Infographics in the Classroom: Using Data Visualization to Engage in Scientific Practices

Activity 1: Data Graphic Interpretation

1. Use David MacCandless's Peak Breakup Times blank infographic (Figure 1) to have a fun introduction to infographics. Share this using the "Activity 1 Presentation" power point slides (download the slides at www.calacademy.org/infographics-in-the-classroom-teacher-toolkit. PDF versions of the slides are also included in this packet). After students try to guess what the blank graphic is showing, reveal what it is and some of the "explanations" MacCandless offers. We modeled this after his TED talk: http://www.ted.com/talks/david_mccandless_the_beauty_of_data_visualization?language=en.
2. Briefly discuss with students why they think scientists would visualize their data.
3. Hand out a few graphics to analyze (Figures 2-8) and *Worksheet 1*. Give them 10 minutes to answer the questions on their own.
4. Have students find people who did the same graphic (if you have a large class, you may want to break them into smaller groups) and share out within their group what they think the graphic is about. You can also have them complete the worksheet together.
5. Working as a group, make a poster to share what you noticed in the graphic: 1-2 sentences describing the central ideas; what numbers/data are represented and how are they represented; what do you like/dislike about the way the author presents his/her story?
6. Give the students a chance to share out their ideas as a group.
7. Make new groups of 3-5 people who did different graphics. Share what the main story was and how the author visualized the numbers. The goal of this discussion is to come up with a list of all the different ways you can visualize/represent numbers. Have them write each one on a post-it. When they are done have each group bring up the post-its and start sorting them by similar ideas
8. Wrap up this section by summarizing the different post-it ideas. Pass out the Academy's list of ways to visualize data. Have a quick read over them – what is similar/different between them.

Infographics used for this lesson:

- David MacCandless, 20th Century Deaths, from his book, Visual Miscellaneum. There is a more complicated version here: http://www.informationisbeautiful.net/visualizations/20th-century-death/
- New York Times, One race, every medalist ever, http://www.nytimes.com/interactive/2012/08/05/sports/olympics/the-100-meter-dash-one-race-every-medalist-ever.html?_r=0

- Big Oak Studios, Inc, Diving the Depths Infographic http://visual.ly/diving-depths-infographic
- David MacCandless, 20th Century Deaths, from his book, Visual Miscellaneum\
- Craig Robinson, The Rise and Fall of Scoring in Baseball, Smithsonian Magazine, http://www.smithsonianmag.com/history/infographic-the-rise-and-fall-of-scoring-in-baseball-170927844
- Ocean Conservancy, International Costal Cleanup 25 years of Debris Collected, http://media-cache-ec4.pinimg.com/550x/7d/35/82/7d358209a4be18d0db69af13ef75ce78.jpg

Activity 1
Data Graphic Interpretation

CALIFORNIA ACADEMY OF SCIENCES

Name _____

Date _____

Title of Graphic _____

1. What ideas or pieces of information does the author present? List as many as you can.

2. Identify main conclusion told in the graphic. This should not just be the title, but what conclusion you can make from the information provided.

3. Pick one point on the image that represents a number. What is that number (you can approximate, if necessary) and what are the units? If known, what is the source of the data?

4. Describe how the author represents data in the graphic? (Ex. Using color to differentiate two things.)

- »
- »
- »
- »

5. What other ways does the author tell the audience about the key message(s)?

6. What questions do you have about the graphic? What confuses you?

7. What do you like/dislike about the graphic?

20th Century Death

What's killed the most?

source: Internet and wikipedia. Data very coarse. Some guesswork and extrapolation

