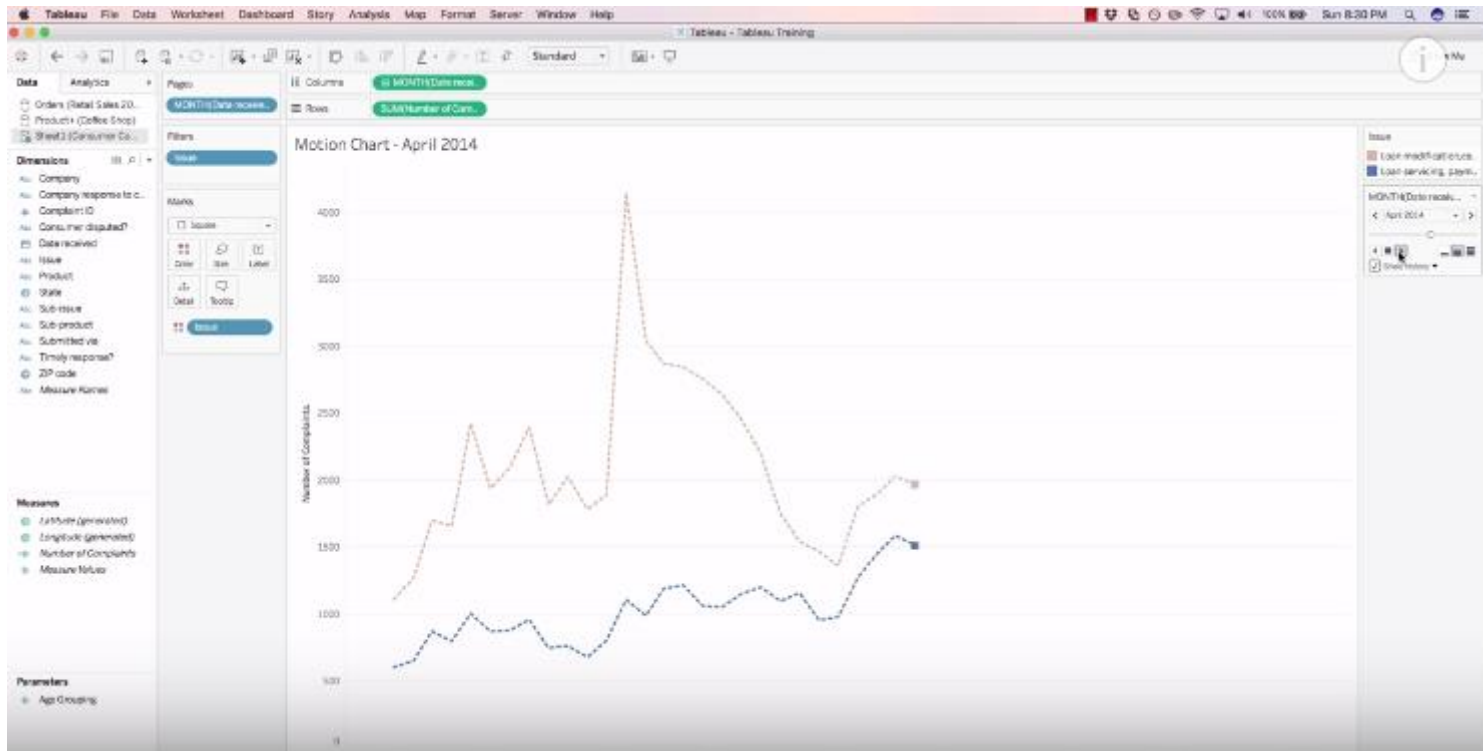# Animation in InfoVis

BAIS 6140 – Information Visualization

L. Miguel Encarnação

Animation

- What is it?

- Definition
  - Rapid successive display of many display frames where objects change position/appearance gradually so as to create the illusion of continuous movement

Tableau Motion Charts

https://youtu.be/yxRnk7fE-J0?t=4m18s

Application

- Where in InfoVis might animation be useful?

Use

- Possibilities
  - Use time as an option for space, so can show more data (over time)
  - To draw attention to something
  - As a visual encoding of particular variable values
  - To help transition between views

What We Know

- Perception
  - Animation is a very strong visual attention mechanism
    - It's difficult to focus on other items when animation is nearby

Animation for Transitions

- Can animation help "soften the blow" when a view changes?

- Preserve context, allow the viewer to track where things went

Suite of Transitions (Heer & Robertson, *TVCG* '07)

- Developed variety of different transitions and applications

- Performed experiments to see how these are perceived

Focus

- What types of animation did they use?

- How did they use animation?

DynaVis

- Implemented in C# and Direct3D graphics

- Let's see it!

http://www.youtube.com/watch?v=vLk7mlAtEXI

Transition Types

- View transformation

- Substrate transformation

- Filtering

- Ordering

- Time step

- Visualization change

- Data schema change

Design Principles

- Congruence (mental matching)
  - Maintain valid data graphics during transitions
  - Use consistent syntactic-semantic mappings
  - Respect semantic correspondence
  - Avoid ambiguity

- Apprehension (easily perceivable)
  - Group similar transitions
  - Minimize occlusion
  - Use simple transitions
  - Use staging for complex transitions
  - Make transitions as long as needed, but no longer

Key Component

- Staging
  - Animation proceeds in stages, not all at once
  - Varies by animation type and view

