

Topics in Data Visualization

Welcome

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Hello, my name is:

Charlotte

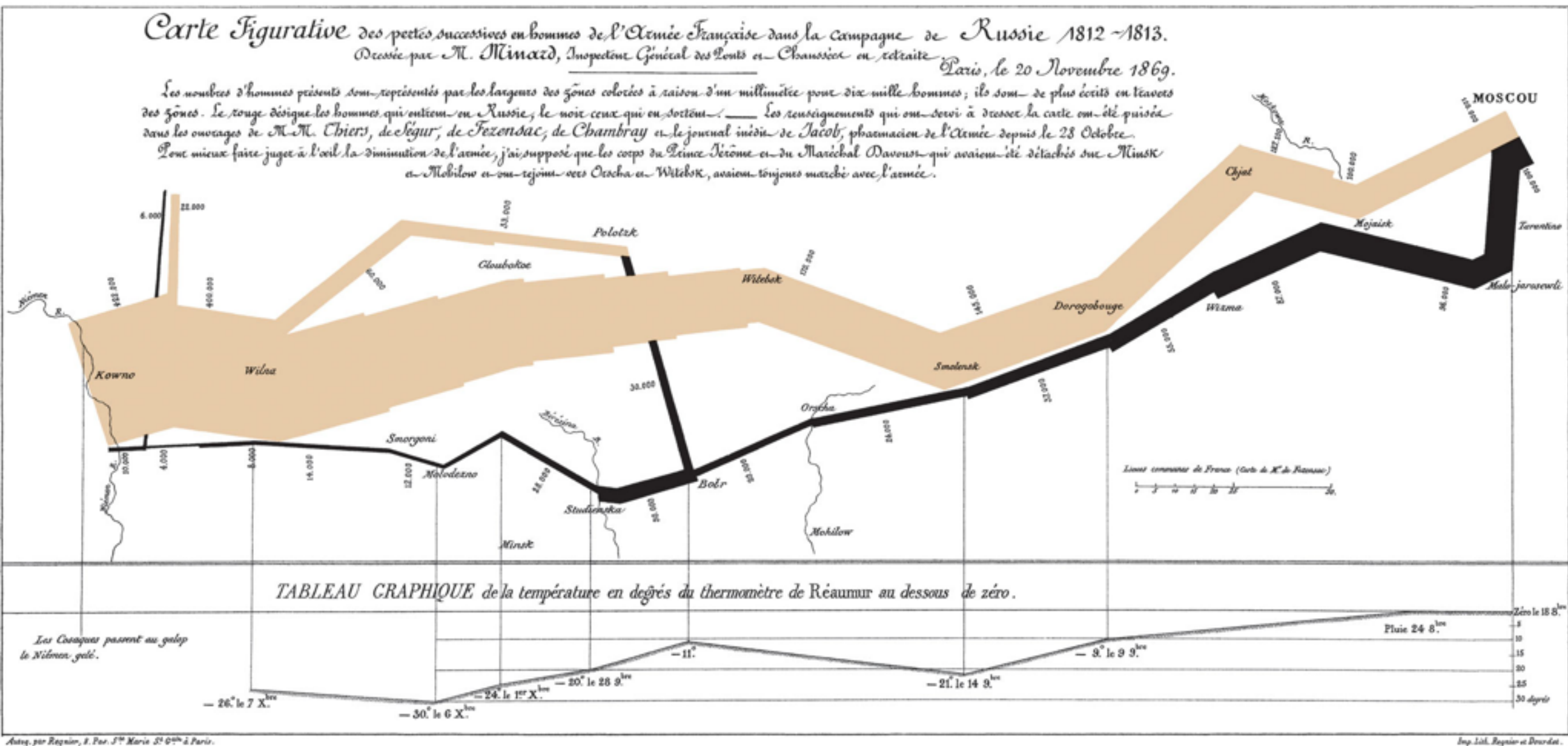
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Why visualize?

Our visual system is the highest bandwidth channel from a computer to our brain.

"Numerical quantities focus on expected values, graphical summaries on unexpected values." - John Tukey

World's Champion Graph?



