

Storytelling with InfoVis



CS 7450 - Information Visualization
October 12, 2016
John Stasko

Learning Objectives



- Define narrative visualization (vis for storytelling) and explain how it differs from analytic/exploratory visualization
- Name and describe different genres and approaches to narrative visualization
- Explain the style, content, and significance of Rosling's GapMinder video
- View and learn from designs of examples
 - Mariano Rivera, What's Warming World?, Home and Away, Bubble Bust to Recovery, Fallen of WWII, ...

Purpose



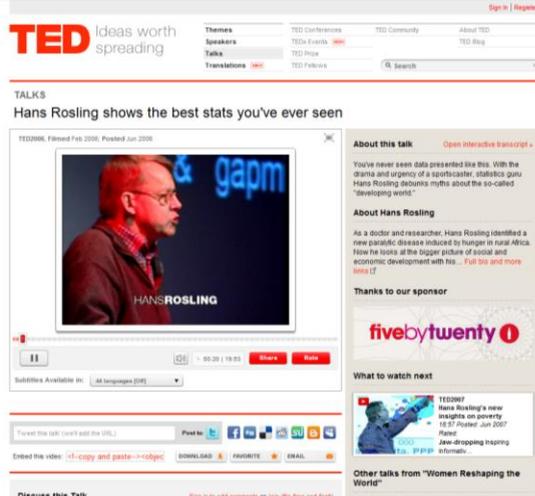
- Two main uses of infovis
 - Analysis – Understand your data better and act upon that understanding
 - Presentation – Communicate and inform others more effectively
- Today we look at that second one more

Telling Stories



- Data visualization can help to communicate ideas, summarize, influence, unite, explain, persuade
- Visuals can serve as evidence or support

A Famous Example



Hans Rosling
Gapminder

2006

http://www.ted.com/index.php/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen.html

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They Had Him Back



2007

http://www.ted.com/index.php/talks/hans_rosling_reveals_new_insights_on_poverty.html

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Discuss



- Why has this had such a big impact?

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InfoGraphics

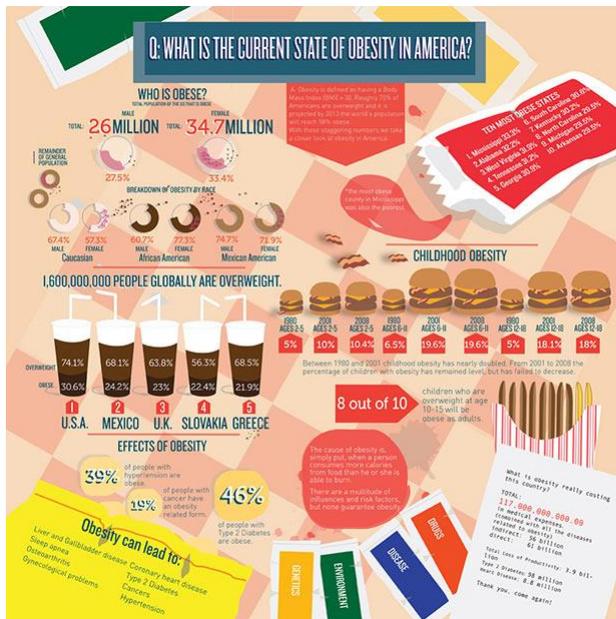


- See them everywhere today
- Perhaps a good example of infovis for presentation purposes
 - Typically not interactive though