Experiments

1. Track object across transitions
   - Animation beats no-animation, staged animation better than no staging

2. Estimate changing values
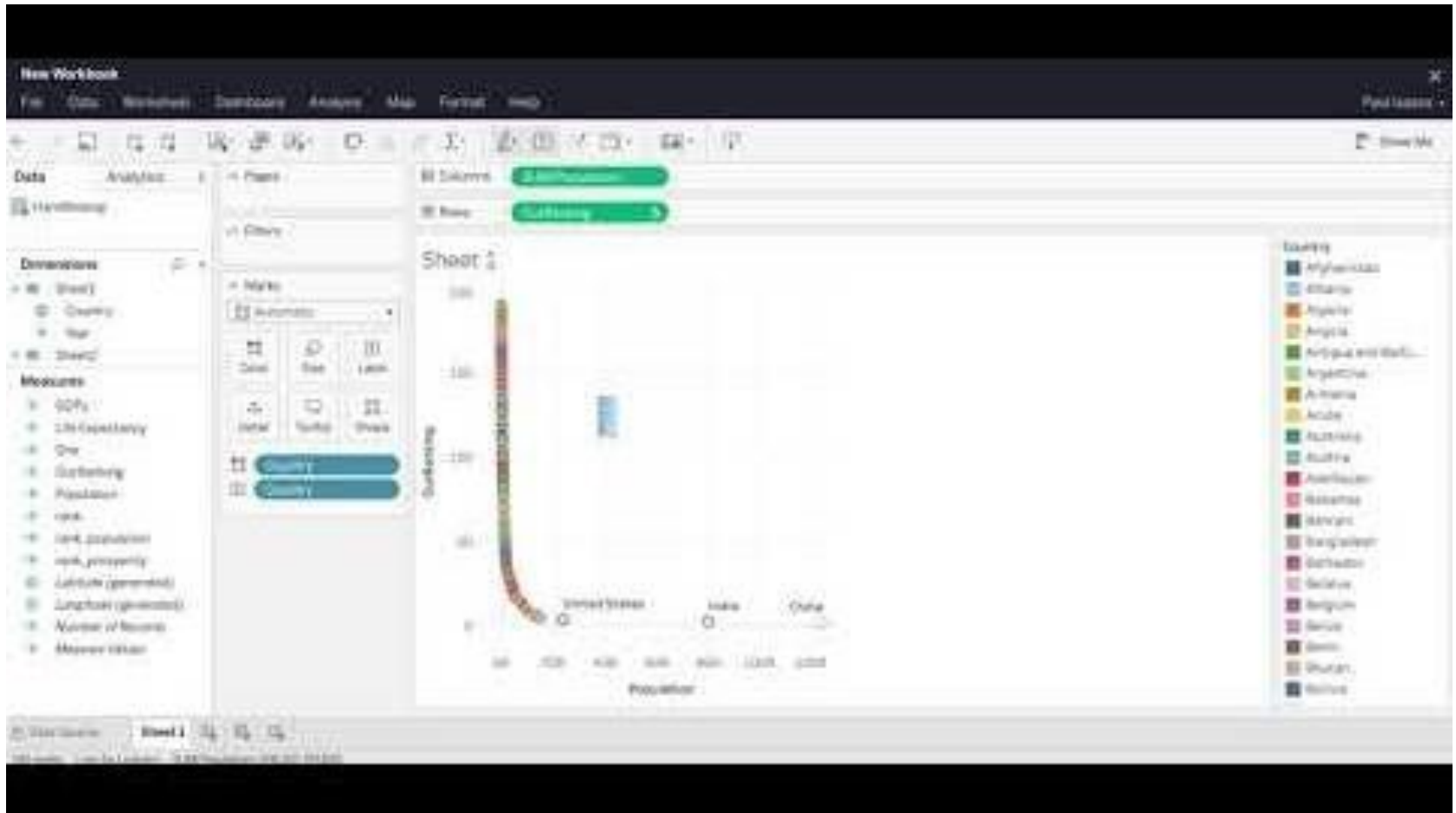   - Animation generally better

- Subjective
   - Staged animation preferred over basic animation preferred over static

It just took 13 years!

New since Tableau 2020.1: Staged Animations
https://www.tableau.com/about/blog/2020/2/bring-your-data-life-viz-animations

Storytelling

- Can animation help explain the data?

- One traditional use:
  - Temporal data – Use animation to show changes in time

GapMinder

- Company started by Hans Rosling†
  - Purchased by Google
  - Trendalyzer software

- Focus on world data (by country), much about economics and health

- Spotfire-like scatterplot display augmented with animation (animated bubble chart)

- Tells a very compelling story with visualizations

TED Talk 2009

https://www.ted.com/talks/hans_rosling_at_state

Why is it so compelling?

- Did the animation really add value to the visualizations?

- Was it Rosling's speaking that makes it compelling?

- More on Storytelling later…

Reflections

- Should animation be used more in information visualization?

- Where?

Empires decline

http://www.youtube.com/watch?v=EwOA8AfeHM4

Interesting InfoViz Animations

2015 Ebola Outbreak
http://www.who.int/csr/disease/ebola/photos/animated-map-med-january-2016.gif

Human Migration
https://www.dnalc.org/view/15892-Human-migrations-map-interactive-2D-animation.html

Atlantic slave trade
http://www.slate.com/articles/life/the_history_of_american_slavery/2015/06/animated_interactive_of_the_history_of_the_atlantic_slave_trade.html

Christianity development over the years
http://www.ed.ac.uk/divinity/research/resources/animated-maps

Unusual maps (world wealth, US settlement, right to bear arms)
http://subdude-site.com/WebPics/WebPicsMaps/WebPicsMaps_dir.htm

How to animate in Tableau

MotionCharts

https://youtu.be/yxRnk7fE-J0?t=4m18s

Replicating Hans Rosling's 2006 TED talk

http://www.edupristine.com/blog/animation-in-tableau

Animating maps

https://public.tableau.com/en-us/s/blog/2014/08/capturing-animation-tableau-maps