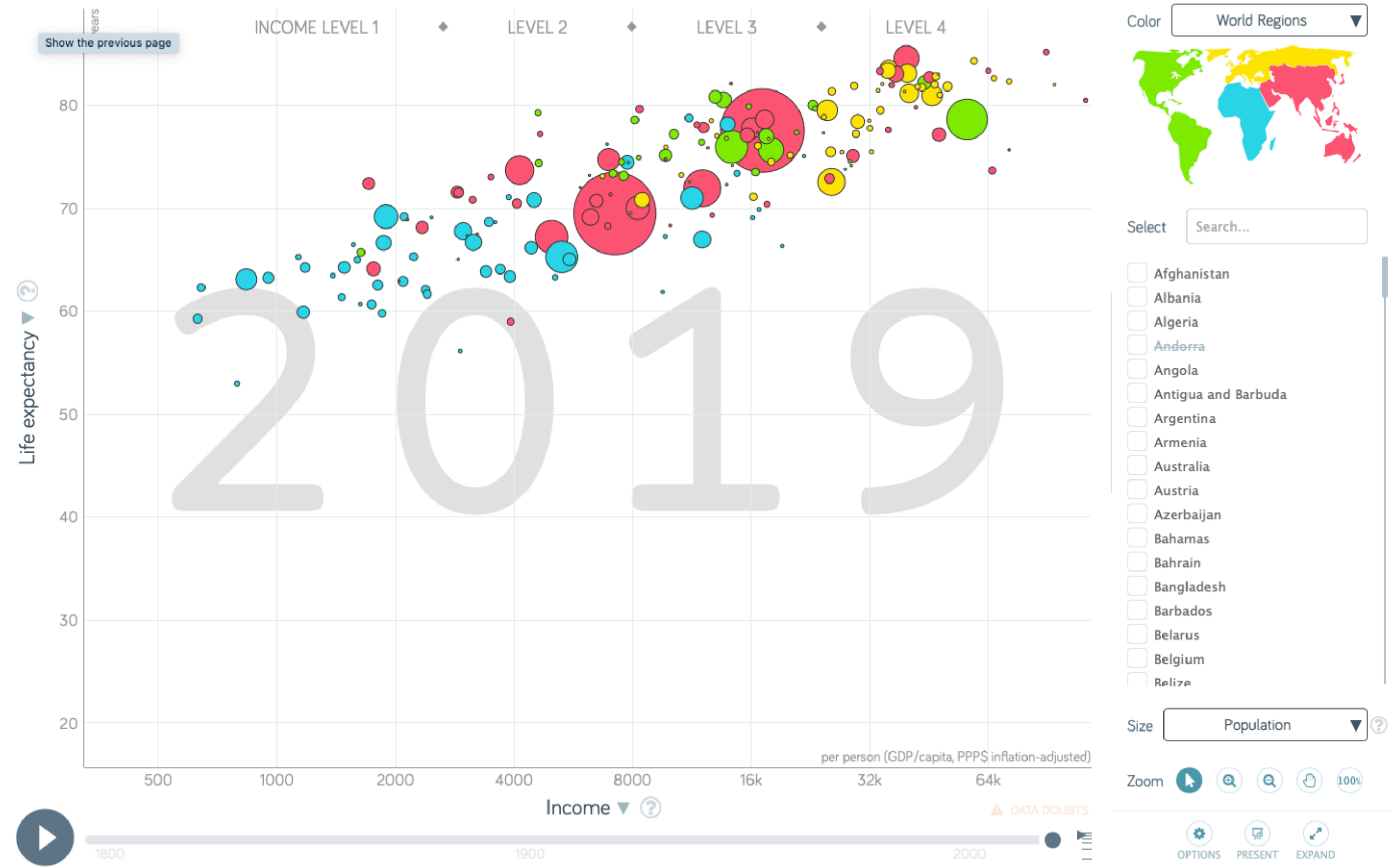
Temporal and Non-temporal Animation

Temporal animation

- Shows change of patterns in time
- Direct relation between display time and world time
- Transition between frames implies change in position or change in attributes of shown spatial data

Examples:

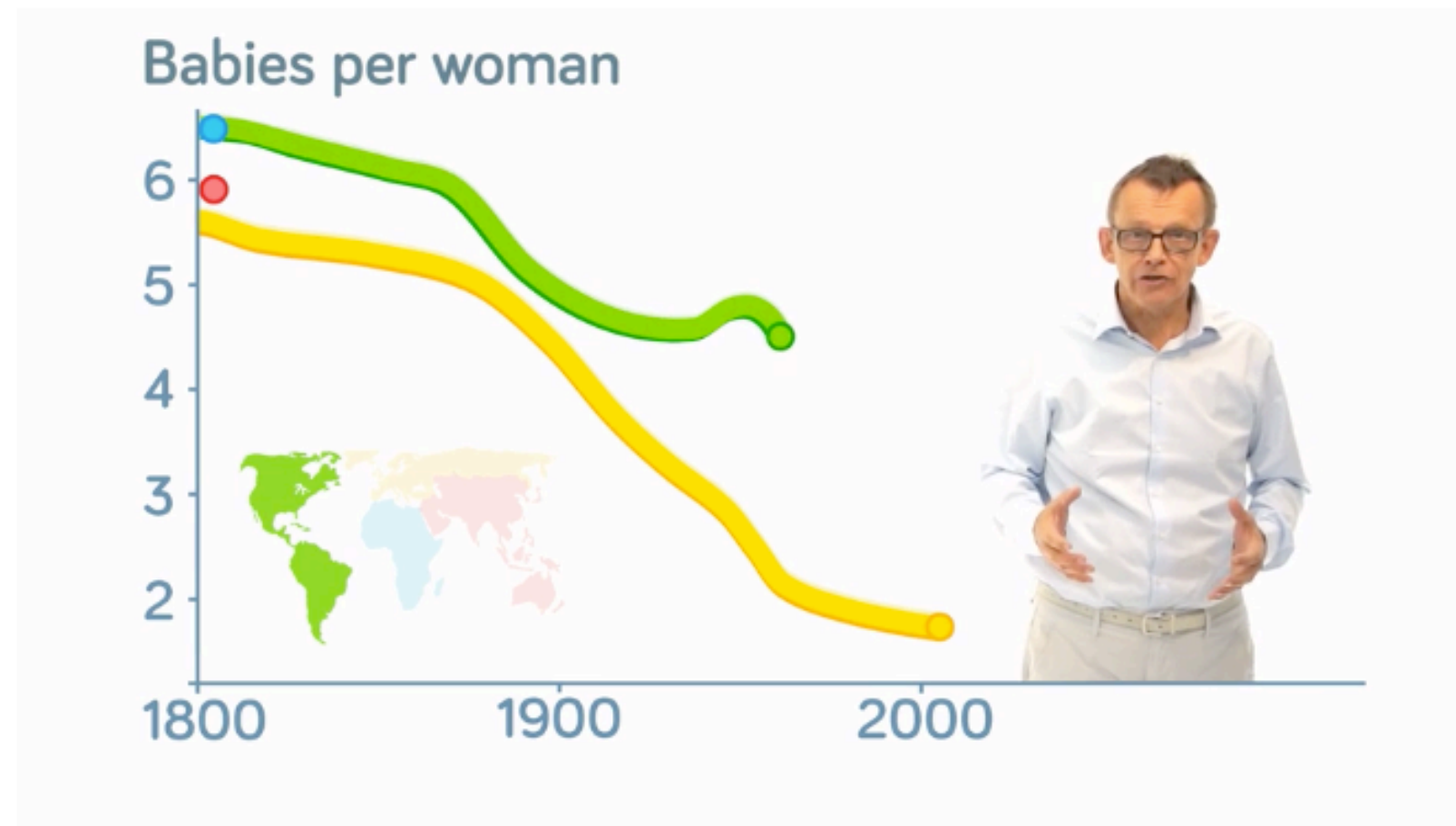
- maps (weather, wildfire spread, etc.)
- temporal attributes in diagrams



[https://www.gapminder.org/tools/#\\$chart-type=bubbles](https://www.gapminder.org/tools/#$chart-type=bubbles)

How Did Babies per Woman Change in Different Regions?

