

Giving Form to Data

By Erica Gunn

BU Spark!

4.05.2019

Giving Form to Data

Data visualization is the practice
of giving **form**

to the **abstract** and **unseen**.

Data Visualizations should:

- 1. Accurately represent information, without distortion or undue emphasis.**

Data Visualizations should:

**2. Help people understand
something about the data
that they might not
otherwise have seen.**

Quantitative insight

Emotional or subjective truth

Data Visualizations should:

3. Have a purpose.

Audience

Context

Scientific publications

CRYSTAL GROWTH & DESIGN

ARTICLE

pubs.acs.org/crystal

Does Crystal Density Control Fast Surface Crystal Growth in Glasses? A Study with Polymorphs

Published as part of a virtual special issue of selected papers presented at the 2010 Annual Conference of the British Association for Crystal Growth (BACG), Manchester, UK, September 5–7, 2010

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School of Pharmacy and Department of Chemistry, University of Wisconsin - Madison, Madison, Wisconsin 53705, United States

ABSTRACT: As organic liquids are cooled to become glasses, crystal growth at the free surface can be substantially faster than in the interior, a phenomenon uncommon for other materials and for which different explanations exist. We have measured the surface and bulk growth rates of three polymorphs in carbamazepine glasses. Crystal density has no controlling effect on the extent to which surface crystal growth is enhanced over bulk crystal growth, in contradiction to models that relate fast surface crystal growth to the release of crystallization-induced tension.

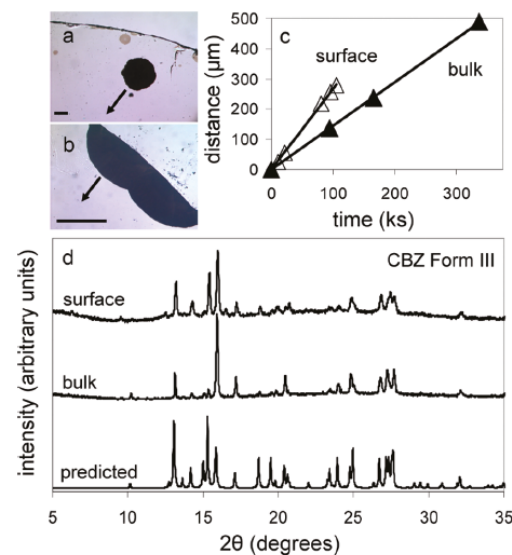
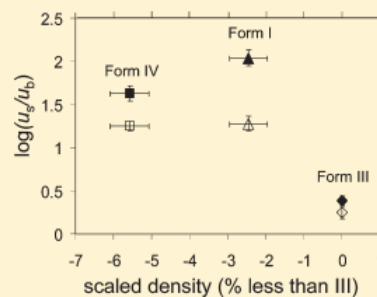


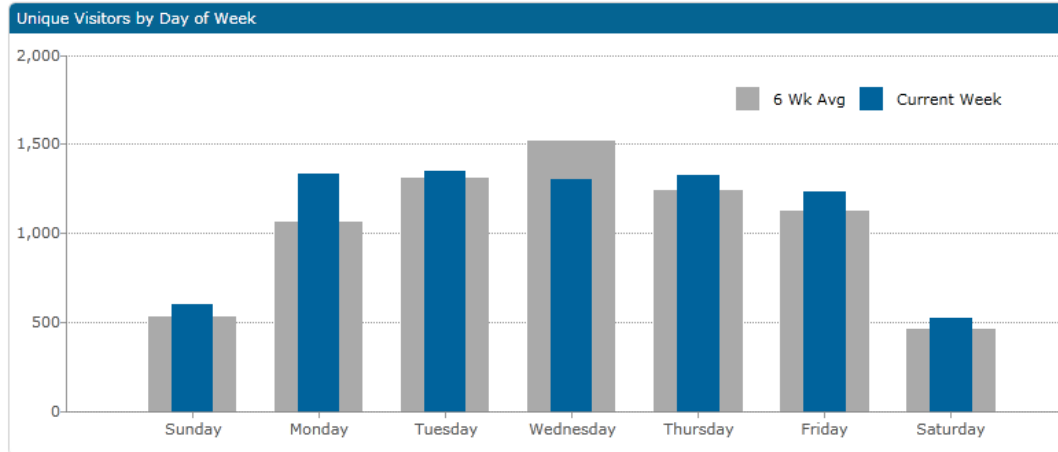
Figure 3. Form III crystals growing (a) at the surface and (b) in the bulk at 313 K. Scale bar = 200 μm . Arrows indicate growth directions. (c) Distance of growth vs time for crystals in (a) and (b). (d) Observed and predicted XRD patterns of Form III crystals.

Business reports



Website Operational Dashboard

June 11th, 2011



Bounce Rate	Change
Yesterday 66.90 %	0.27 %
6 Wk Avg 66.63 %	

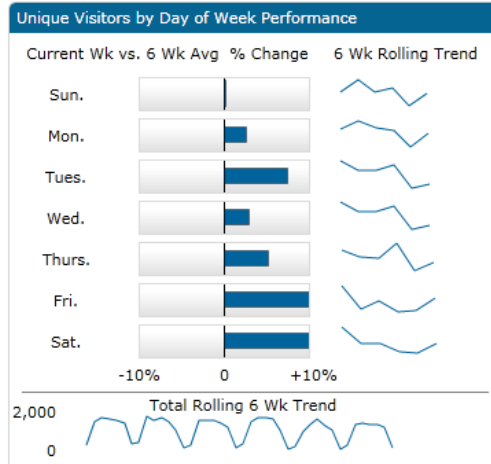
Avg. Time On Site (Seconds)	Change
Yesterday 121	9.00
6 Wk Avg 112	

