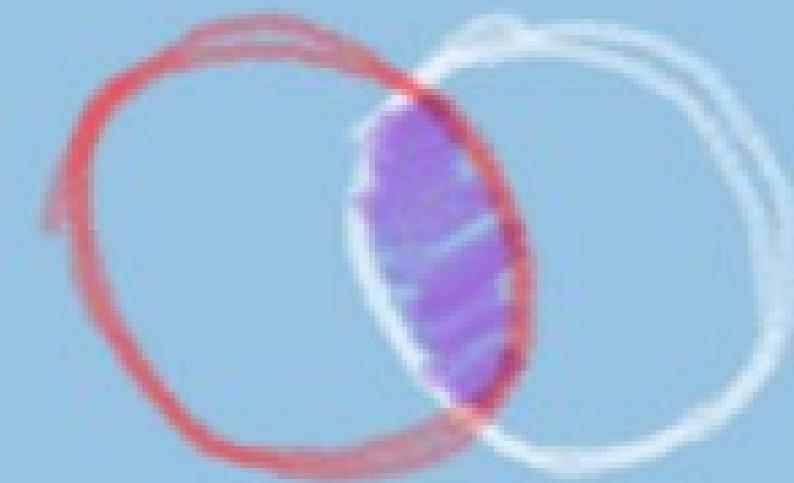


Data Visualization

Xavi Gimenez - March 2017

The Grammar Visualization Interaction
of Graphics Guidelines everywhere

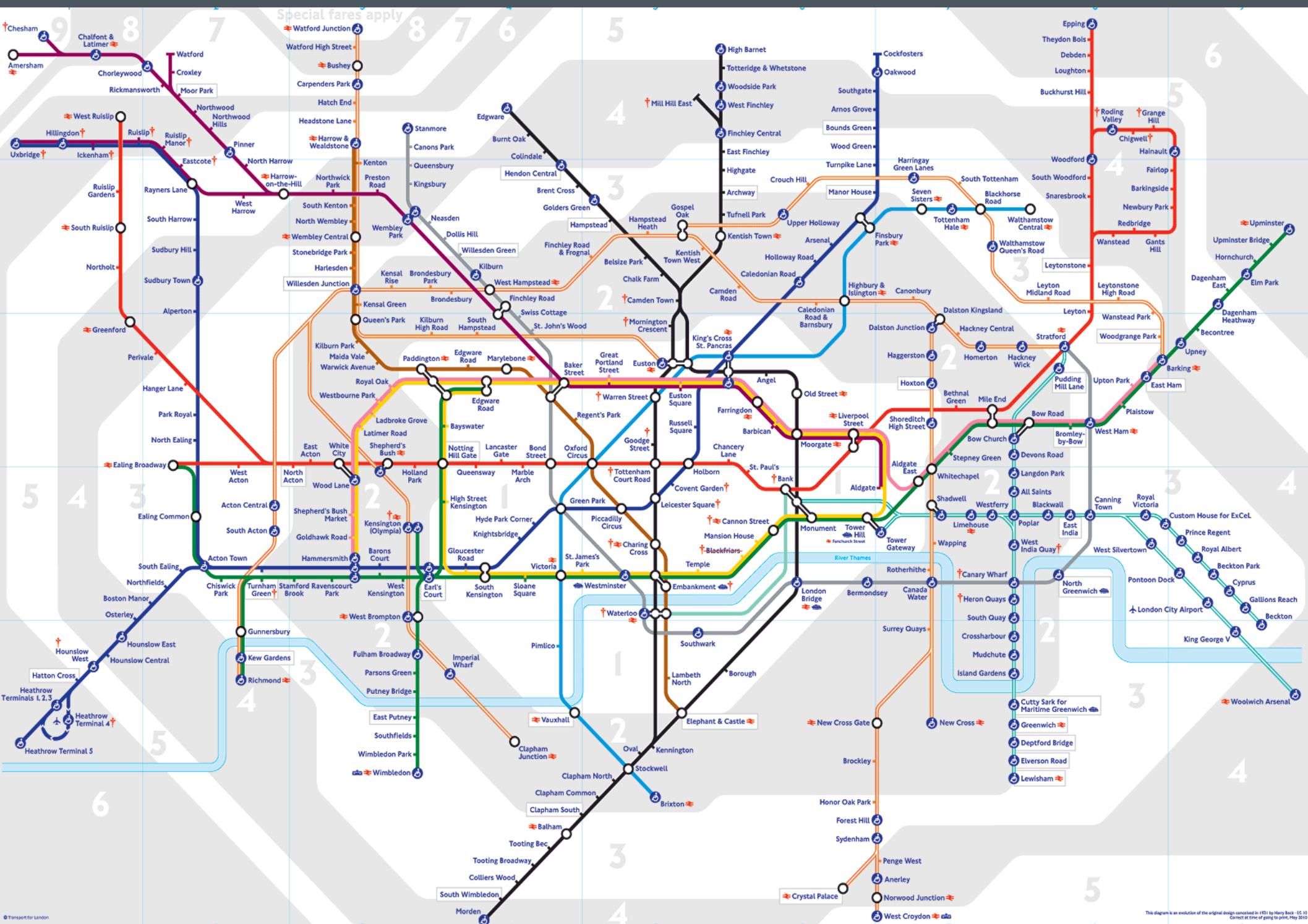


←
More

Level of
academicality

→
Less

THE GRAMMAR OF GRAPHICS



THE GRAMMAR OF GRAPHICS

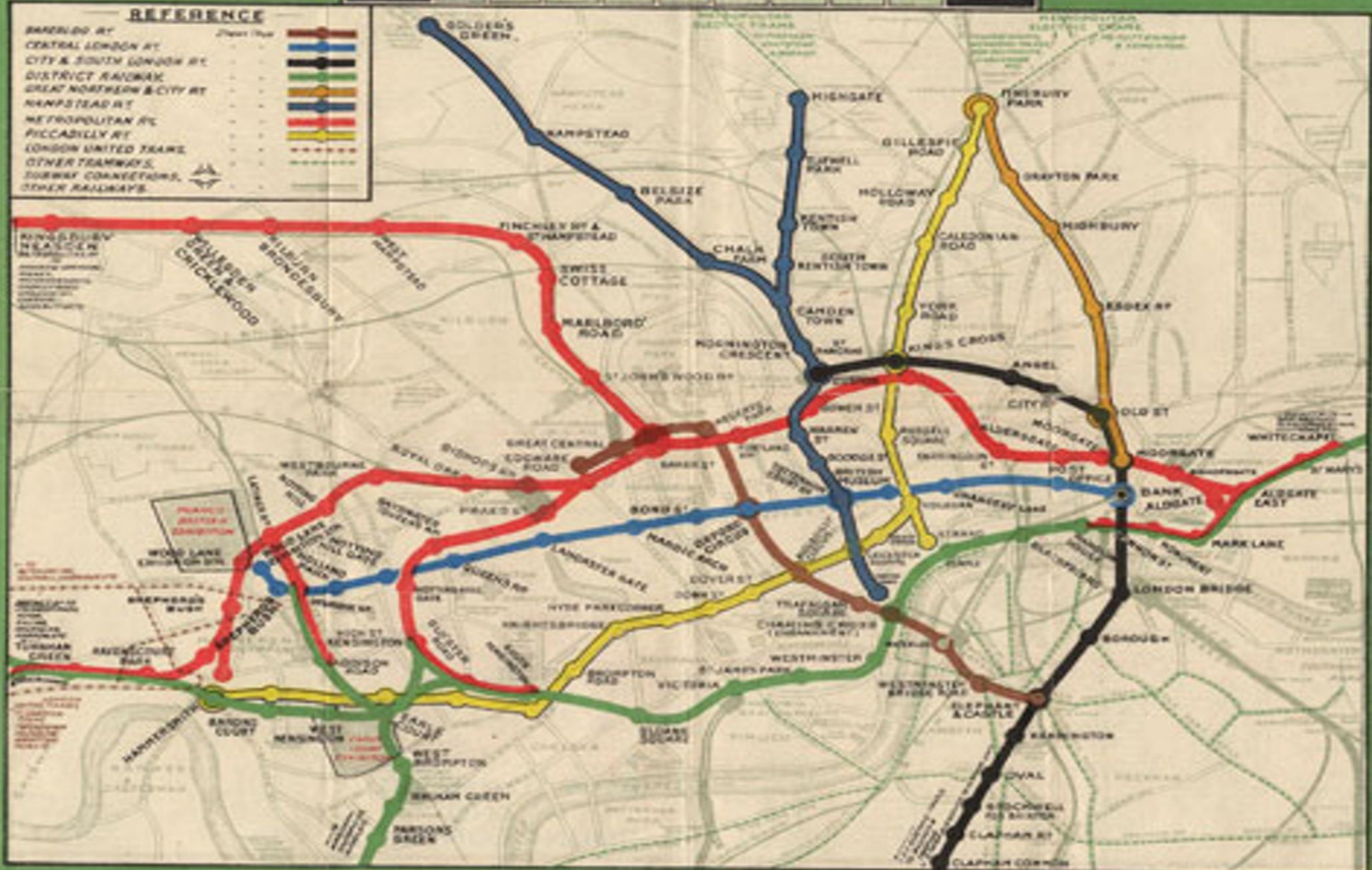
LONDON

UNDERGROUND

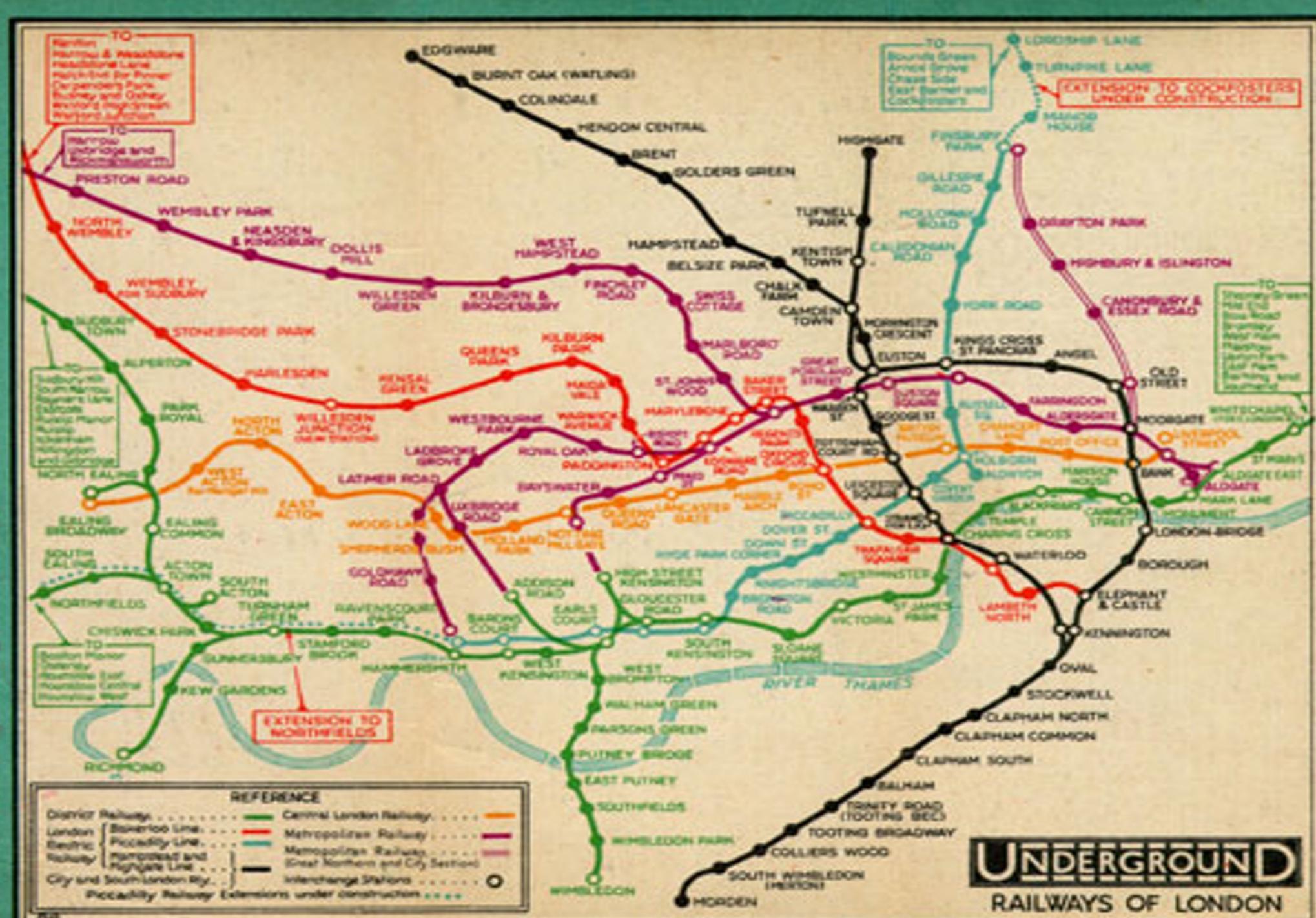
RAILWAYS

REFERENCE

BALFOUR BY
CENTRAL LONDON BY