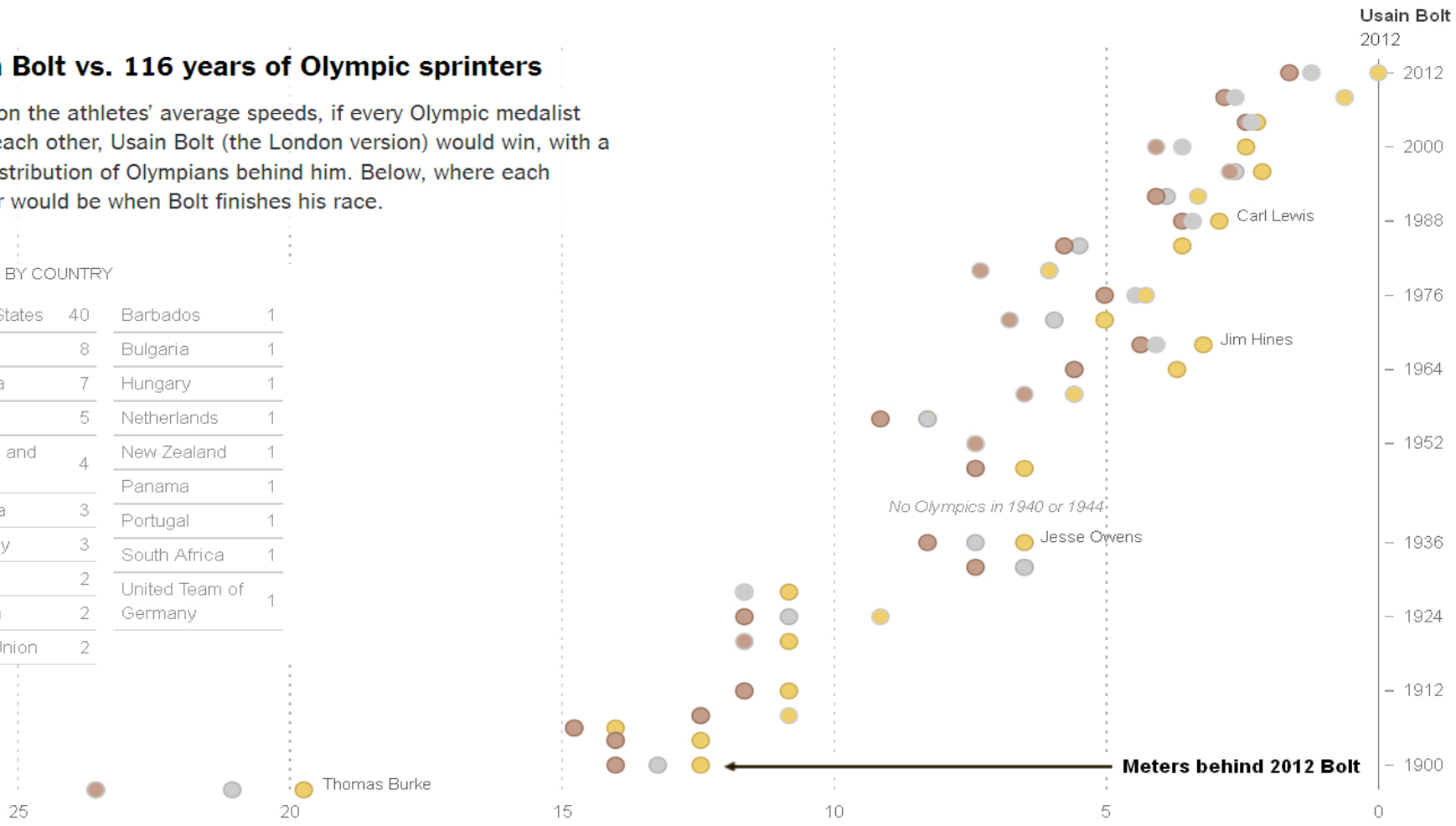
http://www.nytimes.com/interactive/2012/08/05/sports/olympics/the-100-meter-dash-one-race-every-medalist-ever.html

Usain Bolt vs. 116 years of Olympic sprinters

Based on the athletes' average speeds, if every Olympic medalist raced each other, Usain Bolt (the London version) would win, with a wide distribution of Olympians behind him. Below, where each sprinter would be when Bolt finishes his race.

MEDALS BY COUNTRY

United States	40	Barbados	1
Britain	8	Bulgaria	1
Jamaica	7	Hungary	1
Canada	5	Netherlands	1
Trinidad and Tobago	4	New Zealand	1
Australia	3	Panama	1
Germany	3	Portugal	1
Cuba	2	South Africa	1
Namibia	2	United Team of Germany	1
Soviet Union	2		



This chart includes medals for the United States and Australia in the "Intermediary" Games of 1906, which the I.O.C. does not formally recognize.