Avg. # of Pages per Visit	Change
Yesterday 2.24	-0.03
6 Wk Avg 2.27	

% of New Visitors	Change
Yesterday 77.21 %	-1.63 %
6 Wk Avg 78.84 %	

Yesterday's Activities
Article - Data Governance Primer

News Item - Next generation of data federation tools
Article - Data Integration Challenges Rises
Sent out June Newsletter - Visualizing Big Data



Google Keyword Search Rankings (as of Yesterday)

Keyword(s)	Current Month's Rank	Previous Month's Rank	Change
Data Management	1	2	↑
Data Federation	2	2	→
Business Intelligence	3	12	↑
Data Warehouse	3	4	↑
Data Governance	4	2	↓
Data Analytics	4	1	↓
SOX Compliance	4	9	↑
mobile business intelligence	7	34	↑
Big Data	9	11	↑
analytics dashboard	10	23	↑
data in the cloud	12	6	↓

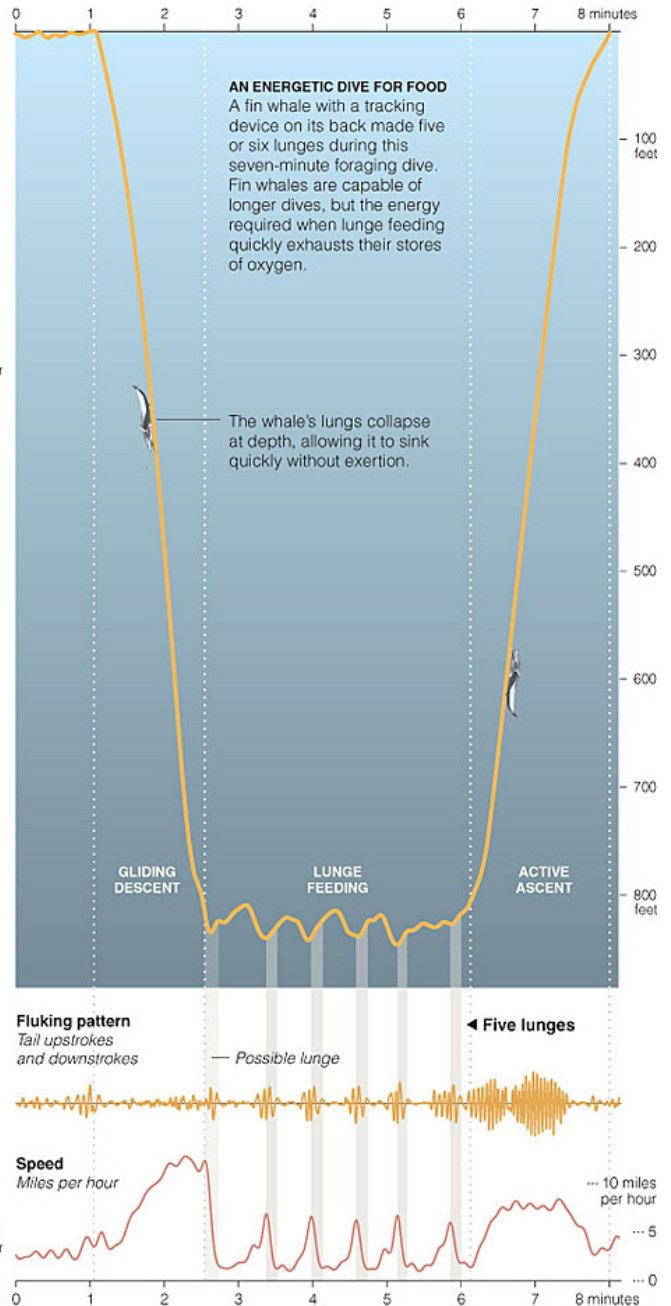
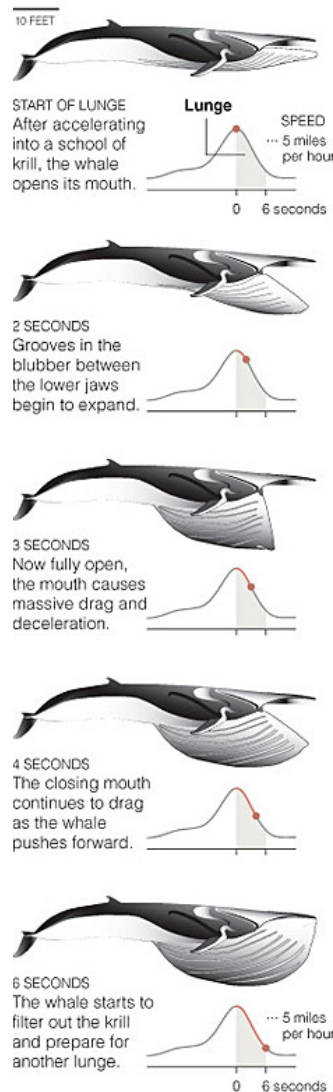
Planned Activities

Activity Date	Description
Jun 20, 2011	New Article - Common Data Management Pitfalls
Jun 23, 2011	Interview with Larry Hinds, President, Show Me the Numbers Inc.
Jun 25, 2011	New Research Paper - Why BI projects fail
Jun 26, 2011	New Article - Looking for the one version of the truth: the never ending search