CITY & SOUTH LONDON BY
DISTRICT RAILWAY
GREAT NORTHERN & CITY BY
HAMPSTEAD BY
METROPOLITAN BY
PICCADILLY BY
LONDON UNITED TRAMS
OTHER TRAMWAYS,
SUBWAY CONNECTIONS,
OTHER RAILWAYS



THE GRAMMAR OF GRAPHICS



THE GRAMMAR OF GRAPHICS

Harold Beck



THE GRAMMAR OF GRAPHICS



Where is the theory about what makes
graphic representations of knowledge
or data work?

Visual language?

Grammar?

THE GRAMMAR OF GRAPHICS



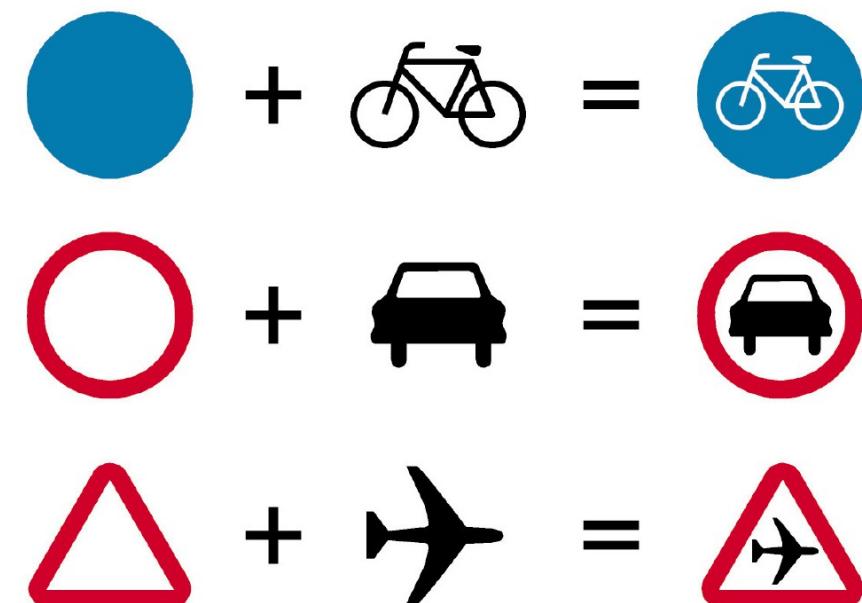