Charles Joseph Minard, *Carte figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813*

The visualization process

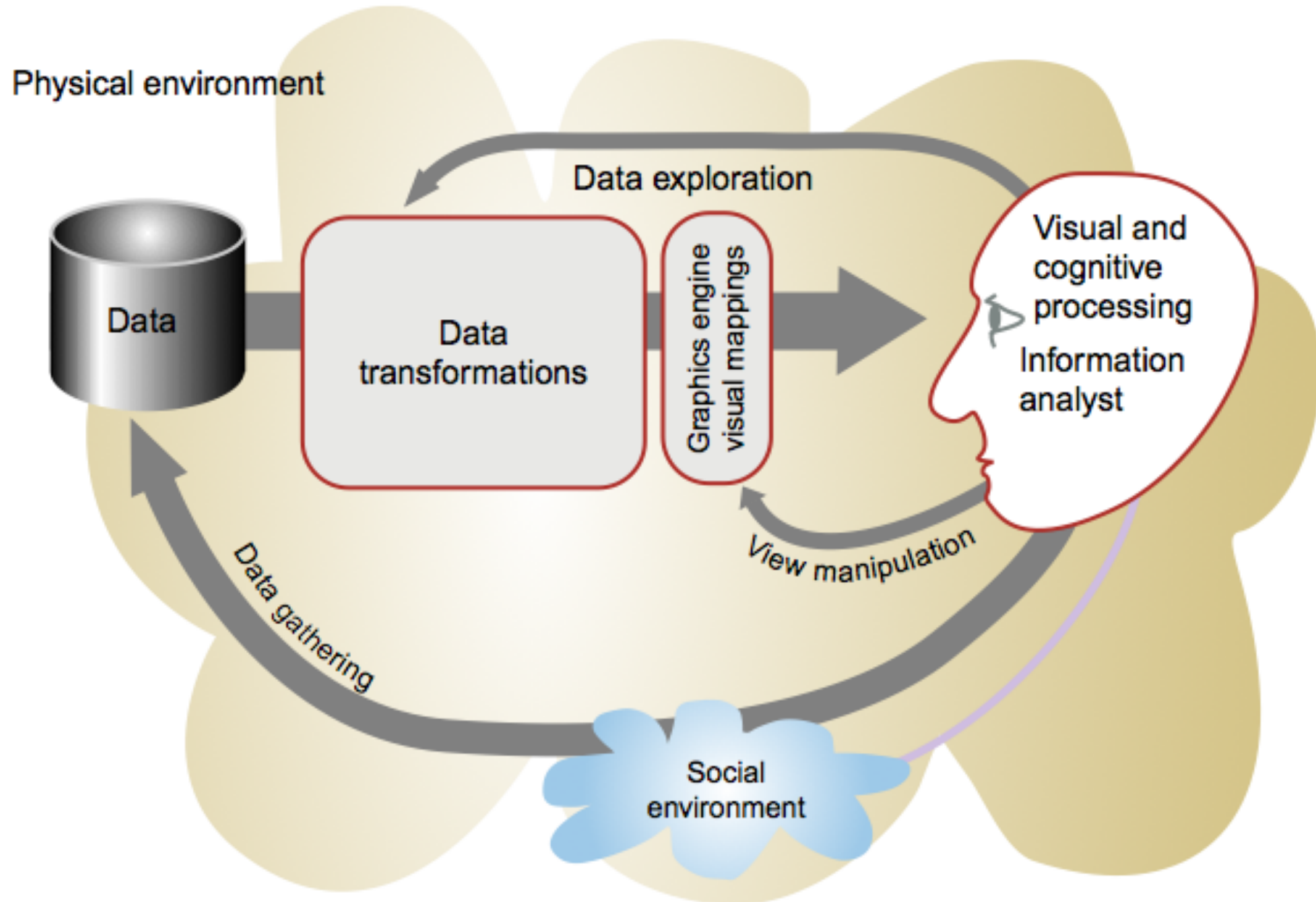


Figure 1.2 Ware, Colin. *Information visualization: perception for design*. Elsevier, 2013.