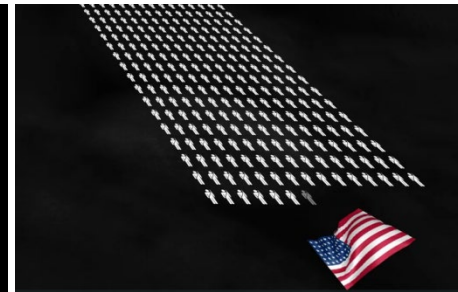
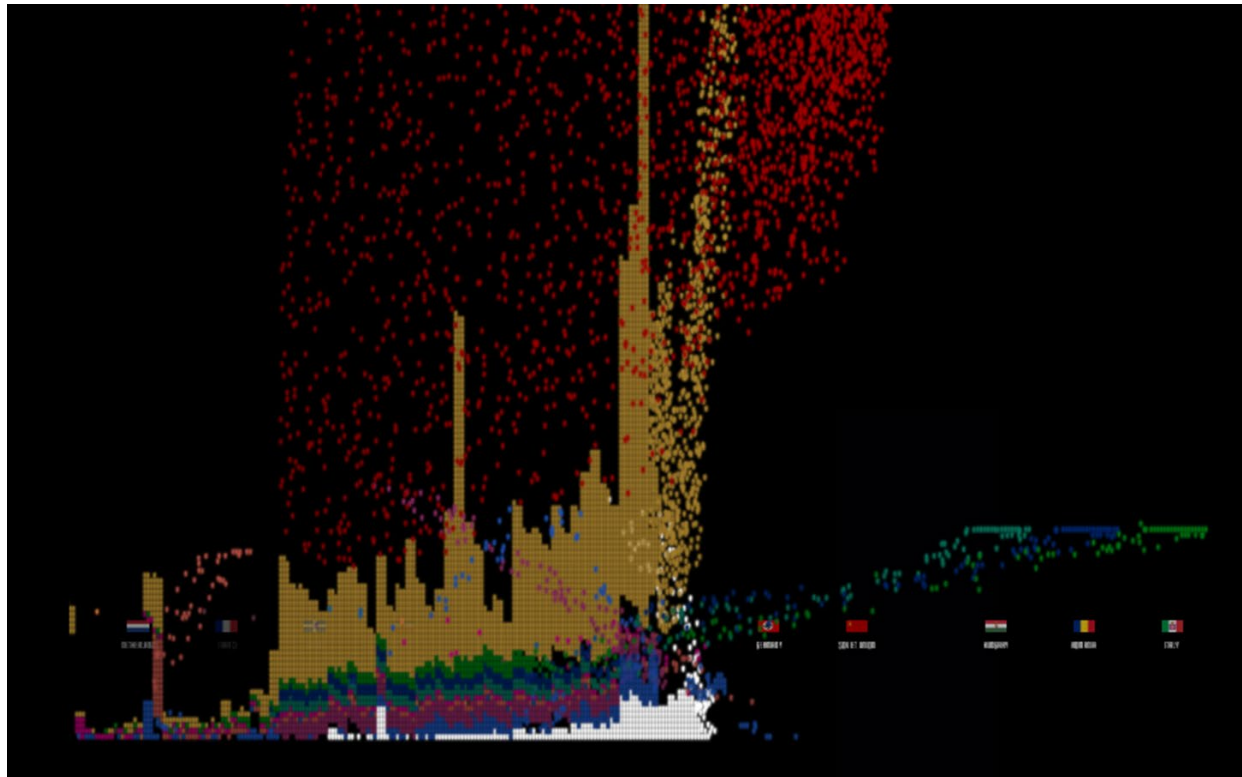
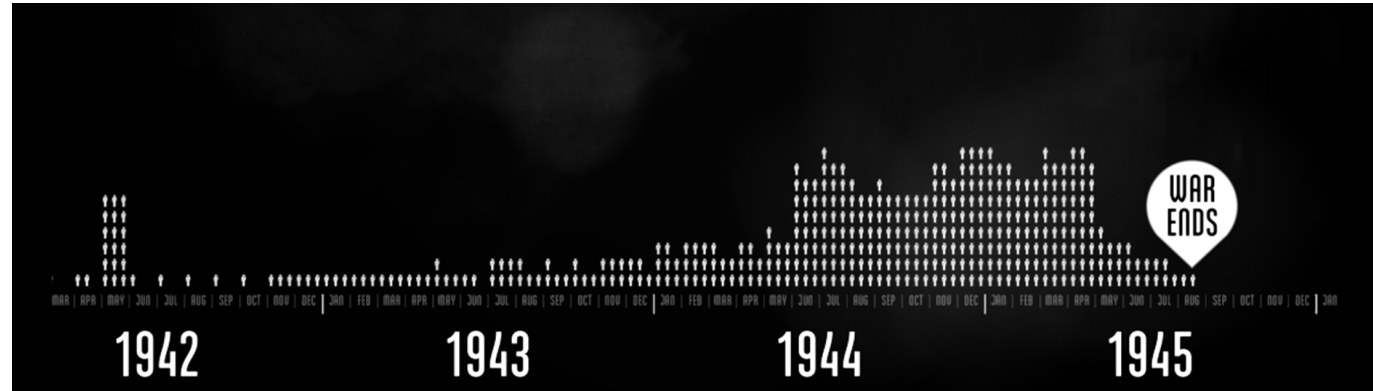
News article

Lunge Feeding

Scientists tracking fin whales have created the first detailed model of how they feed. After gliding to depths of more than 600 feet in search of krill, a fin whale will repeatedly accelerate and open its mouth wide, engulfing about 20 pounds of krill and more than its own weight in water as it grinds to a halt.