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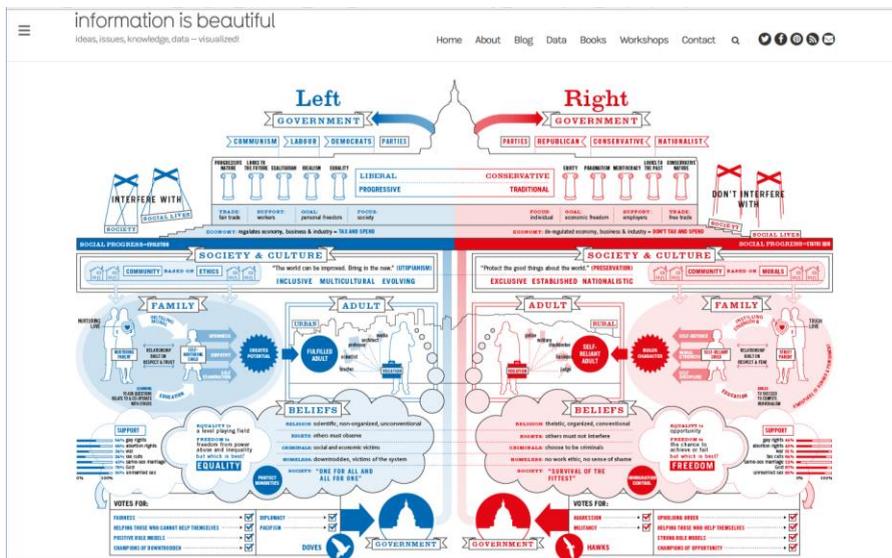
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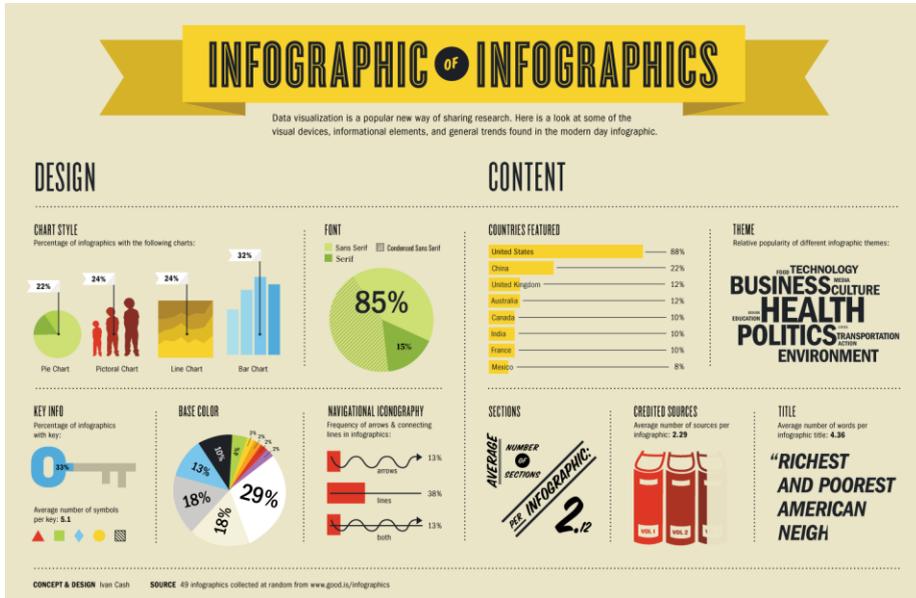
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A Lead Paper

Segel & Heer
TVCG (InfoVis) '10

- Studied storytelling: Described topics as "Narrative Visualization"
 - How does this differ from traditional forms of storytelling
 - Reviews the design space
 - Characterizes genres
 - Describes a framework

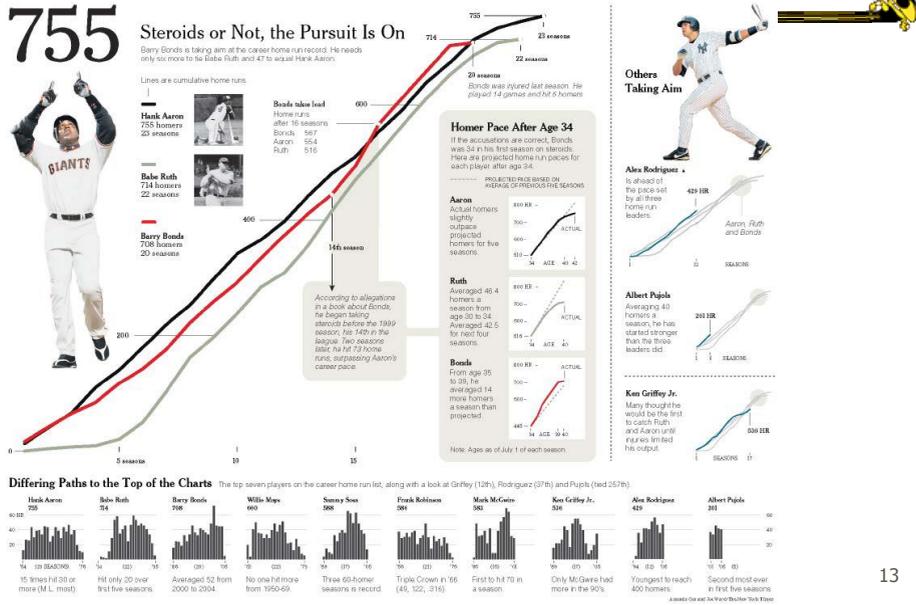


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Case Studies

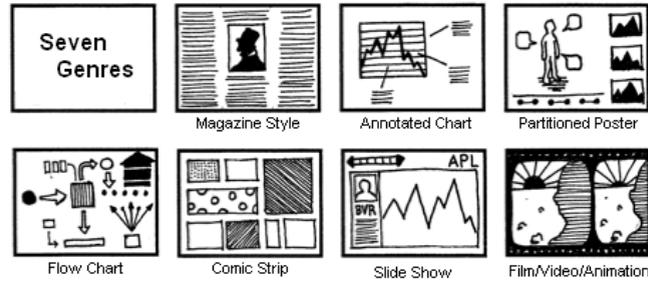


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Design Space Dimensions

- Genre (next slide)
- Visual Narrative Tactics
 - Visual structuring
 - Highlighting
 - Transition Guidance
- Narrative Structure (non-visual mechanisms to assist narrative)
 - Ordering
 - Interactivity
 - Messaging

Genres



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Observations



- Clusters of different ordering structures
- Consistency of interaction design
- Under-utilization of narrative messaging

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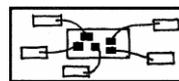
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Approach