Short answer - It dropped everywhere



ABOUT THIS VIDEO


In this short video Professor Hans Rosling shows how the drop in number of babies per woman is distributed across the world. The numbers have dropped in all regions of the world, but not exactly in the same way and not at the same time. The drop in Africa and Asia came later, but is faster than in the Americas and Europe. If the current trend continues, by the end of the century we can expect two babies per woman all over the world.


Share



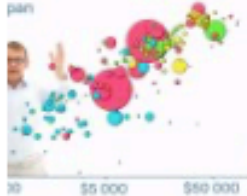
Related

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How Did Babies per Woman Change in the World?
Short answer - It dropped
- 

Will saving poor children lead to overpopulation?
Short answer - No. The opposite.
- 

How Did The World Population Change?
Short answer - First slowly. Then fast.
- 

How Reliable is the World Population Forecast?
Short answer - Very reliable
- 

How Does Income Relate to Life Expectancy?
Short answer - Rich people live longer

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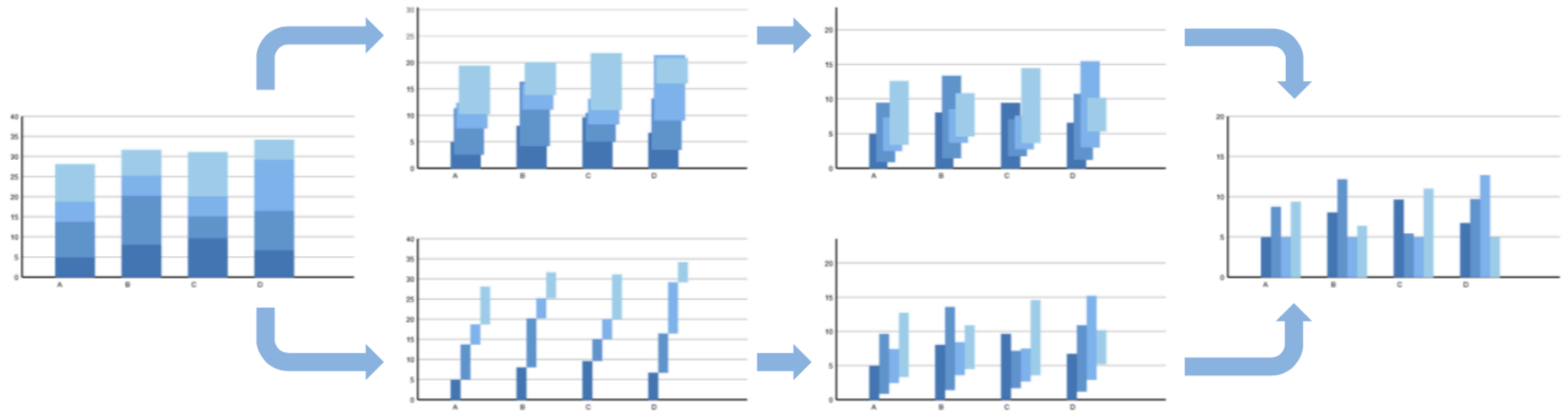
Non-temporal animation

- Explains spatial relationships by presenting individual frames in a sequence that is not related to time

Examples:

- transition between idioms
- animated zoom and pan in maps and other large visualisations
- etc.

Animated diagrams



Heer and Robertson 2007
Animated Transitions in Statistical Data Graphics

<https://www.youtube.com/watch?v=vLk7mlAtEXI>

Some Optimistic Cognitive Research

Preliminary research has shown that animation can reveal subtle space-time patterns that are not evident in static representations, even to expert users who are highly familiar with the data.

Example from Dorling and Openshaw (1992):

In an animation of leukaemia rates in England, experts discovered new hot spots in space and time as well as a peculiar oscillation between leukaemia rates in 5-year cycles between two cities. In the perviously used static map, time was collapsed in the representation and the details where hidden.

Dorling, D., & Openshaw, S. (1992). Using computer animation to visualize space-time patterns. *Environment and Planning B: Planning and Design*, 19(6), 639-650.