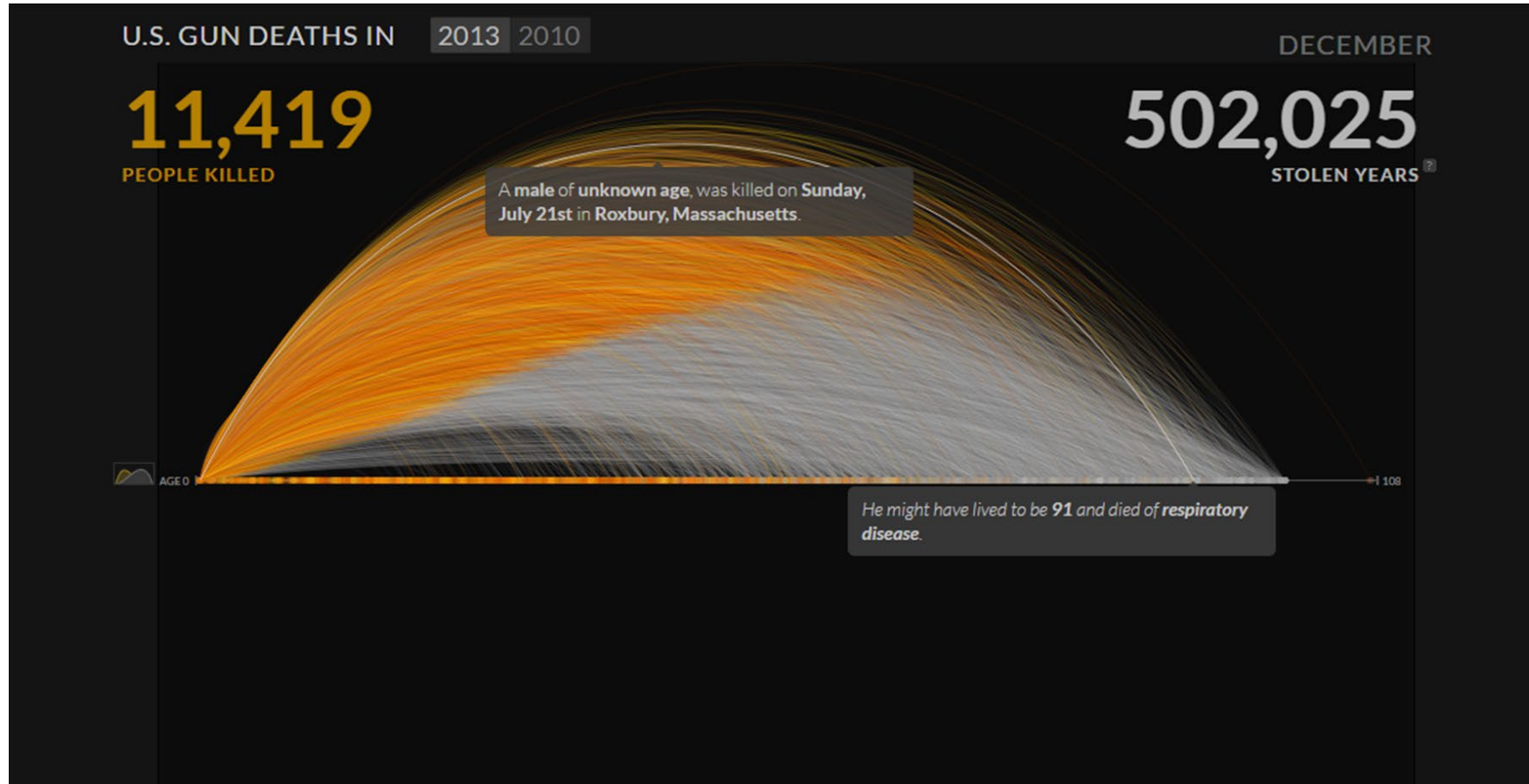


Persuasion



Neil O'Halloran: <http://www.fallen.io/ww2/>

Activism / Advocacy



Periscope: <https://guns.periscope.com/?year=2013>

Art



Jeff Hemsley. Occupy the Amendment.

Data Visualizations should:

4. Have a perspective.

Who is represented, how, and why?

Georgia Lupi: <http://giorgialupi.com/bruises-the-data-we-dont-see/>

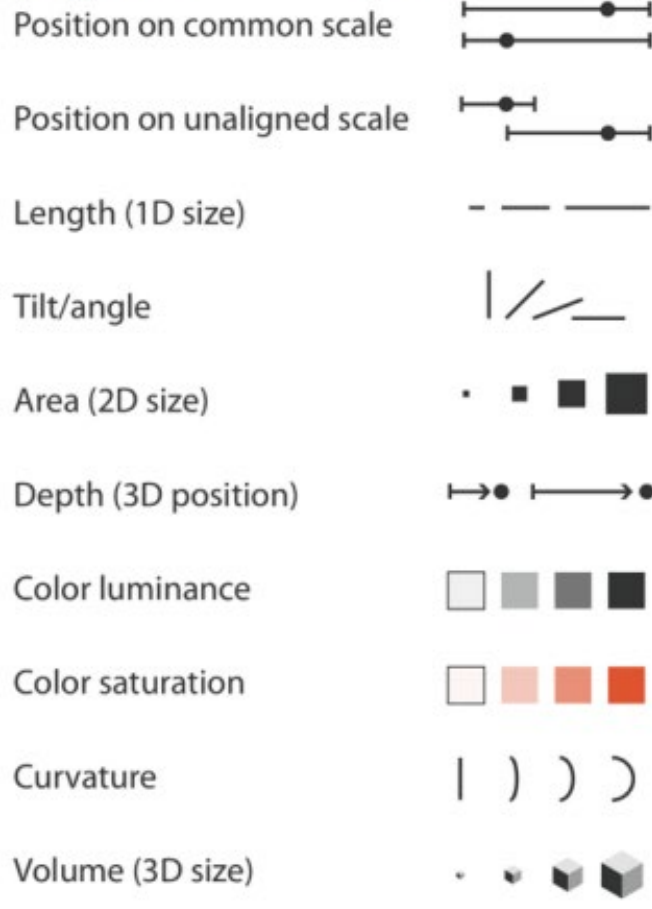
Johanna Drucker: Graphesis. Visual Forms of Knowledge Production

What is a data visualization?