Purpose matters

Me exploring a new dataset

NYT front page graphic

dozens of plots

one or two plots

asking and answering
questions

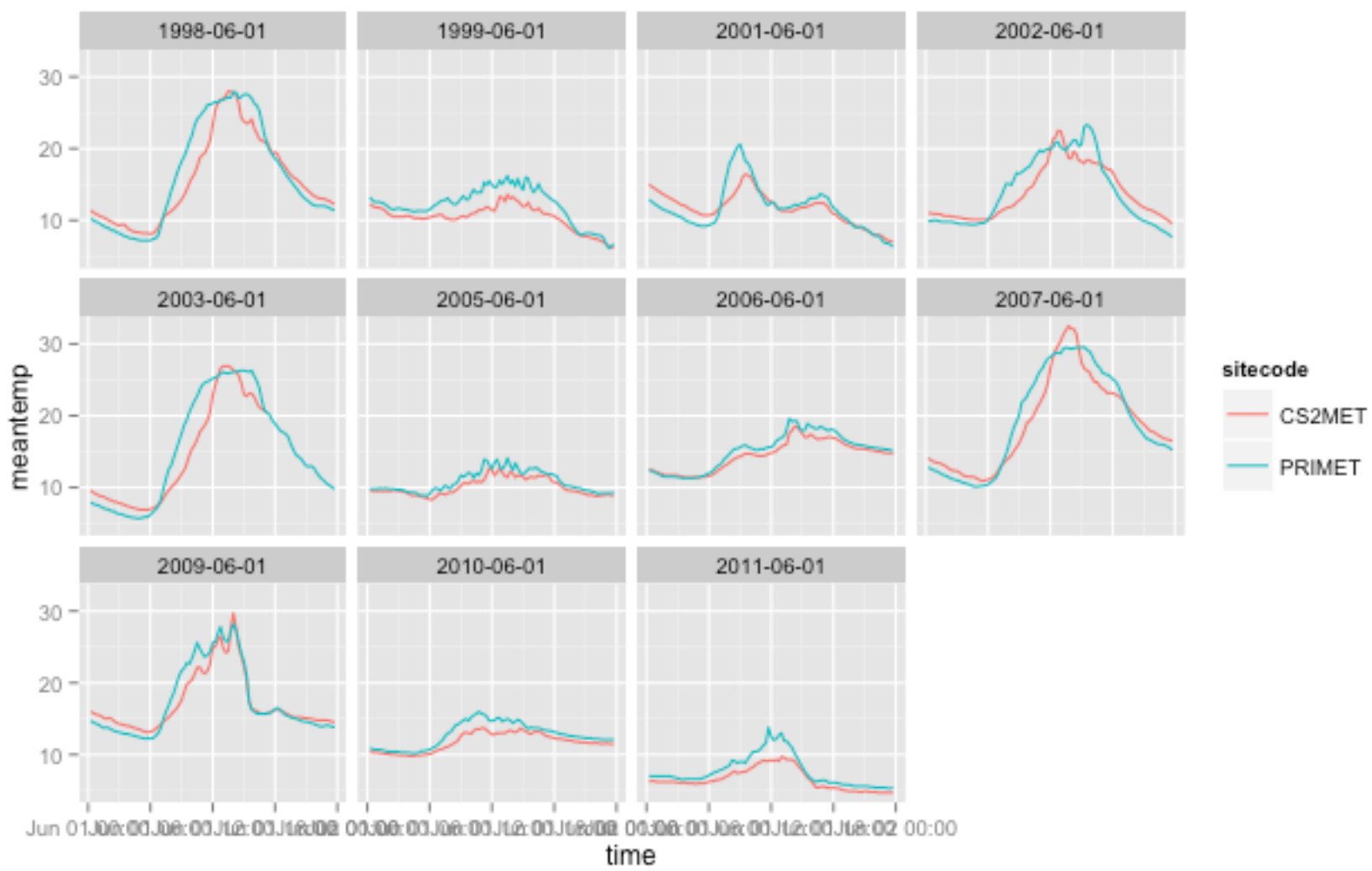
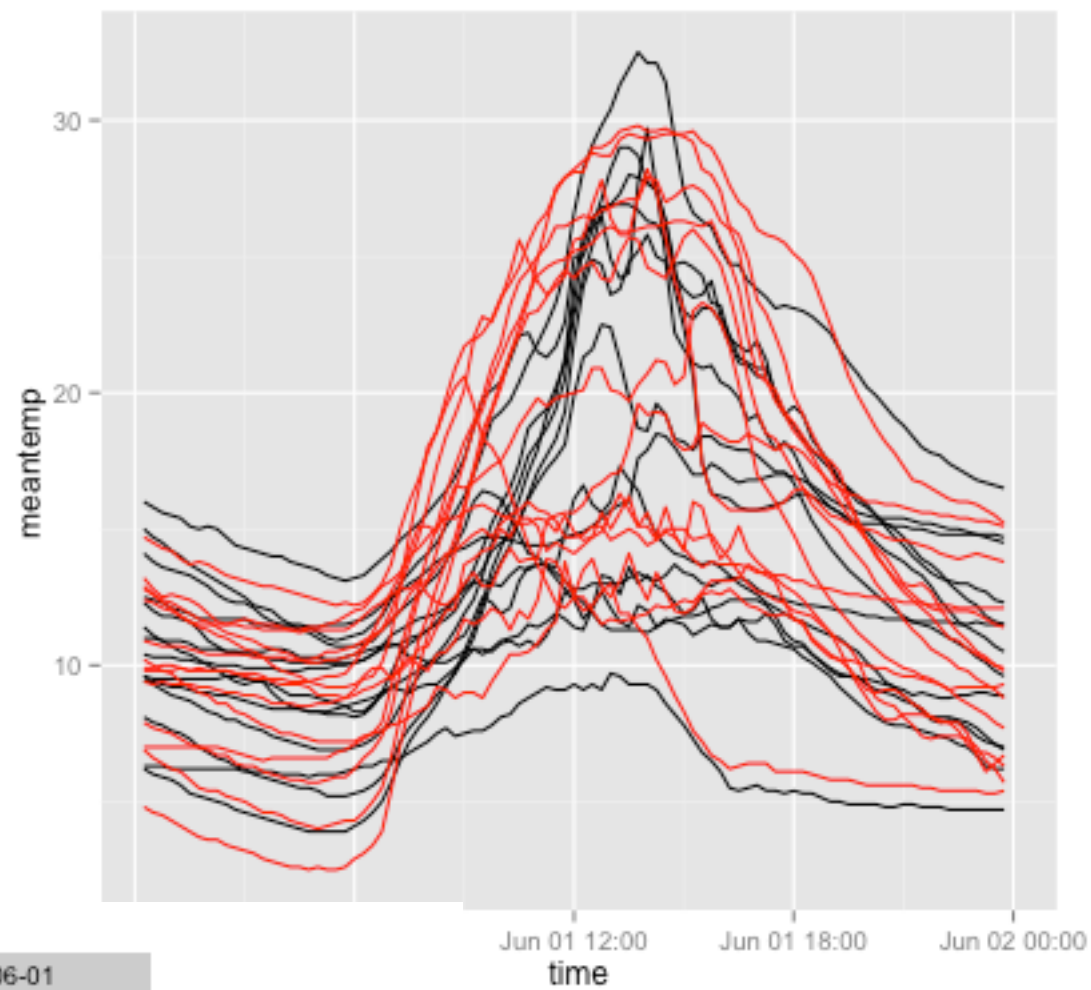
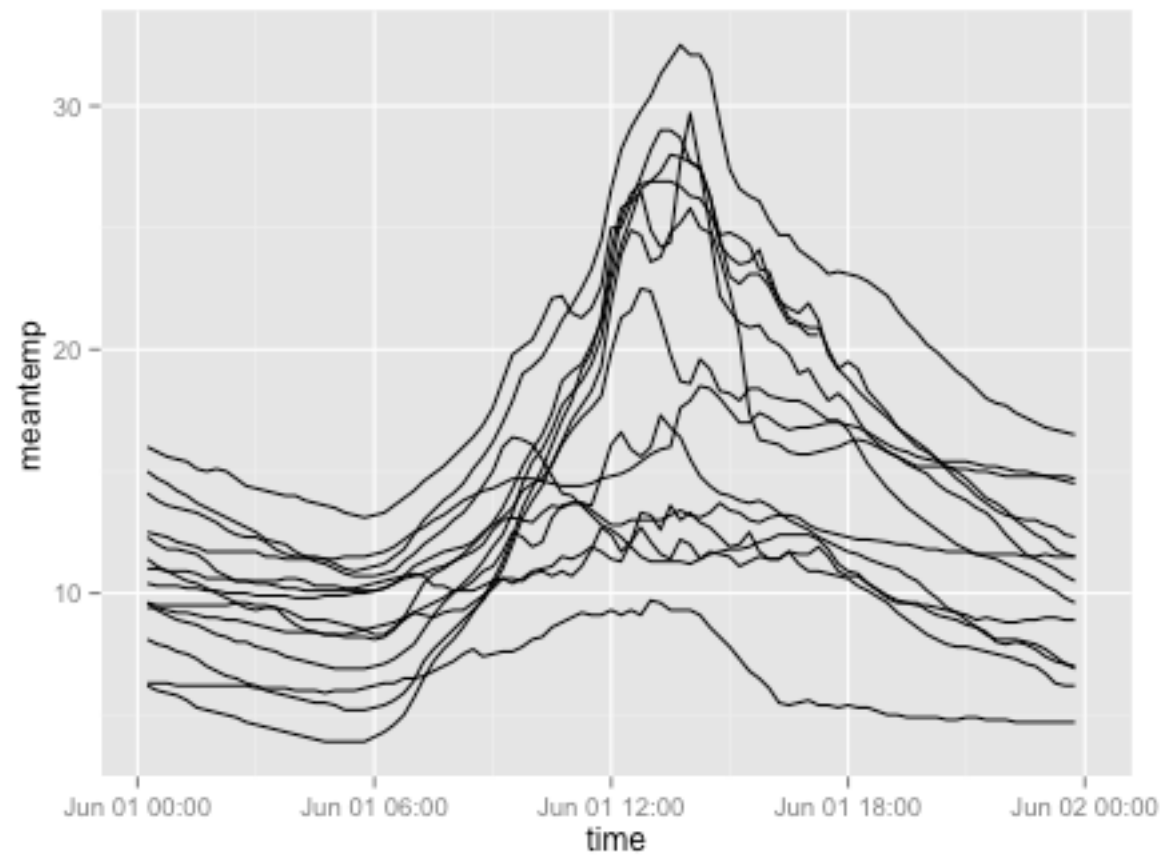
answers a specific question