Every known natural language is based
on the possibility of combining
“building blocks” of different categories

What about visual languages?



Every known natural language is based
on the possibility of combining
“building blocks” of different categories

**What about
visual languages?**

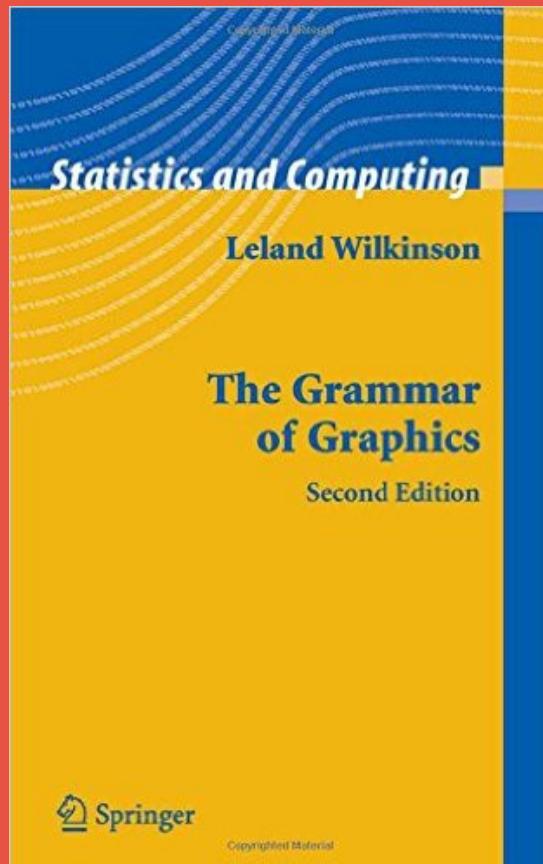


Every known natural language is based
on the possibility of combining
“building blocks” of different categories