- **Encodes** information
- Converts data **channels** (variables) into visual form
- Uses **marks** to represent the data values

Methods of encoding data

Magnitude Channels: Ordered Attributes

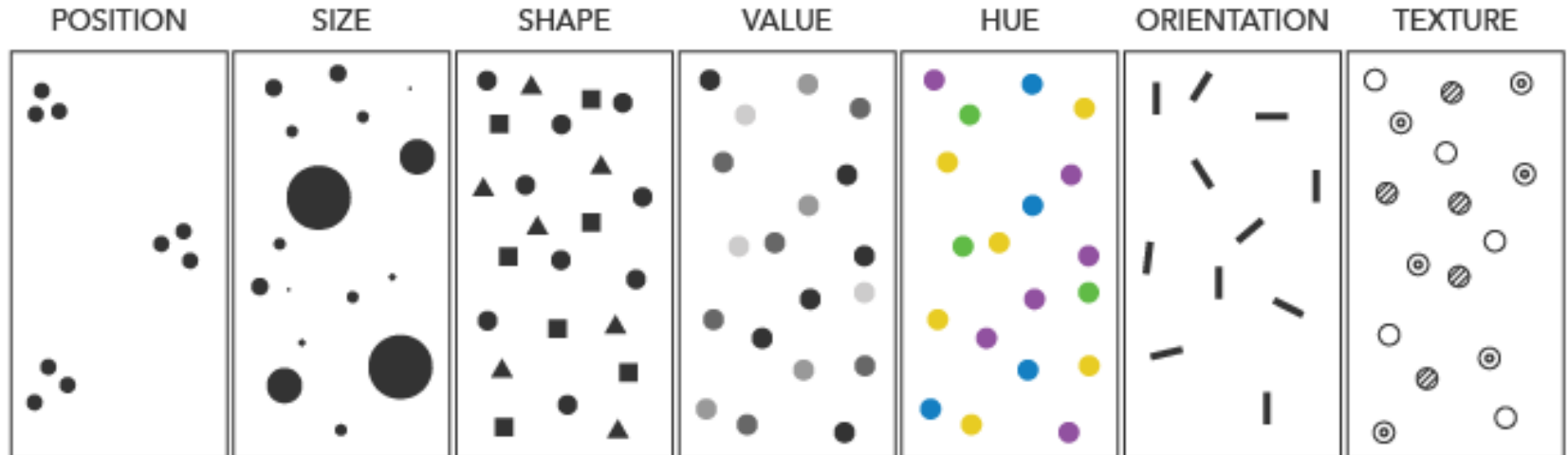


Identity Channels: Categorical Attributes



Making marks

Marks are usually drawn using some combination of **visual variables**.



From object to visualization

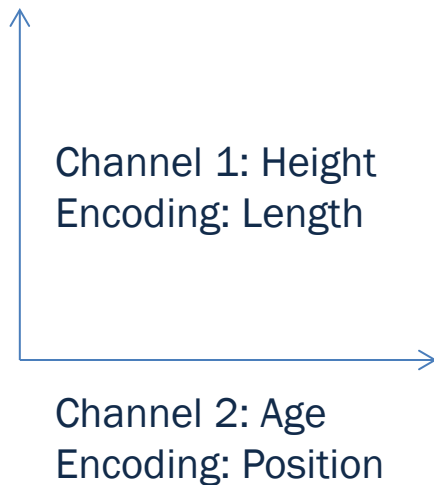
Objects (people themselves)



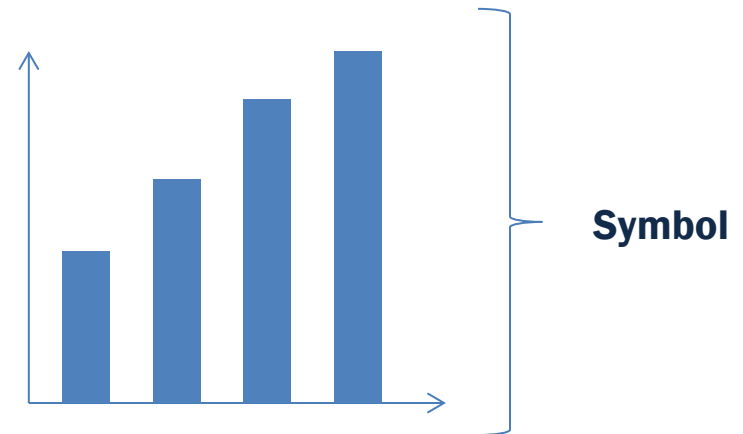
Data (measurement/icon)

Age (y)	Height (in)
4	40
8	51
12	58
16	67.5

Channel and Encoding

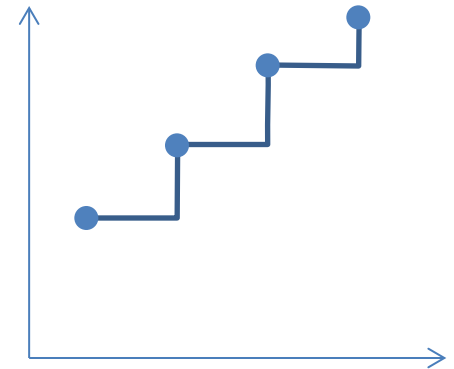
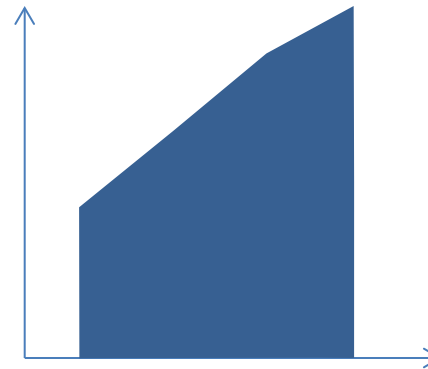
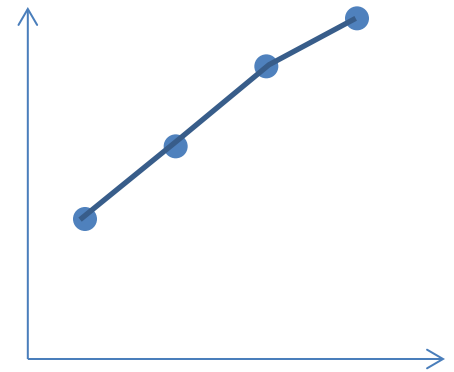
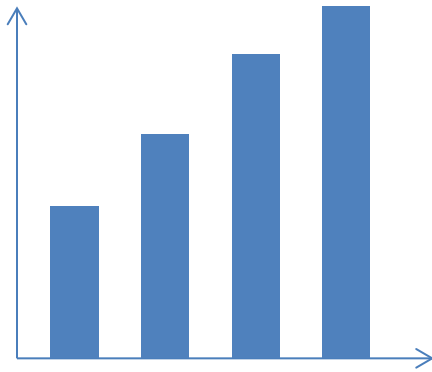