- Author-driven vs. reader-driven
- Common patterns
 - Martini glass
 - Interactive slideshow
 - Drill-down story



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IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS, VOL. 17, NO. 12, DECEMBER 2011 233

Visualization Rhetoric: Framing Effects in Narrative Visualization

Jessica Hullman, Student Member, IEEE, and Nicholas Diakopoulos, Member, IEEE

Abstract—Narrative visualizations combine conventions of communicative and scientific information visualization to convey an intended story. We demonstrate visualization rhetoric as an analytical framework for understanding how design techniques that promote particular interpretations in visualizations that “tell a story” can significantly affect audience interpretation. We draw a parallel between narrative visualization interpretation and evidence from framing studies in political messaging, decision-making, and financial markets. Drawing on understanding of the rhetorical status of narrative visualizations as persuasive, informative, and/or diagnostic, we explore how framing effects can be leveraged to influence audience interpretation. We then discuss how design techniques represent evidence in promotion of various levels—the data, visual representation, textual annotations, and interpretive context—of narrative visualization. We conclude with a general analysis of recent narrative visualizations and, based on our findings, we provide a taxonomy of visualization rhetoric in designing engaging, impactful narrative visualizations and how our research can shed light on how a visualization design can affect interpretation. We identify areas where future inquiry into visualization rhetoric can improve understanding of visualization interpretation.

Index Terms—Rhetoric, narrative visualization, framing effects, semantics, denotation, connotation.

1 INTRODUCTION

Narrative information visualization as a style of visualization that often engages the viewer in a story to help explore and understand a complex phenomenon. It is a combination of persuasive, analytical techniques to convey an intended story to help as well as exploratory, diagnostic strategies aimed at providing the user with context over the insights the graphic can provide. Text and data are used to help the viewer understand the underlying data and the story being told. The design of narrative visualization is a general design strategy in narrative visualization [1]. The field of explanation and communication rhetoric provides another research perspective that is being used to understand the process of a narrative visualization in light of the rhetorical conventions that the author employs. By applying rhetorical techniques and how such techniques may affect audience interpretation and design that affect the user's ability to understand how visualization interpretation.

To help us understand how narrative visualization is used to convey a story, we explore the design and end-user experience of narrative visualization in order to deepen understanding of how common design techniques represent rhetorical strategies that make our interpretations more persuasive. How are rhetorical techniques used in visualization and what are the effects of these techniques on our interpretations of data? Under an analysis, persuasion, and critical thinking, we explore rhetorical techniques used in visualization and how they affect our interpretations. We then discuss how design techniques represent evidence in promotion of various levels—the data, visual representation, textual annotations, and interpretive context—of narrative visualization. We conclude with a general analysis of recent narrative visualizations and, based on our findings, we provide a taxonomy of visualization rhetoric in designing engaging, impactful narrative visualizations and how our research can shed light on how a visualization design can affect interpretation. We identify areas where future inquiry into visualization rhetoric can improve understanding of visualization interpretation.

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IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS, VOL. 18, NO. 12, DECEMBER 2013 248

A Deeper Understanding of Sequence in Narrative Visualization

Jessica Hullman, Steven Dwyer, Nathalia Henry Flores, Benjamin Lee, Cheryl Fisher, and Eytan Adar

Abstract—Conveying a message with visualizations often requires creating an order in which to present visualizations. While evidence exists that narrative sequencing in traditional stories can affect comprehension and memory, little is known about how sequencing choices affect narrative visualizations. We explore the forms and readers' responses to sequences in narrative visualization presentations to provide a deeper understanding with a focus on how “before/after” presentations. We conduct a qualitative analysis of 42 professional narrative visualizations to gain empirical knowledge on the forms and readers' responses to sequences in narrative visualization presentations. We then discuss how design techniques represent evidence in promotion of various levels—the data, visual representation, textual annotations, and interpretive context—of narrative visualization. We conclude with a general analysis of recent narrative visualizations and, based on our findings, we provide a taxonomy of visualization rhetoric in designing engaging, impactful narrative visualizations and how our research can shed light on how a visualization design can affect interpretation. We identify areas where future inquiry into visualization rhetoric can improve understanding of visualization interpretation.

Index Terms—Sequence, narrative visualization, framing effects, semantics, denotation, connotation.

1 INTRODUCTION

Storytelling is one of the most powerful ways to convey information. It is a combination of persuasive, analytical techniques to convey an intended story to help as well as exploratory, diagnostic strategies aimed at providing the user with context over the insights the graphic can provide. Text and data are used to help the viewer understand the underlying data and the story being told. The design of narrative visualization is a general design strategy in narrative visualization [1]. The field of explanation and communication rhetoric provides another research perspective that is being used to understand the process of a narrative visualization in light of the rhetorical conventions that the author employs. By applying rhetorical techniques and how such techniques may affect audience interpretation and design that affect the user's ability to understand how visualization interpretation.

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Index Terms—Sequence, narrative visualization, framing effects, semantics, denotation, connotation.