Diving the Depths

Pearl Divers to Squid Eaters

Pearl Diver (Free Dive)

Pearl divers of the central Tuamotu Archipelago in French Polynesia dive without external air supply. They can dive to depths of more than 39 meters where they collect oysters for up to two minutes.

39 mefers

Emperor Penguin

Emperor penguins dive deeper than any other bird. They hold their breath when they dive and how long they hold their breath depends on how deep they dive and how fast they move.

200 mefers

SCUBA Diver (Aided Dive)

In June 2005 Nuno Gomes set the World's Deepest Open Circuit SCUBA record, independently verified by Guinness World Records. It took Gomes about 20 minutes to reach 318.25m, and 12 hours to surface.

318.25 mefers

Bottlenose Dolphin

Bottlenose dolphins usually do not need to dive deep to catch their food however they are capable of diving. Under experimental conditions, one bottlenose dolphin dove to 535 meters.

535 mefers

647 mefers

Beluga Whale

Beluga whales are able to swim both forward and backwards (something few other whales can do). Under experimental conditions a trained beluga whale dove to a depth of 647 meters.

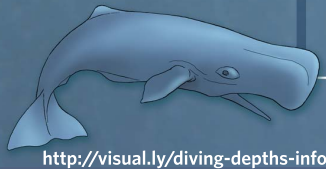
Southern Elephant Seal

Southern elephant seals live in sub-Antarctic and Antarctic waters and are the largest of all seals. The deepest dive recorded by an Elephant Seal is 2388 meters.

2388 mefers

Sperm Whale

Sperm Whales are one of the deepest-diving mammals in the world. They dive in search of squid to eat and are believed to be able to dive up to 3000 meters in depth to the ocean floor.