Marks



Changing the mark

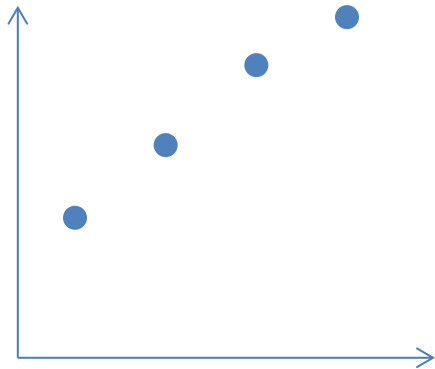
The mark chosen can emphasize different aspects of the data



Changing the encoding

Changing the way we encode data also affects how we perceive it, and what we can actually see.

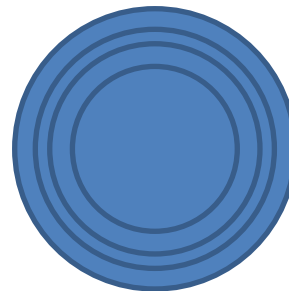
Length/Position



Area/Radius



Color



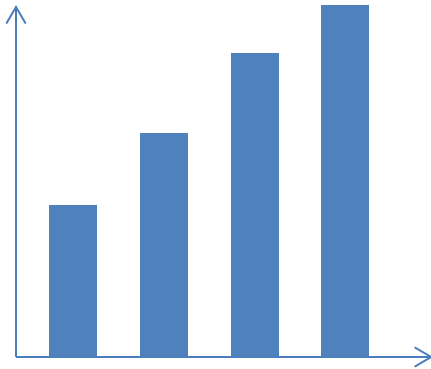
Most accurate



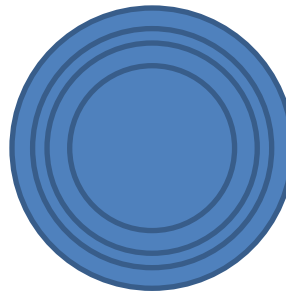
Least accurate

The importance of metaphor

Matching the encoding metaphor to your data makes a visualization more readable.



Metaphorical connection is clear



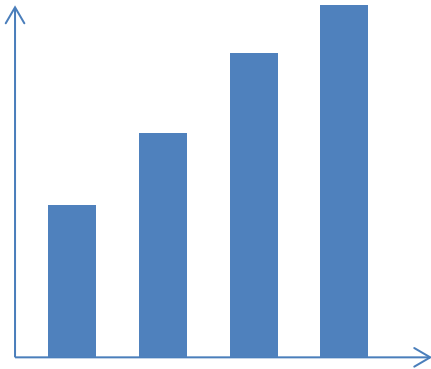
Pure symbols – no automatic meaning

Data Visualizations should:

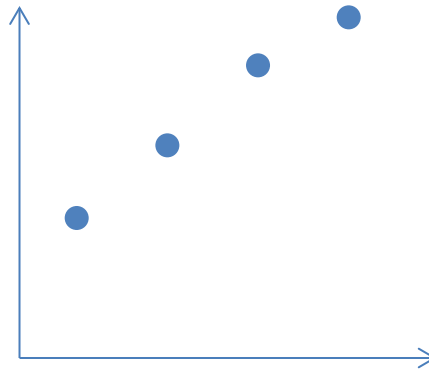
5. Support a user **task.**

User tasks

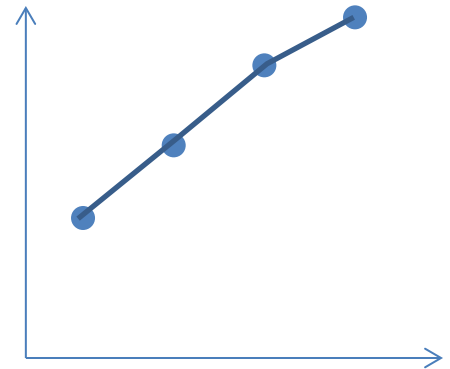
Compare bar height



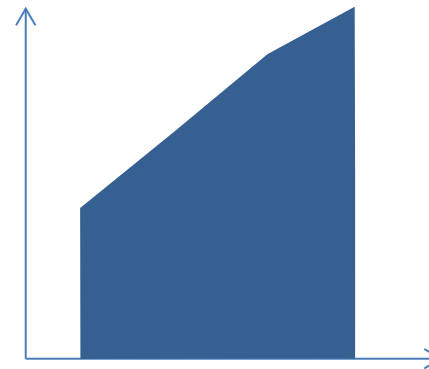
Read dot values



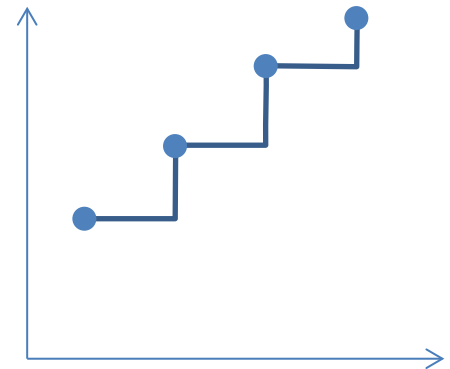
See change btwn points



Focus on area under curve



See size of change



Data visualization as story

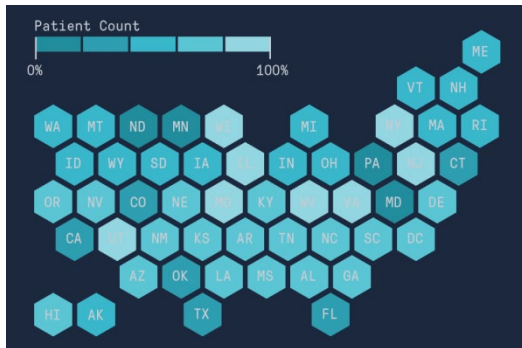
What kind of story does your data tell?

- **Compare** objects side by side
- **Group** things together
- Narrate a **sequence** of events
- Show **membership**
- Explain how things **change**
- Show how individuals are **connected**.

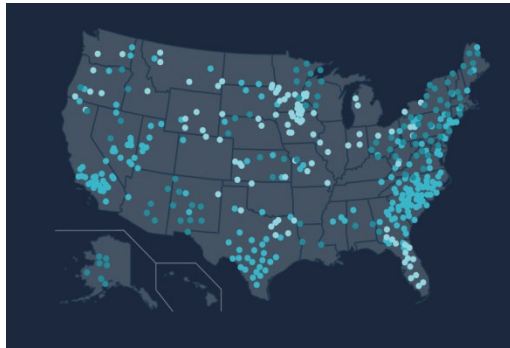
Kinds of maps

Choosing how you represent your data affects what the user will see and understand.