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Follow-on work



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Journalism Angle



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Computer-Assisted Reporting



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Some Examples



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News Stories

Tufte praises the work of Megan Jaegerman at NY Times



The collage features three distinct news graphics. The top-left graphic is a map titled 'From Montauk to Cape May: The State of the Beaches' with a detailed legend and text. The top-right graphic is titled 'Spitting a hidden handgun' and uses a sequence of stick figures to show a person's movement and the location of a handgun. The bottom-right graphic is titled 'The Jumping Off Points: Moves That Will Be Made in the Free Skating Programs' and uses stick figures to illustrate various skating jumps and their execution points.

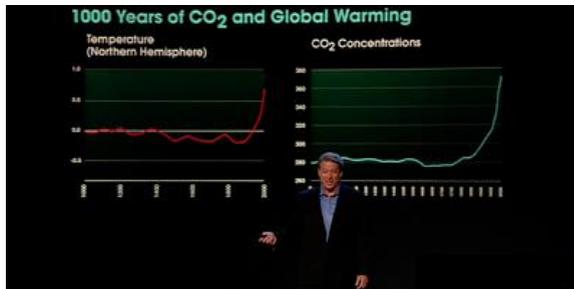
http://www.edwardtufte.com/bboard/q-and-a-fetch-msg?msg_id=0002w4

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Films



An Inconvenient Truth

Gore made extensive use of data graphics

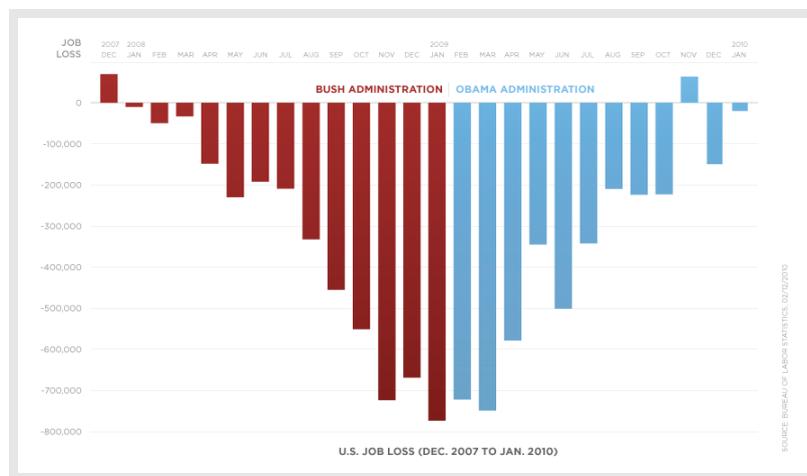


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Infographics (with a message)



Controversial, see <http://soquelbythecreek.blogspot.com/2010/02/what-does-obama-job-chart-really-mean.html>

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http://www.nytimes.com/interactive/2010/06/29/magazine/rivera-pitches.html?ref=multimedia

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Published June 29, 2010

How Mariano Rivera Dominates Hitters

The closer has confounded hitters with mostly one pitch: his signature cutter. [Related Article >](#)

By GRAHAM ROBERTS, SHAN CARTER and JOE WARD | [Send Feedback](#)

Sources: Major League Baseball; New York University Movement Lab; Complete Game Consulting

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2. Shaken-Baby Syndrome Faces New Questions in Court
3. Unhappy Meals
4. Recipes: Yuzu Chiffon Cake
5. The Medium: A Prescription for Fear
6. How Haf Got His Groove Back
7. A Plan for Peace That Still Could Be

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http://www.cnn.com/homeandaway

CNN Home | Video | NewsPulse | U.S. | World | Politics | Justice | Entertainment | Tech | Health | Living | Travel | Opinion | iReport | Money | Sports

CASUALTIES: AFGHANISTAN IRAQ

Map view List view

Showing 2,215 US and Coalition casualties

Hometown Locations

Age

Location: (Countries & U.S. states)

Date

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<http://www.bloomberg.com/graphics/2015-whats-warming-the-world/>

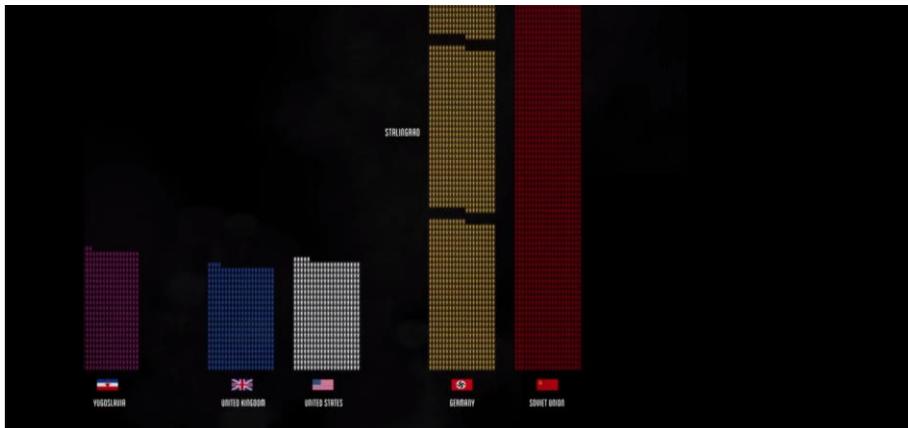


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<http://www.fallen.io/ww2/>



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http://public.tableau.com/views/MinimumWage_3/MinimumWage-StoryPointsEdition?:showVizHome=no