Potential Pitfalls of Animated Visualisations

- length of animation (running time)
 - change blindness If the animation is very complex
 - cognitive load Where users are unable to store new information in their short term memory
- For example in the number of babies example, only four lines are used to combat this

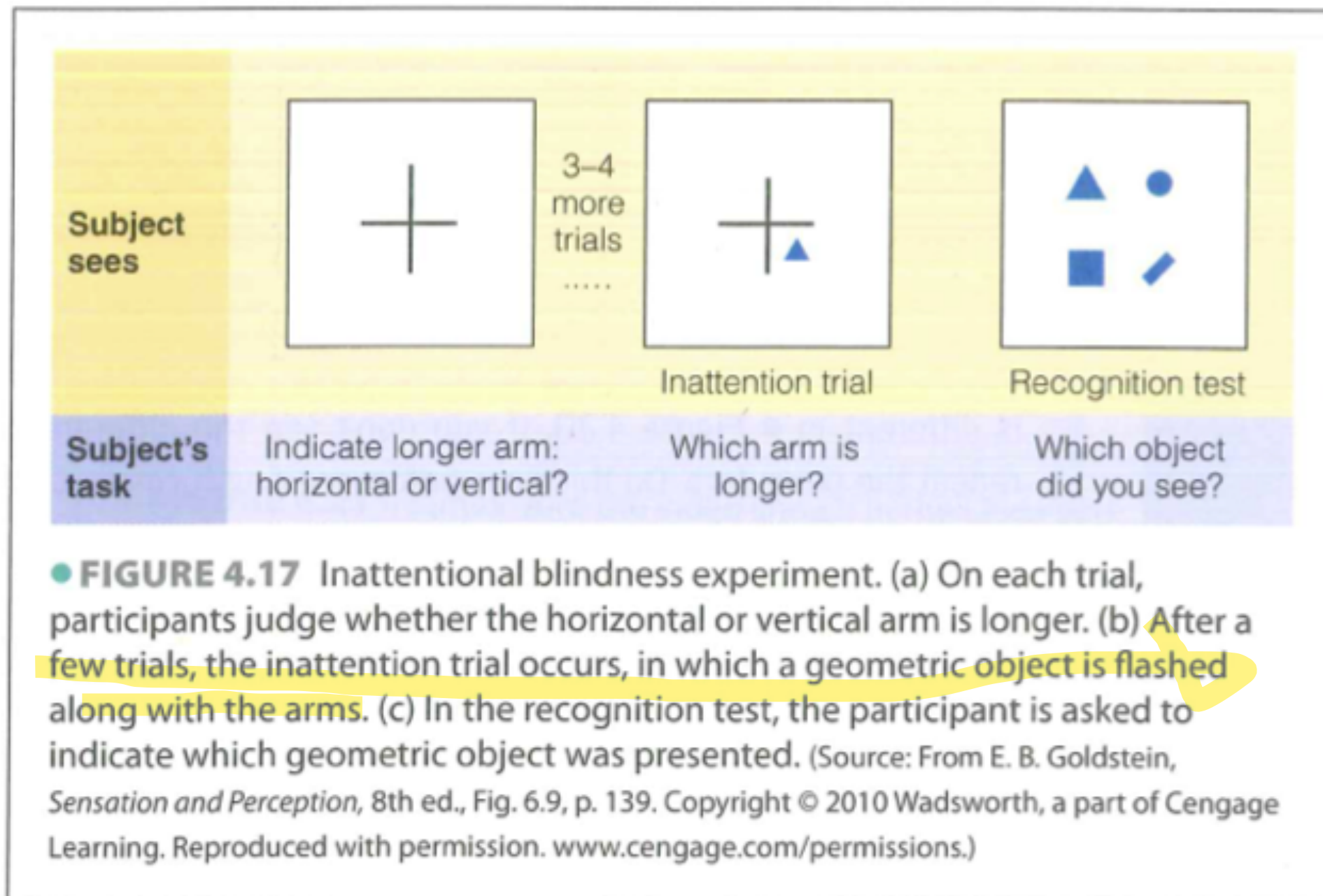
Cognitive Resources

When a person uses up all their resources, they can become “blind” to unattended objects, noises, changes, etc.