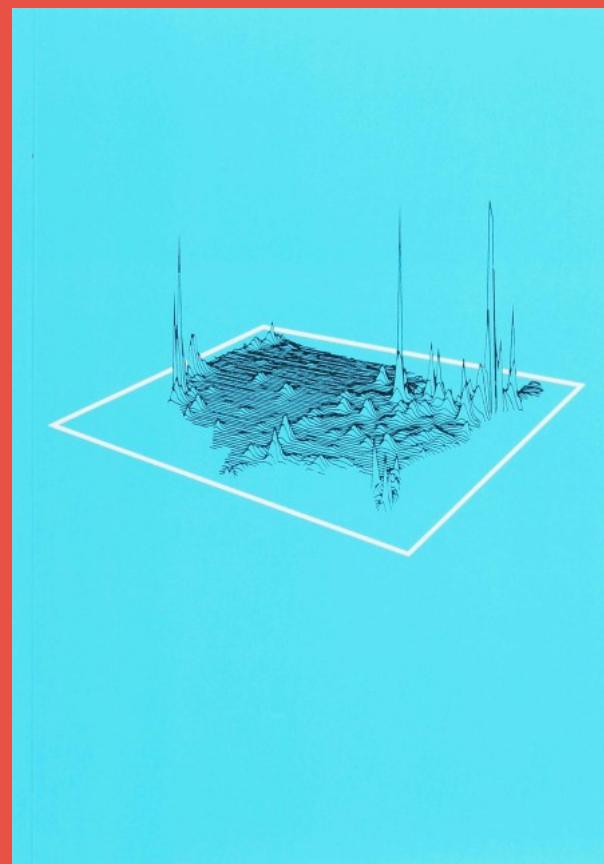
**What about
visual languages?**

THE GRAMMAR OF GRAPHICS

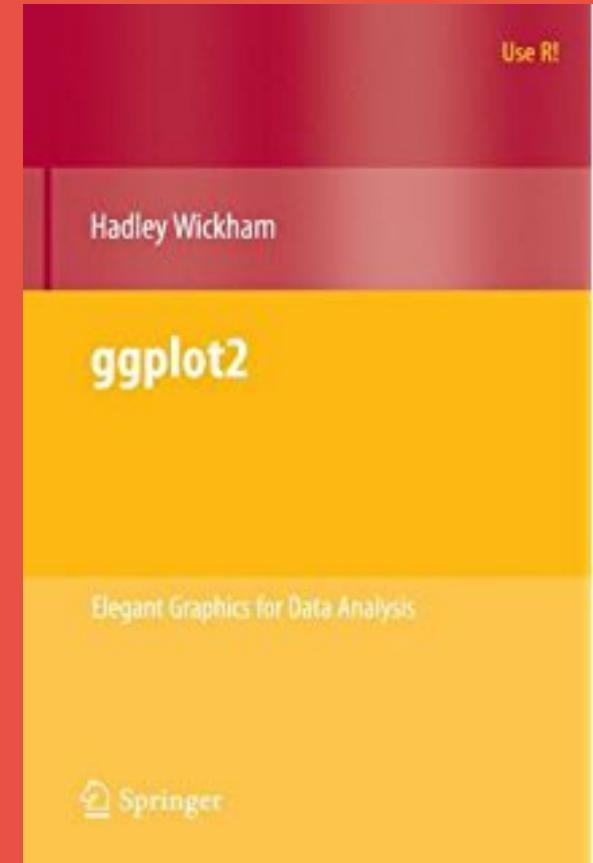
A lot of literature out there!