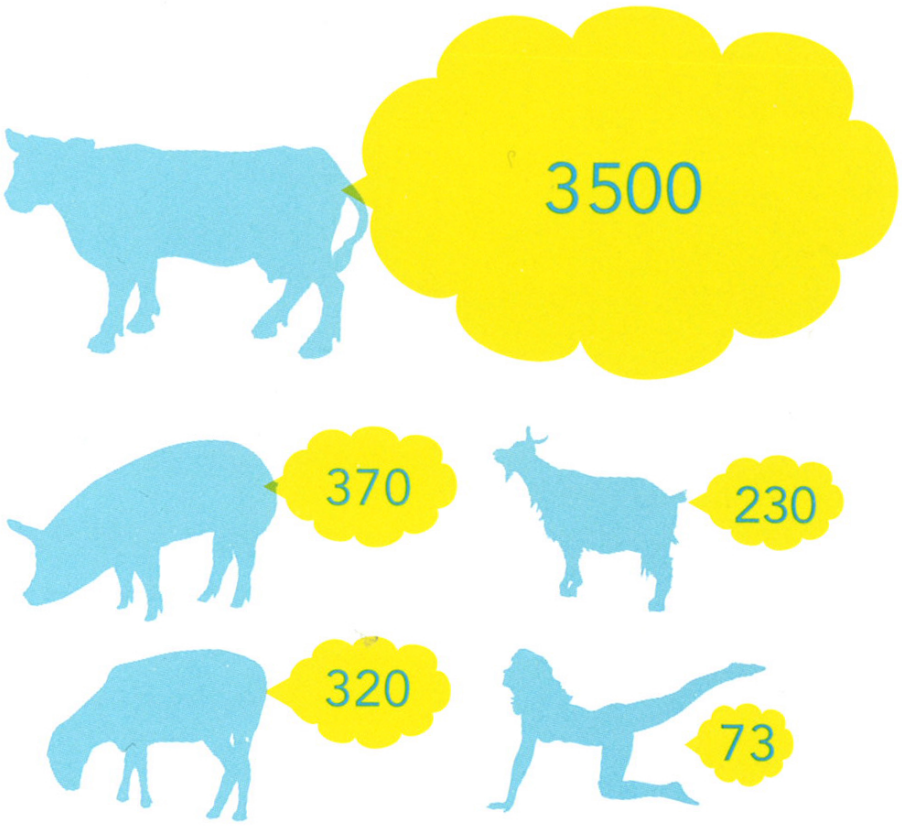


3000 mefers

http://visual.ly/diving-depths-infographic

Farty Animals

Annual methane emissions in equivalent CO2

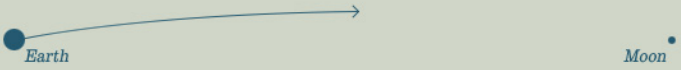


source: UN Environmental Programme, theregister.co.uk

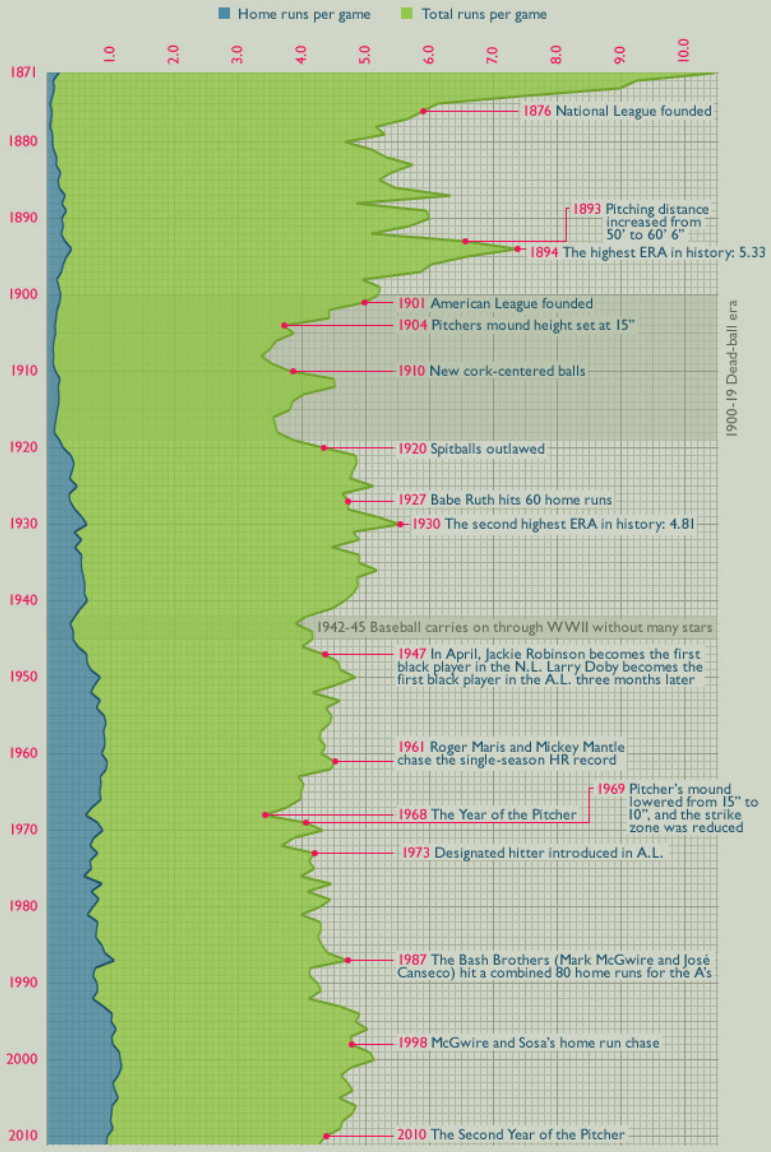
http://www.smithsonianmag.com/history-archaeology/Visualized-The-Rise-and-Fall-of-Scoring-in-Baseball.html

TOTAL RUNS SCORED IN MAJOR LEAGUE BASEBALL
1871-2011

The total number of runs scored since 1871 is 1,814,039.
If you multiply those runs by the 360 ft covered when scoring a run, the total distance is 123,684.48 miles: 51.8% of the way to the moon.
It's also 4.97 times the circumference of the Earth's equator.