Tableau StoryPoints

Textual narrative, slides with titles as breadcrumbs, element highlighting, and textual annotation on the chart

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<http://www.bloomberg.com/dataview/2014-02-25/bubble-to-bust-to-recovery.html>



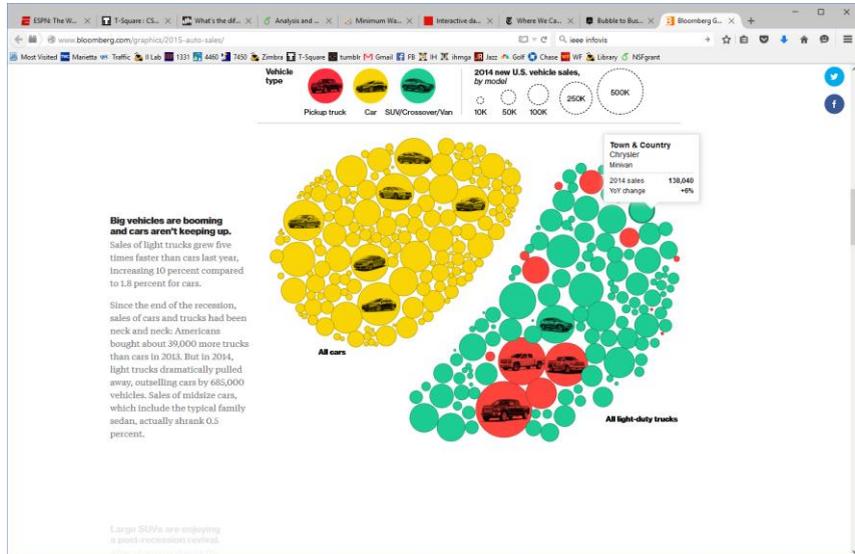
Dot breadcrumbs, interaction on charts, tooltips, ...

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<http://www.bloomberg.com/graphics/2015-auto-sales/>



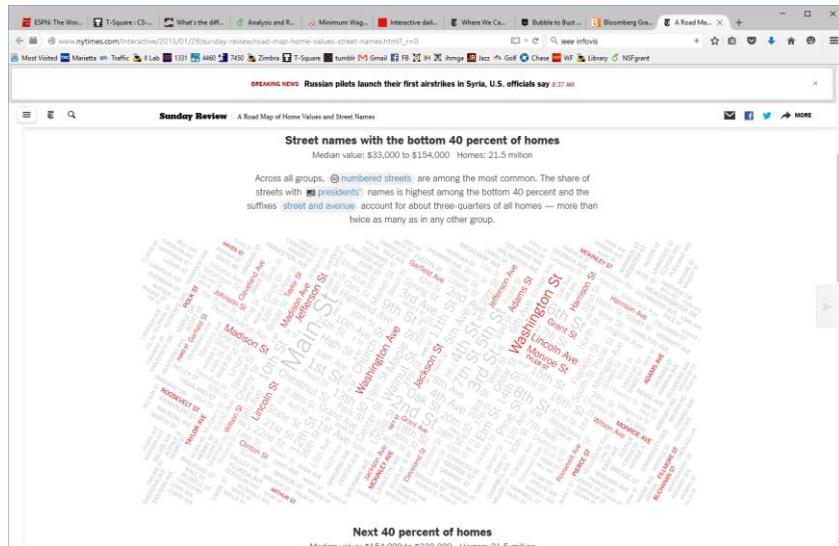
Page scroller, text annotations, rearranging glyphs

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http://www.nytimes.com/interactive/2015/01/29/sunday-review/road-map-home-values-street-names.html?_r=0



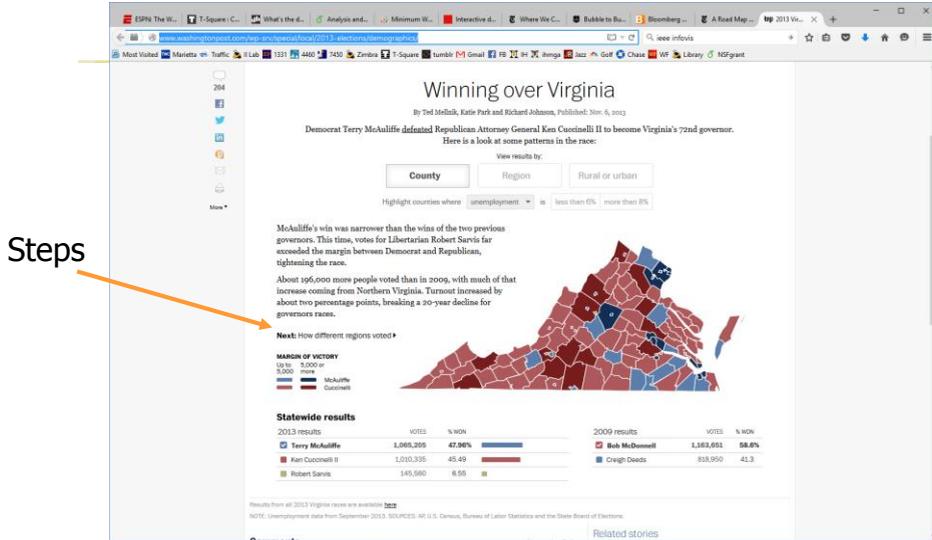
Dynamic query widget embedded in textual narrative