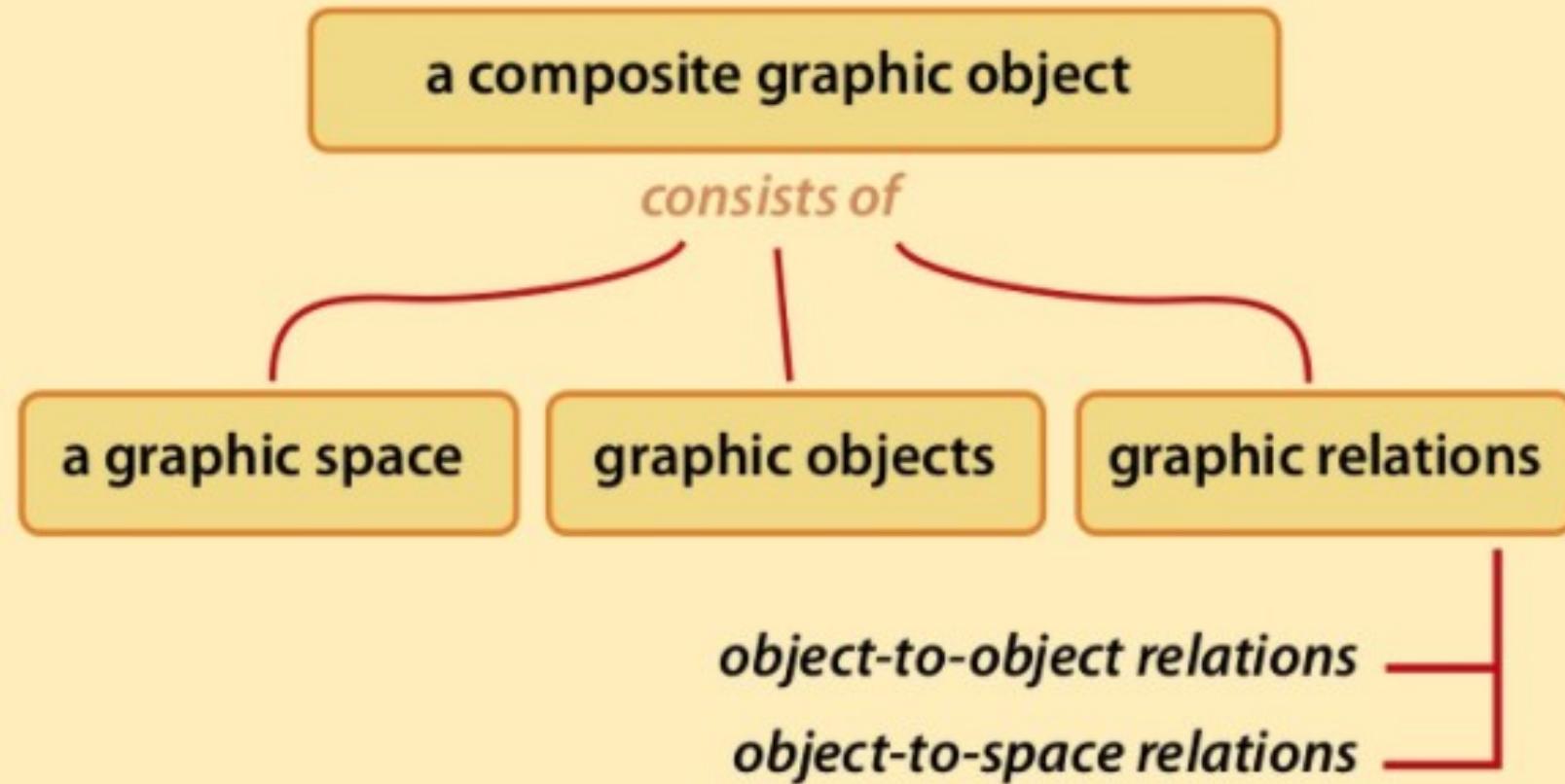
Leland Wilkinson



Yuri Engelhardt



Hadley Wickham



Relations are achieved (represented) visually using 'gestalt principles' and techniques such as *proximity*, *similarity*, *common region* (enclosure), *connectedness*, *good continuation* (alignment), *assumed closure*

Gestalt principles

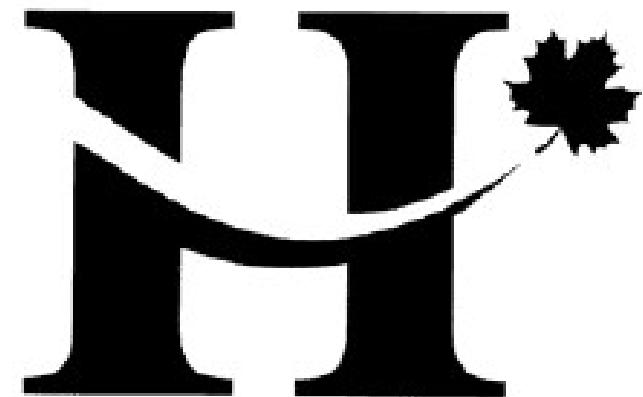
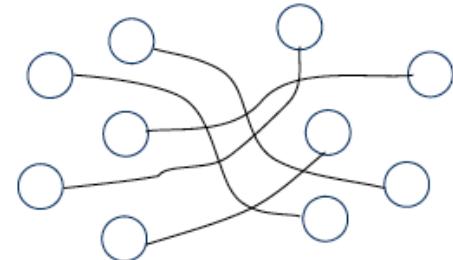
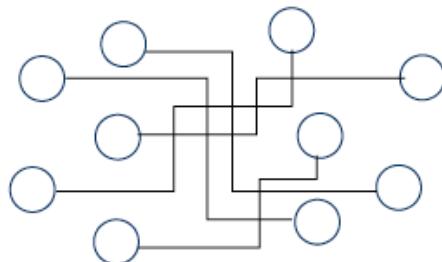
Theory of visual perception, attempting to describe how people tend to organize visual elements into groups or unified wholes when certain principles are applied.

Parts of a figure that have a “good shape”, or point to a common direction, are perceived as a whole and not as “part of”.