Cognitive resources refers to the idea that a person has a certain cognitive capacity, which can be used for carrying out various tasks. **Cognitive load** is the amount of a person's cognitive resources needed to carry out a particular cognitive task. Some tasks, especially easy, well-practiced ones, have low cognitive loads; these **low-load tasks** use up only a small amount of the person's cognitive resources. Other tasks, those that are difficult and perhaps not as well practiced, are **high-load tasks** and use more of a person's cognitive resources.

inattention blindness = change blindness = perceptual blindness

Change Blindness



When observers were then given a recognition test in which they are asked to pick the object that had been presented, they were unable to do so.

Change Detection

Difficulty in detecting changes in scenes.

Motion attracts attention.

Example: Confirmed for animated choropleth maps: change blindness & blindness to change blindness: overestimation of one's own change detection ability.

Fish, C., Goldsberry, KP, Battersby, S. (2011) Change Blindness in Animated Choropleth Maps: An Empirical Study

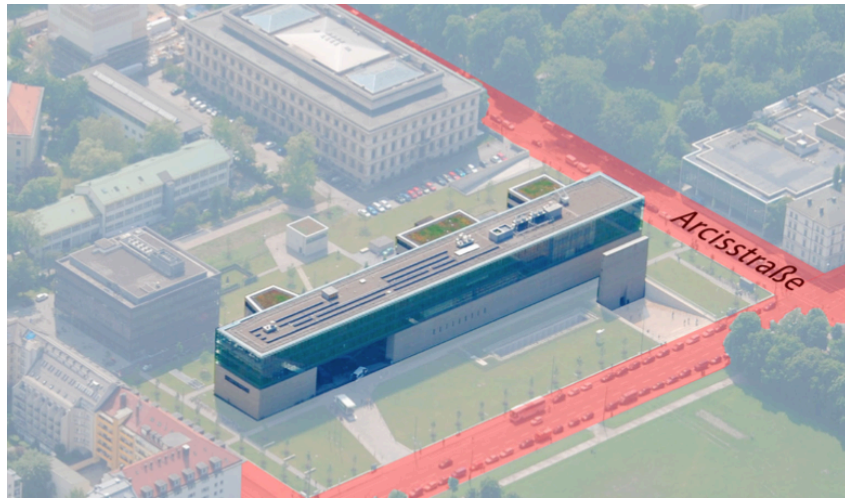
Directing user attention

Assuming the author knows where the user should look:

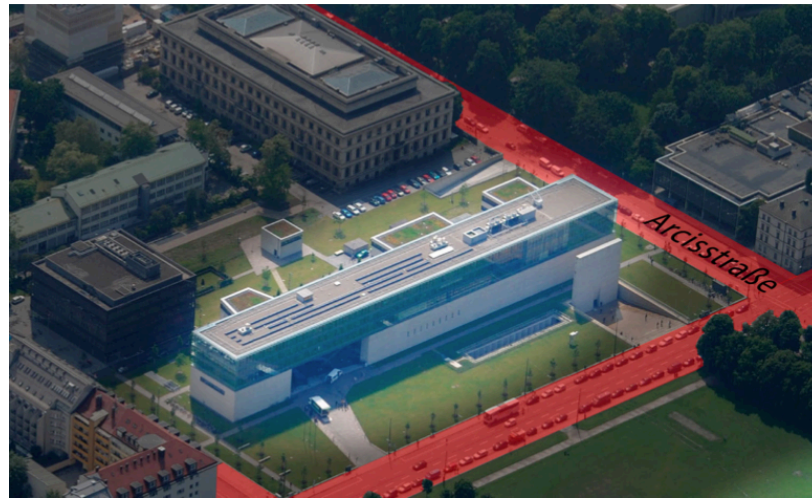
- Use annotations: viewer is presented with a cue that indicates where a stimulus is most likely to occur.
- Modify saliency of an item, so that attention is directed to important unattended areas. (Saliency = the state or quality by which an item stands out relative to its neighbours.)

Examples of saliency shown below

Directing user attention



Brightness



Spotlight



Focus

Murphy, 2019, Designing the imagery on image maps – how far can we take it?

Summary

- Frames
- Temporal animation: change marks and channels in time
- Non-temporal animation: animate between idioms
- Cognitive load
- Change Blindness
- Directing user attention with annotation and modifying saliency