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http://www.washingtonpost.com/wp-srv/special/local/2013-elections/demographics/



Steps

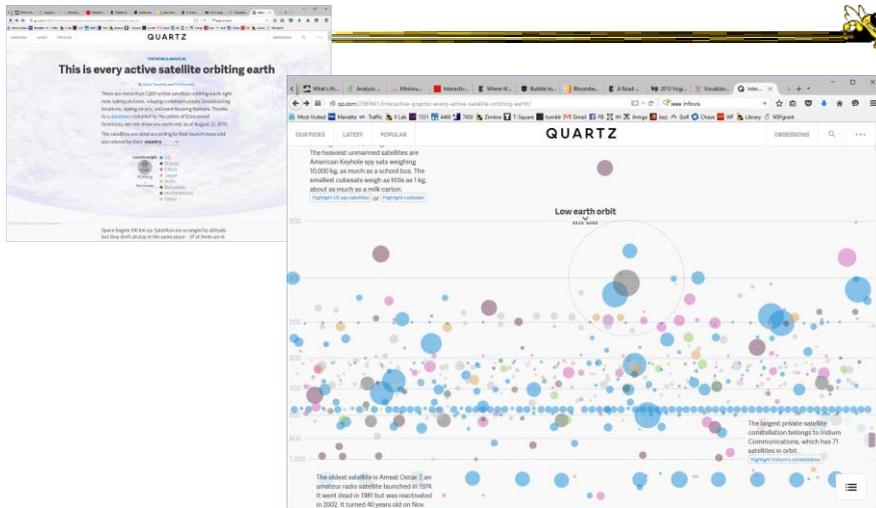
Linear steps with much interaction, comments

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http://qz.com/296941/interactive-graphic-every-active-satellite-orbiting-earth/



Animated interaction, tooltips, scrolling

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<http://www.facesoffracking.org/data-visualization/>



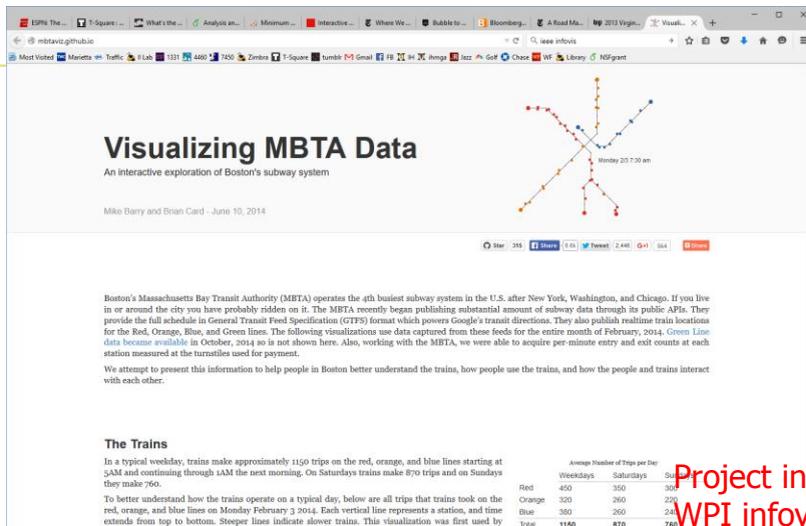
Scrolling page with geovis updates

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<http://mbtaviz.github.io/>



Project in
WPI infovis
class

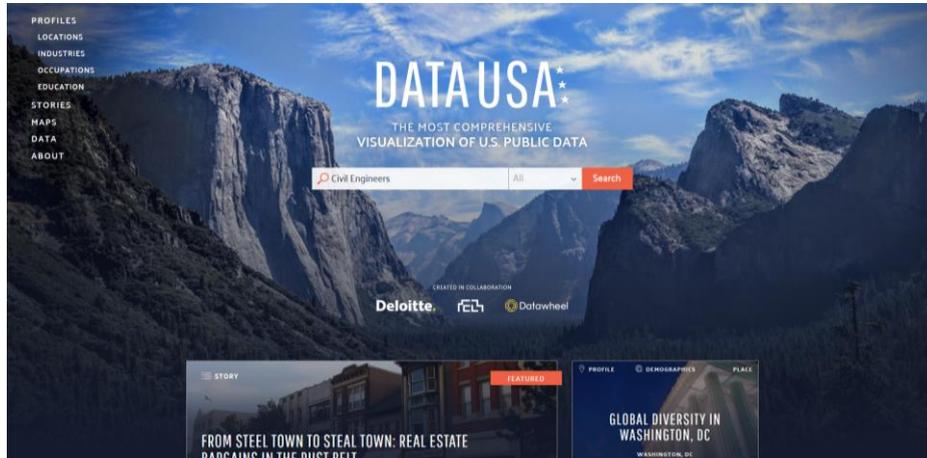
Scrolling page with many visualizations, much interaction