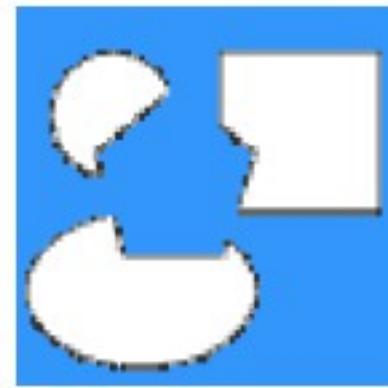
Similarity



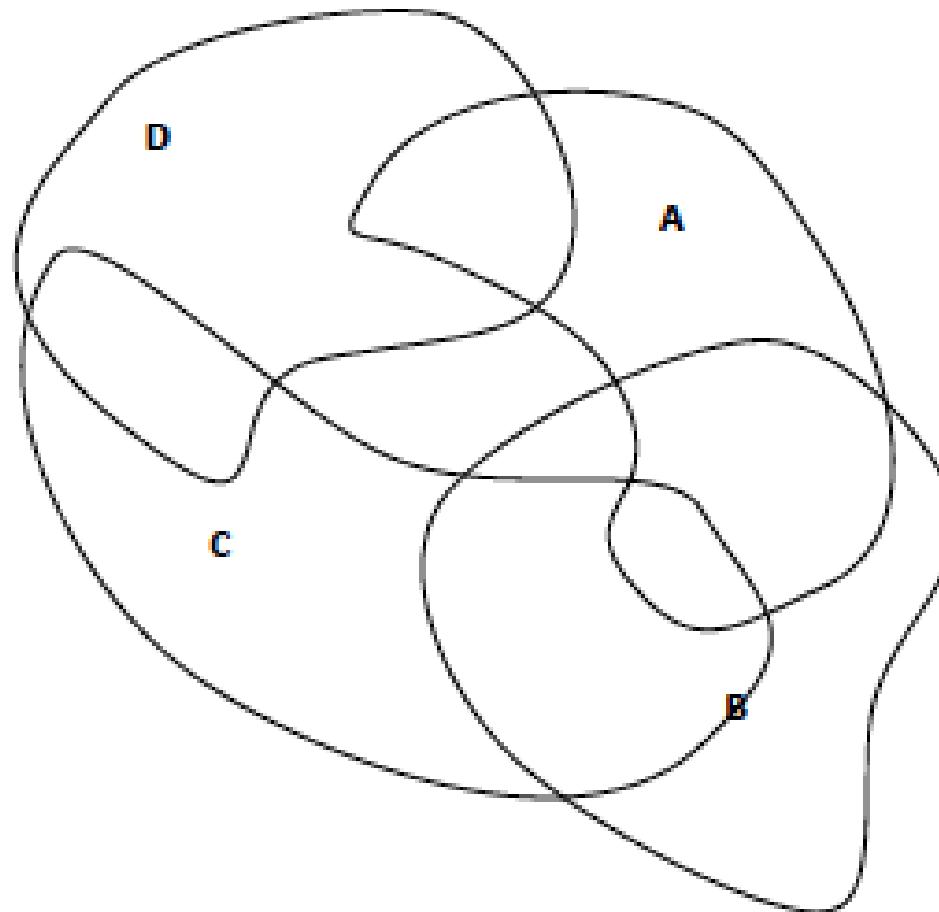
Continuation

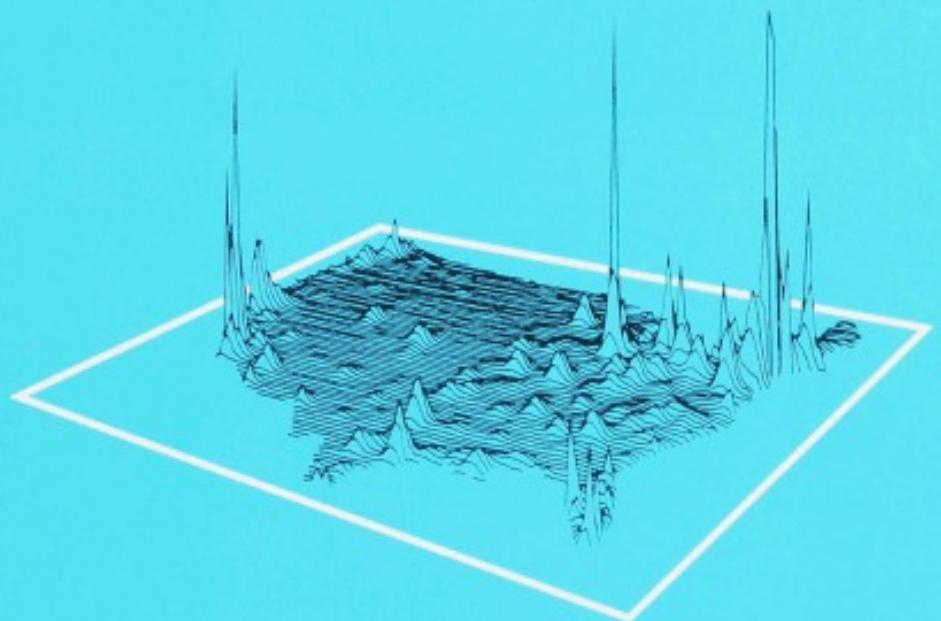


Closure



Closure / Venn diagram





Yuri Engelhardt

The Language of Graphics

A framework for the analysis of
syntax and meaning in maps,
charts and diagrams

- Spaces

- complete spaces



- axes

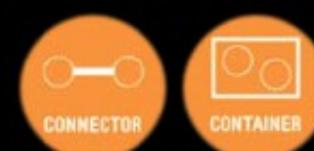


- Objects

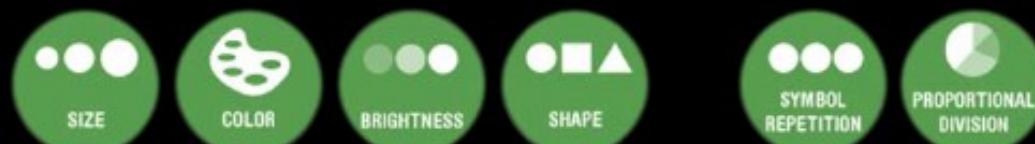
- primary objects



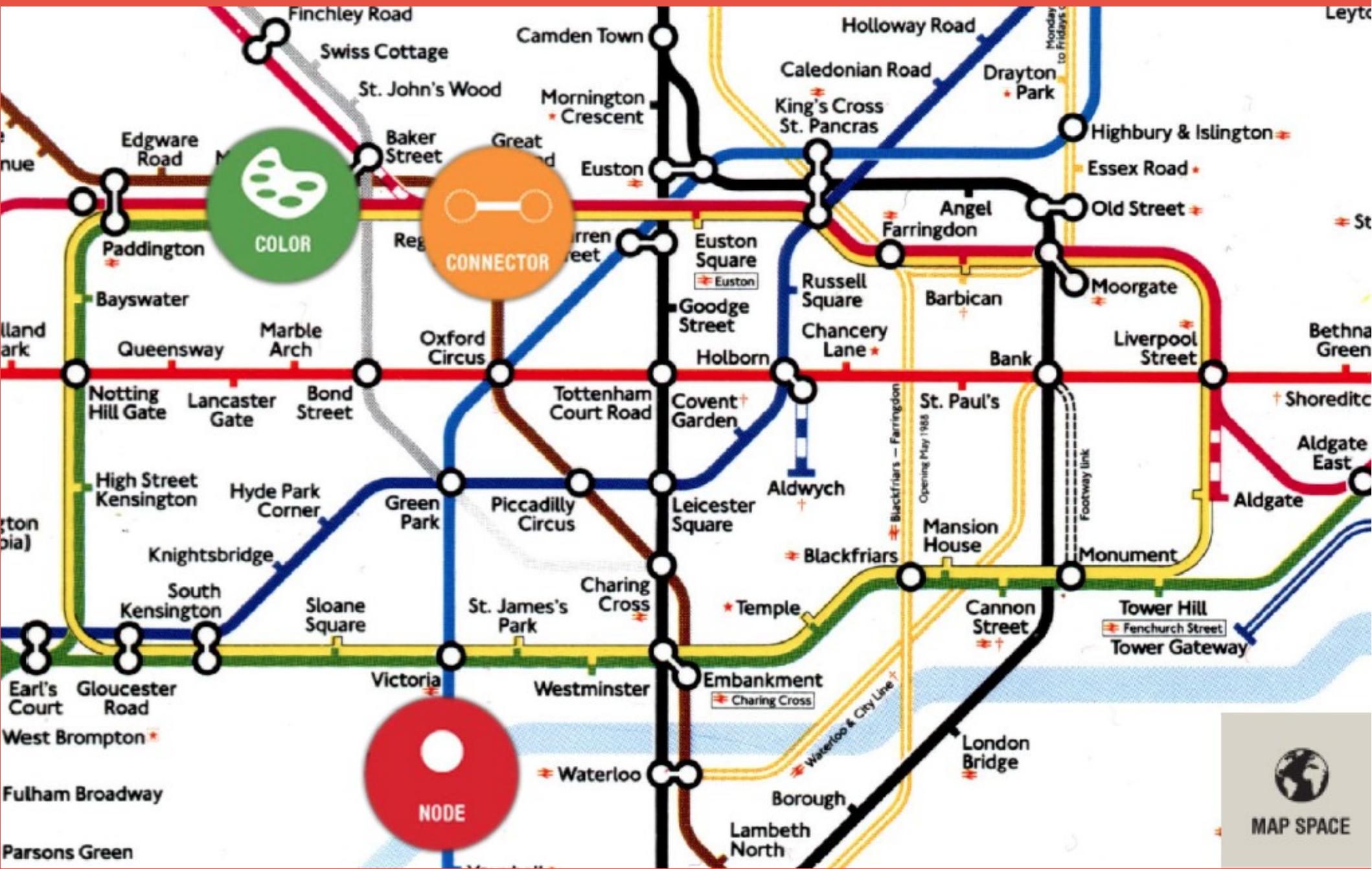
- secondary objects