seconds to create

hours to create and polish

rely on my memory for
context

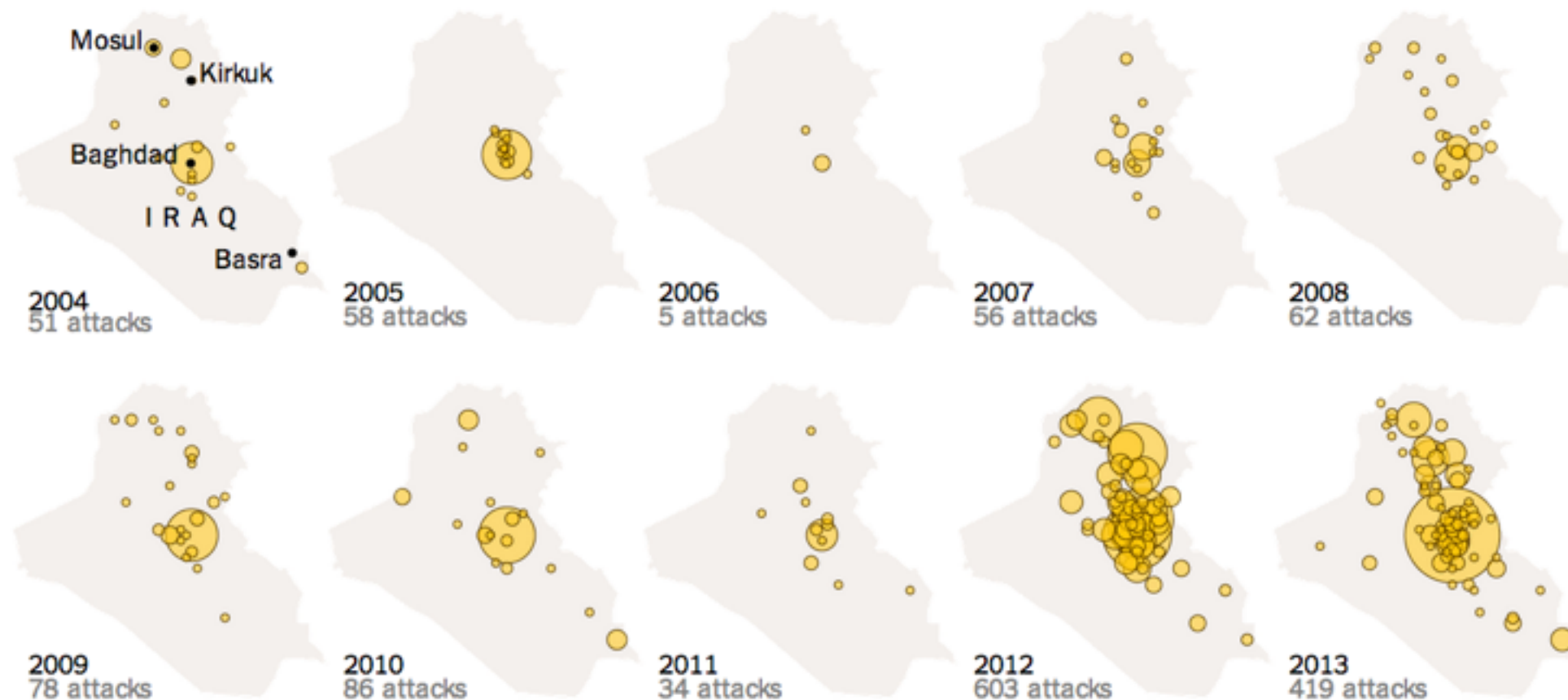
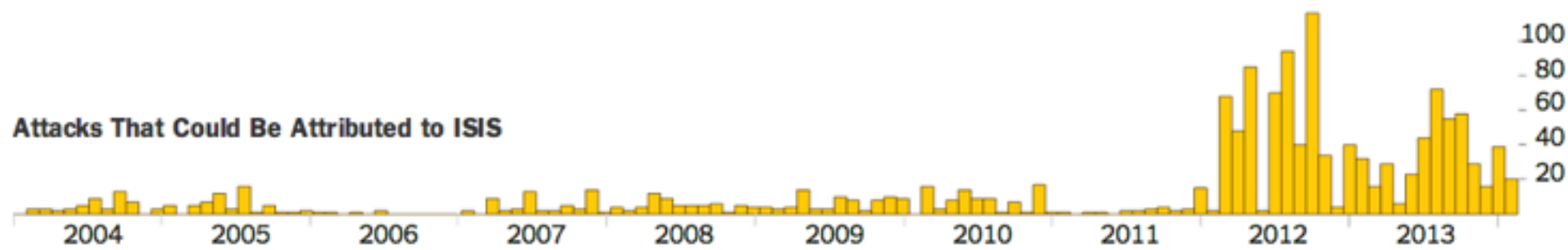
graphic must provide all
context