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<https://datausa.io/>



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<http://www.r2d3.us/visual-intro-to-machine-learning-part-1/>



Design discussion



<https://www.youtube.com/watch?v=Z4tB6qyxHJA>

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Even the President Goes Interactive

2011 State of Union Address

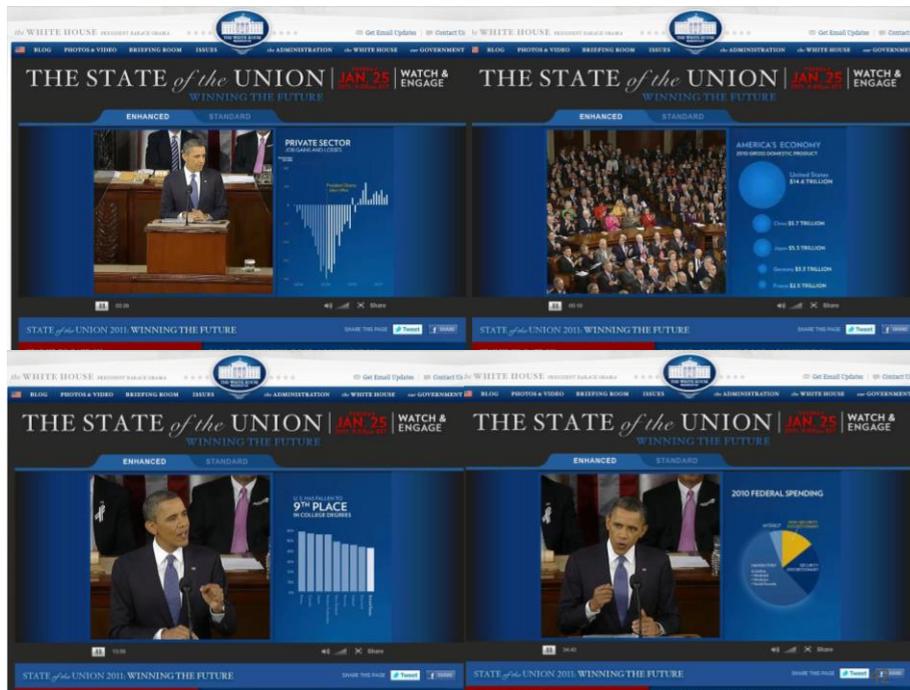


Side channel data visualizations accompanied speech

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Defined by ordered sequence of steps

Usually, but not always, told in linear fashion

Kosara & Mackinlay
Computer '13

Storytelling Scenarios

- Self-running presentations for a large audience
- Live presentations
- Individual or small group presentations

Research Directions



- Storytelling approaches and affordances
 - What vis affordances can help guide reader through story?
- Evaluation
 - How to measure effectiveness?
- Memory, context, & embellishments
 - What makes one memorable, and is that good?
- Interaction
 - How to allow without interfering with story?
- Annotations & highlights
 - How to balance text and visualization?
- Learning from other disciplines
 - What can we learn from journalism, choreography, directing, etc.?
- Techniques specific to storytelling
 - Which vis techniques are good matches?
- Stories & collaboration
 - How to facilitate more collaboration?

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Data Matters



The screenshot shows the TED website interface for a talk by David McCandless. The top navigation bar includes 'TED Ideas worth spreading', 'Themes', 'Speakers', 'Talks', and 'Translations'. The main content area features a video player for 'David McCandless: The beauty of data visualization' with a play button and a progress bar. To the right of the video, there is a section 'About this talk' with a link to 'Open interactive transcript', a paragraph describing the talk's content, and a section 'About David McCandless' with a link to 'Full bio and more links'. Below this is a 'Thanks to our sponsor' section for Rolex, and a 'What to watch next' section with a recommendation for 'TED2016 Gary Flaker: Is Pivot a turning...'. The URL at the bottom of the screenshot is 'http://www.ted.com/talks/david_mccandless_the_beauty_of_data_visualization.html'.

David
McCandless

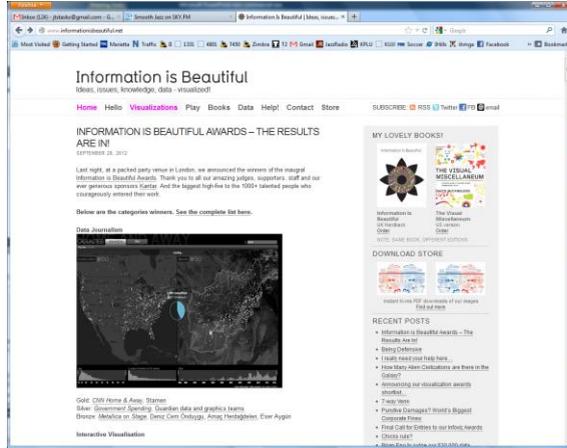
http://www.ted.com/talks/david_mccandless_the_beauty_of_data_visualization.html