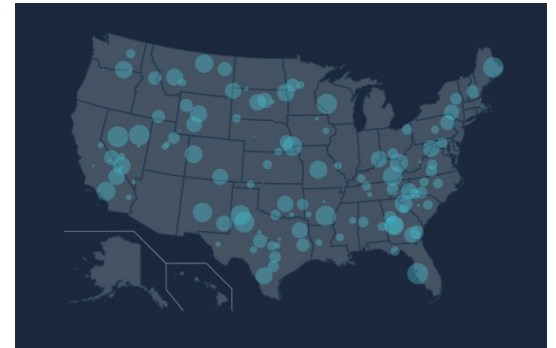
Tile map



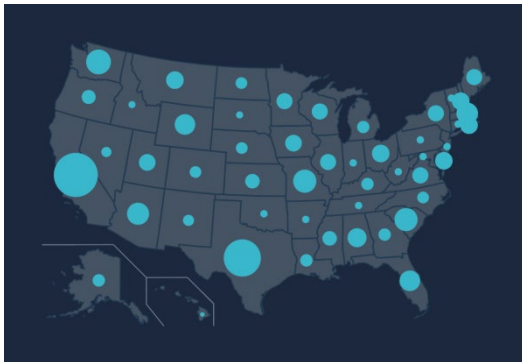
Point density map



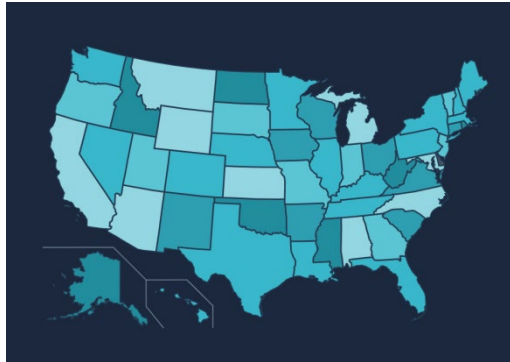
Scaled point map



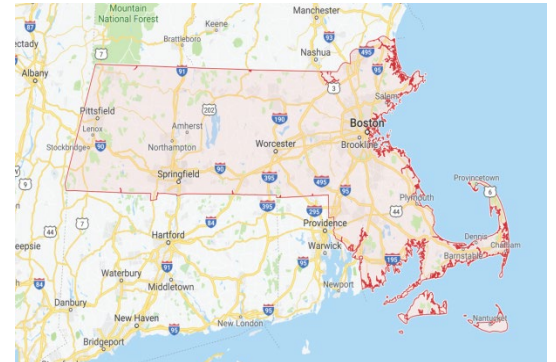
Dorling cartogram



Choropleth

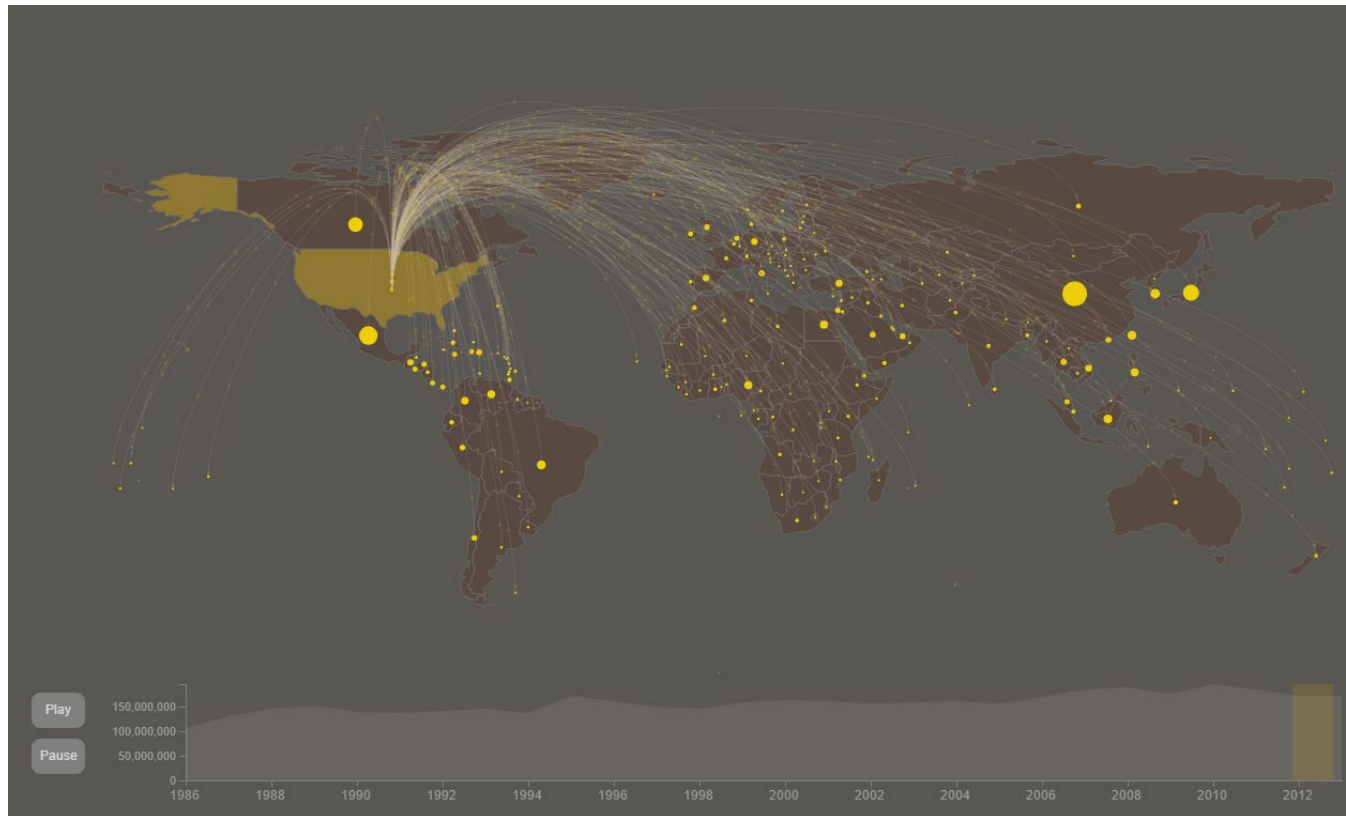


Navigation map



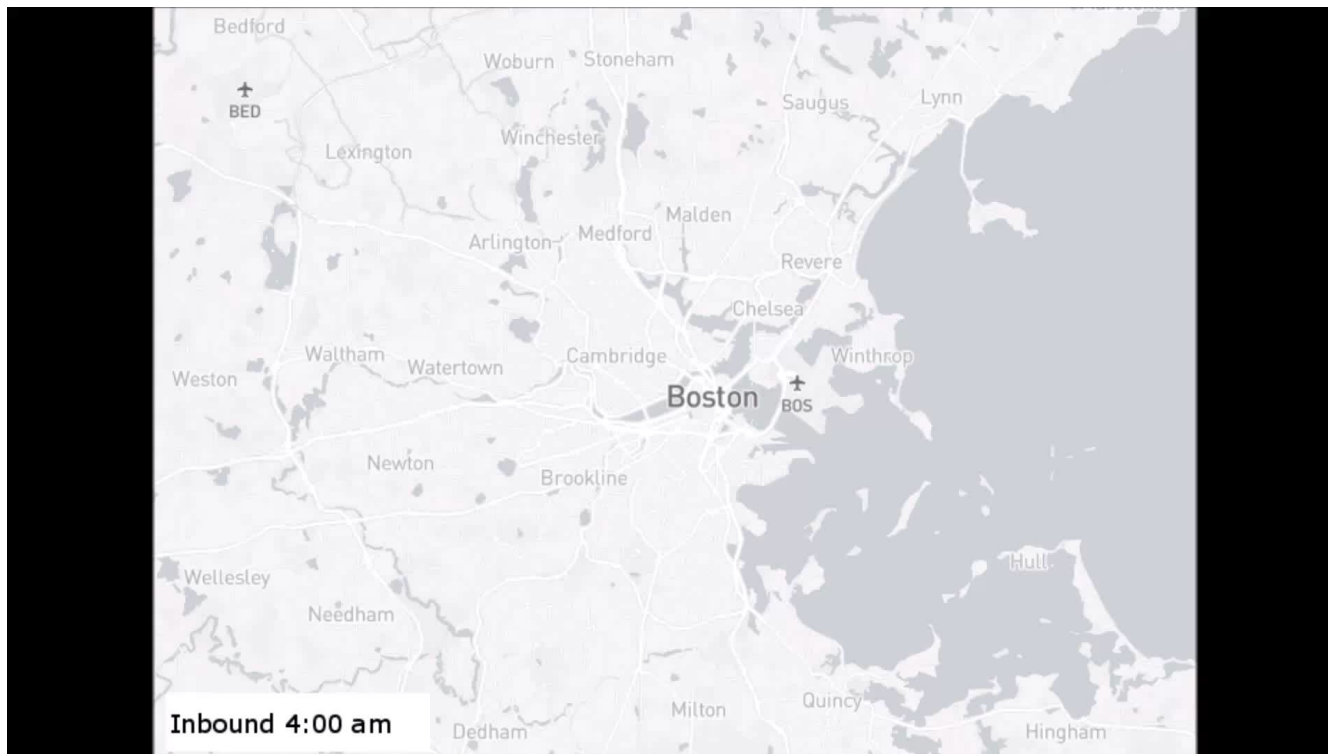
Companion or Linked Charts

Combining a map with other charts can help to support a user task, while still creating a sense of geographic context.



Companion or Linked Charts - II

This map shows an overview of bus crowding in the MBTA system throughout the day.



Companion or Linked Charts - III

This dashboard visualization helps users navigate crowding data for the MBTA bus system, for various times throughout the day