Ten Years of ISIS Attacks in Iraq PUBLISHED JUNE 15

The Islamic State in Iraq and Syria, the Sunni militant group that staged a stunning operation to seize Iraq's second largest city, has been fueling sectarian violence in the region for years.

[RELATED ARTICLE »](#)



2004-05 The group emerges as "Al Qaeda in Iraq" following the U.S.-led invasion of Iraq. Its goal is to provoke a civil war.

2006-07 The group's February 2006 bombing of one of Iraq's most revered Shiite shrines [ignites sectarian violence](#) across the country. After merging with several other Sunni insurgent groups, it changes its name to the Islamic State of Iraq.

2008-10 I.S.I. claims responsibility for more than 200 attacks, many in densely-populated areas around Baghdad.

2011-12 The group is relatively quiet for most of 2011, but re-emerges after American troops withdraw from Iraq.

2013 Seeing new opportunities for growth, I.S.I. enters Syria's civil war and changes its name to reflect a new aim of establishing an Islamic religious state spanning Iraq and Syria. Its success in Syria [bleeds over the border to Iraq](#).

Note: Before 2011, less information was available on who was responsible for attacks, so the number of ISIS attacks from 2004 to 2010 may be undercounted.

Sources: Global Terrorism Database, National Consortium for the Study of Terrorism and Responses to Terrorism (attack data); Congressional Research Service; Council on Foreign Relations; Long War Journal; Institute for the Study of War

My goals

You get the tools:

- to rapidly **explore** data visually

- to **experiment** with different visual displays of data

- to **critique** visual displays of data

- to **polish** plots for publication

Topics

See syllabus

Why ggplot2?

Next week, we'll jump right into ggplot2

- gives us a language for describing graphics

- allows us to experiment with perceptual concepts

- we can tweak almost any visual aspect of the resulting plot

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Syllabus

Assignments

Three big assignments.

$15 + 15 + 20 = \mathbf{50 \text{ points.}}$

The last one will involve you sourcing data, so start thinking.

Lots of little homework challenges. Earn up to **50 points**, but I will post at least 60 - Complete/Incomplete

Submit on Blackboard

(or if you are unregistered, by email)

Email policy

For questions about course content, R code, or cool graphics you find, use the forum.

For other questions you may email me directly.

Office hours

Mon/Wed 2-3pm Kidder 76 (or by appt)

wickhamc@stat.oregonstate.edu

Ask questions!

Ask for feedback!

Guiding principles

Tufte's graphical excellence...

- ...is the well designed presentation of interesting data
- a matter of *substance*, of *statistics* and of *design*.
- ...consists of complex data communicated with clarity, precision and efficiency.
- ...is that which gives to the viewer the greatest number of ideas in the shortest time with the least ink in the smallest space.
- ...is nearly always multivariate.
- ...requires telling the truth about the data.

Ross Ihaka's three principles

If the “story” is simple, keep it simple.

If the “story” is complex, make it look simple.

Tell the truth.

Next time...

Ways to **not**:

Tell the truth