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McCandless Website



<http://www.informationisbeautiful.net/>

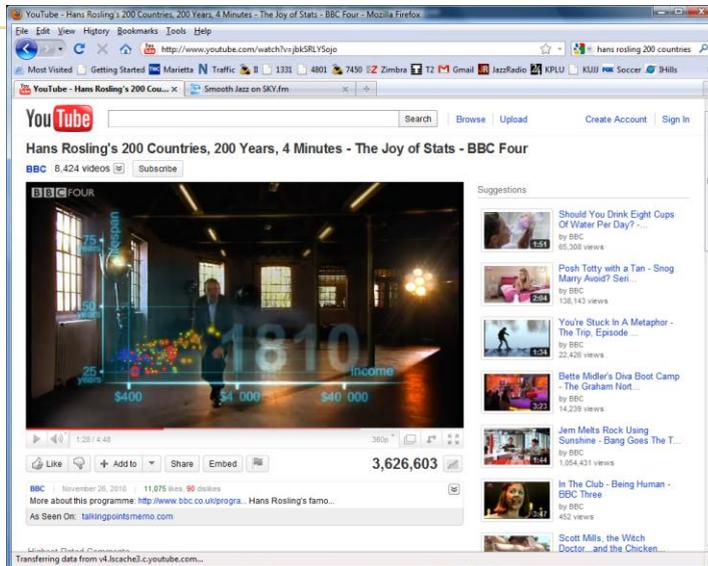
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<http://www.youtube.com/watch?v=jbkSRLYSojo>

Back to Where We Started

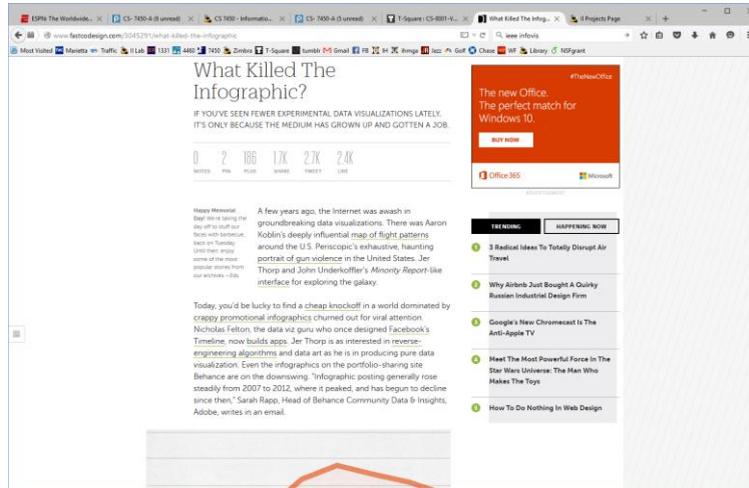


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Changing Trends



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Questions



- How do these types of visualizations differ from “traditional” infovis?

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Questions



- Would you characterize all of these as information visualizations?
 - Consider some of the different examples

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My Reflections



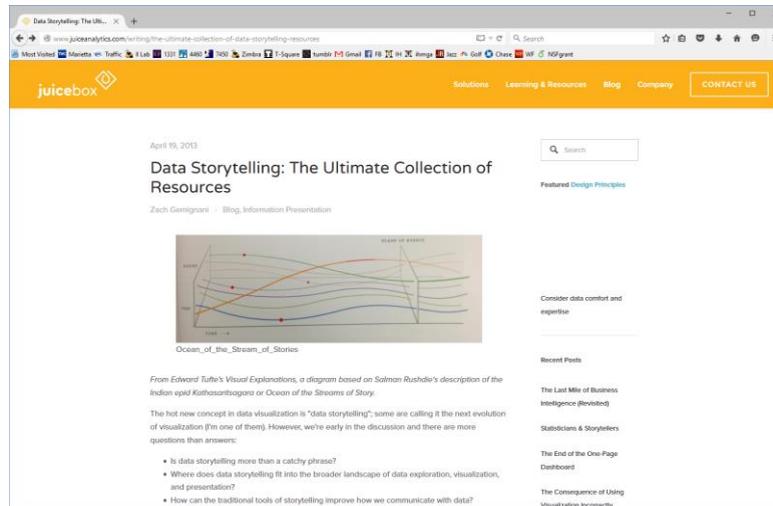
- InfoVis for analysis and presentation are different
 - Apples & oranges (both fruit though)
- How?

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Resources



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Learning Objectives



- Define narrative visualization (vis for storytelling) and explain how it differs from analytic/exploratory visualization
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Project Design Document



- Ingredients
 - Clarify the data
 - Objectives, user tasks & queries, ...
 - Designs from your poster and more
 - A suggested design to implement

- Bring 3 copies

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Reading



- Explore the data-driven storytelling websites not shown in class
- Watch the videos we didn't show

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Upcoming



- Tufte's design principles
- Geospatial visualization