AVERAGE NUMBER OF RUNS SCORED PER TEAM



SOURCES
http://www.baseball-reference.com/leagues/MLB/bat.shtml
http://www.baseball-reference.com/leagues/MLB/pitch.shtml
http://solarsystem.nasa.gov/planets/profile.cfm?Display=Facts&Object=Moon
http://earth-info.nga.mil/GandG/publications/geolay/TR80003A.html
http://www.baseball-almanac.com/rulechng.shtml

DESIGN & RESEARCH
Craig Robinson www.craigrobinson.com

Smithsonian.com

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http://media-cache-ec4.pinimg.com/550x/7d/35/82/7d358209a4be18d0db69af13ef75ce78.jpg
http://www.oceanconservancy.org/our-work/marine-debris/check-out-our-latest-trash.html

How do Scientists Communicate?

Take 3 minutes to come up with a list of as many different ways that a scientist might use to share their findings with other scientists and with the the public

Scientists often use visual representations of their data to tell stories about their research

Let’s look at one example taken from social scientists, who study how groups of people behave…

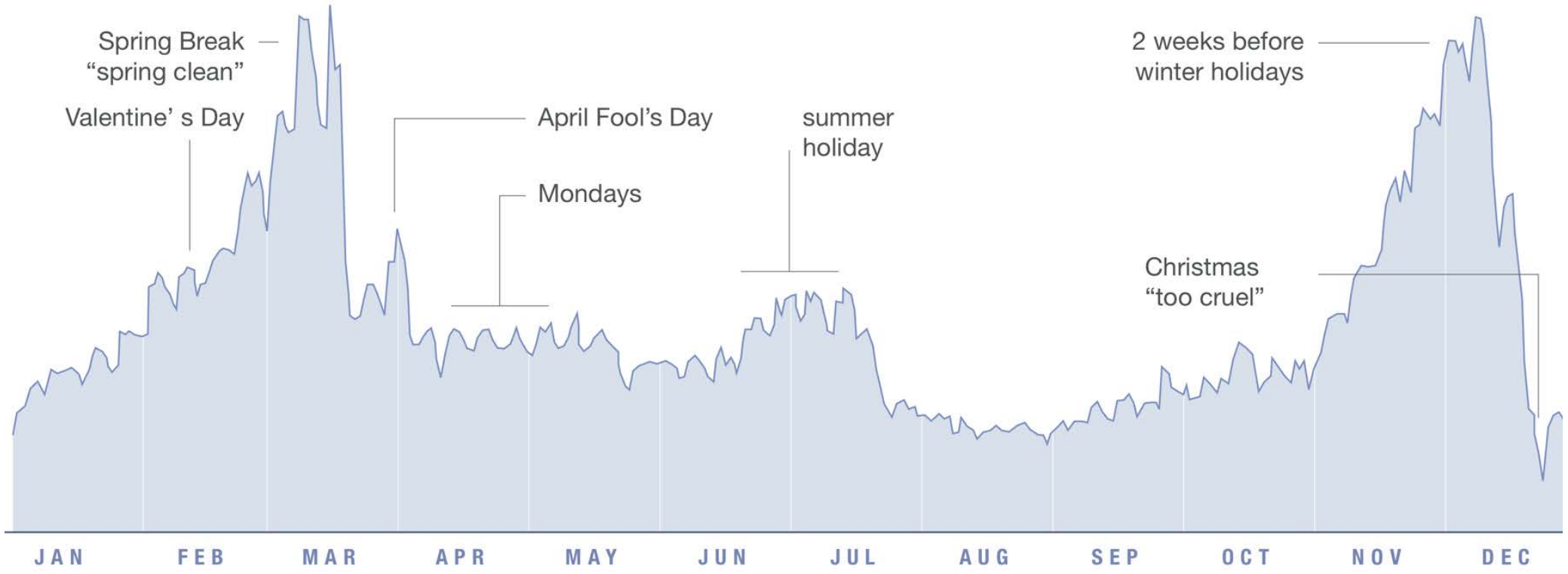

JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

Peak Break-Up Times

According to Facebook status updates

Peak Break-Up Times

According to Facebook status updates



Source: searches for "we broke up because" from Facebook Lexicon