- Properties



THE GRAMMAR OF GRAPHICS



THE GRAMMAR OF GRAPHICS



Hadley Wickham

A Layered Grammar of Graphics

A statistical graphic is a mapping
of data variables to aesthetic
attributes of geometric objects

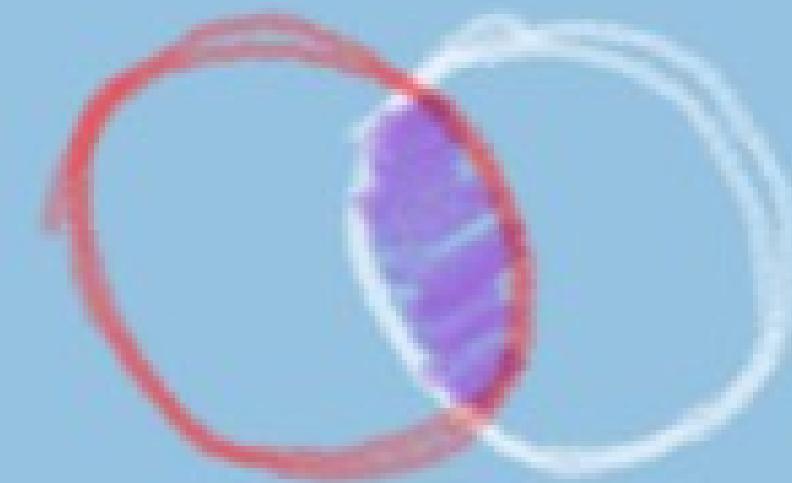


The grammar tells us what words make up our graphical “sentences,” but offers no advice on how to write well.

How can we build on top of the grammar to help data analysts build compelling, revealing graphics?

What would a poetry of graphics look like?

The Grammar Visualization Interaction of Graphics Guidelines everywhere



←
More

Level of
academicity

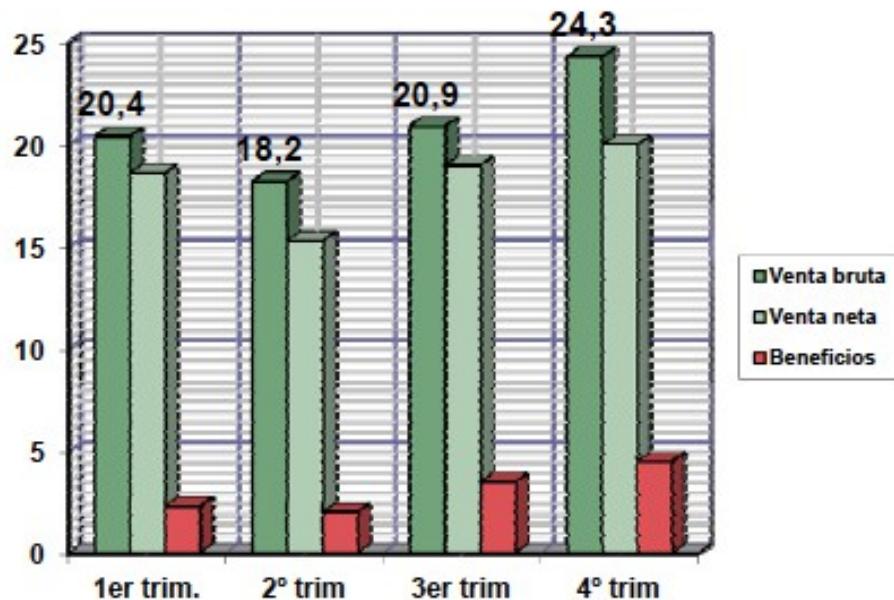
→
Less

DATA INK RATIO =

DATA INK

**TOTAL INK USED TO
PRINT THE GRAPHIC**

The aim is to
maximize the data-
ink ratio



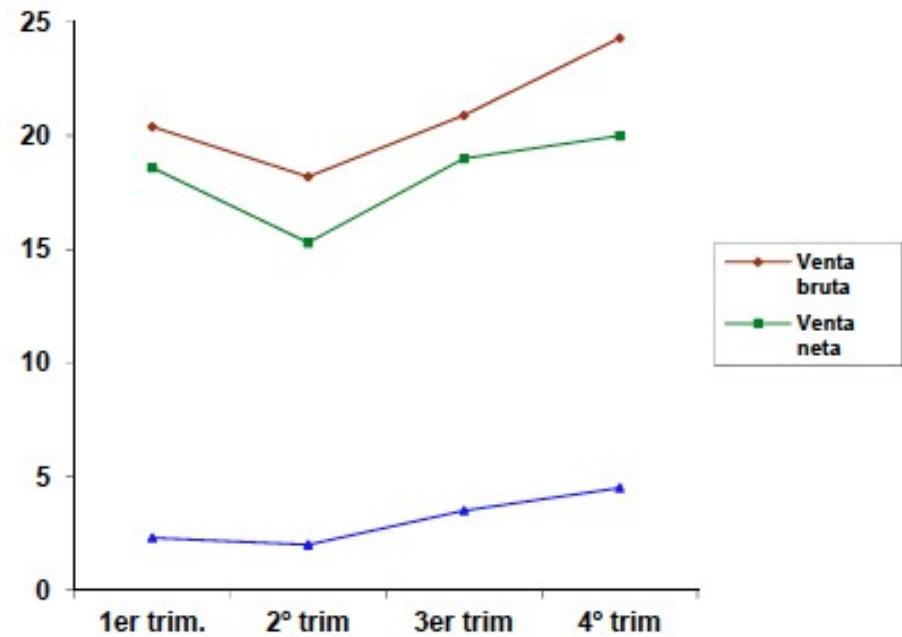
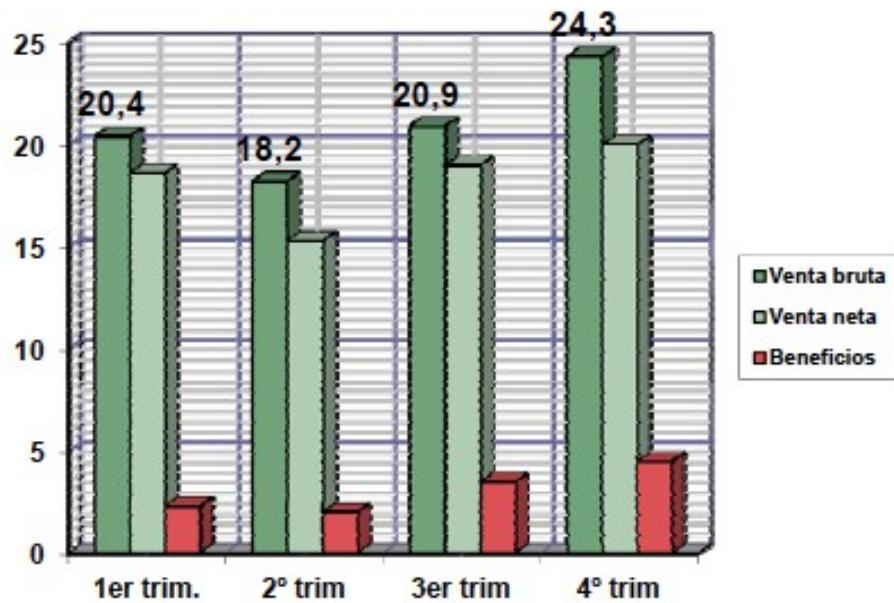
¿Proportion of the graphic that can be erased?

Remove non-data ink, when reasonable

Axis, scales, secondary lines can not be data

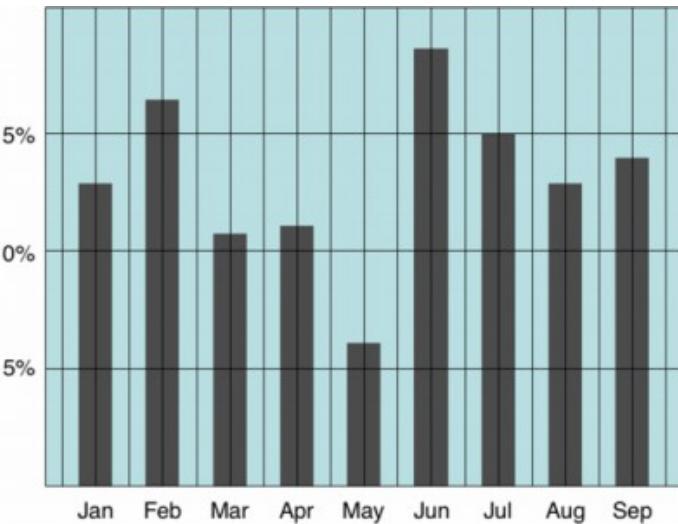
Non-data ink does not add information

(SOME) VISUALIZATION GUIDELINES

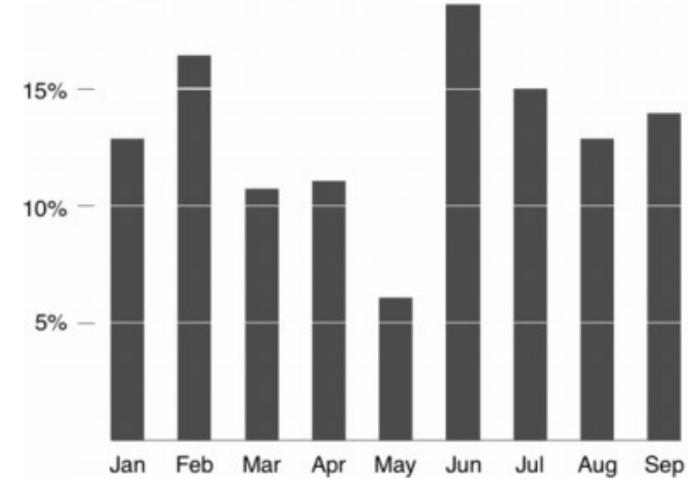


Is there less information
in the graphic above?

(SOME) VISUALIZATION GUIDELINES



Low data-ink ratio

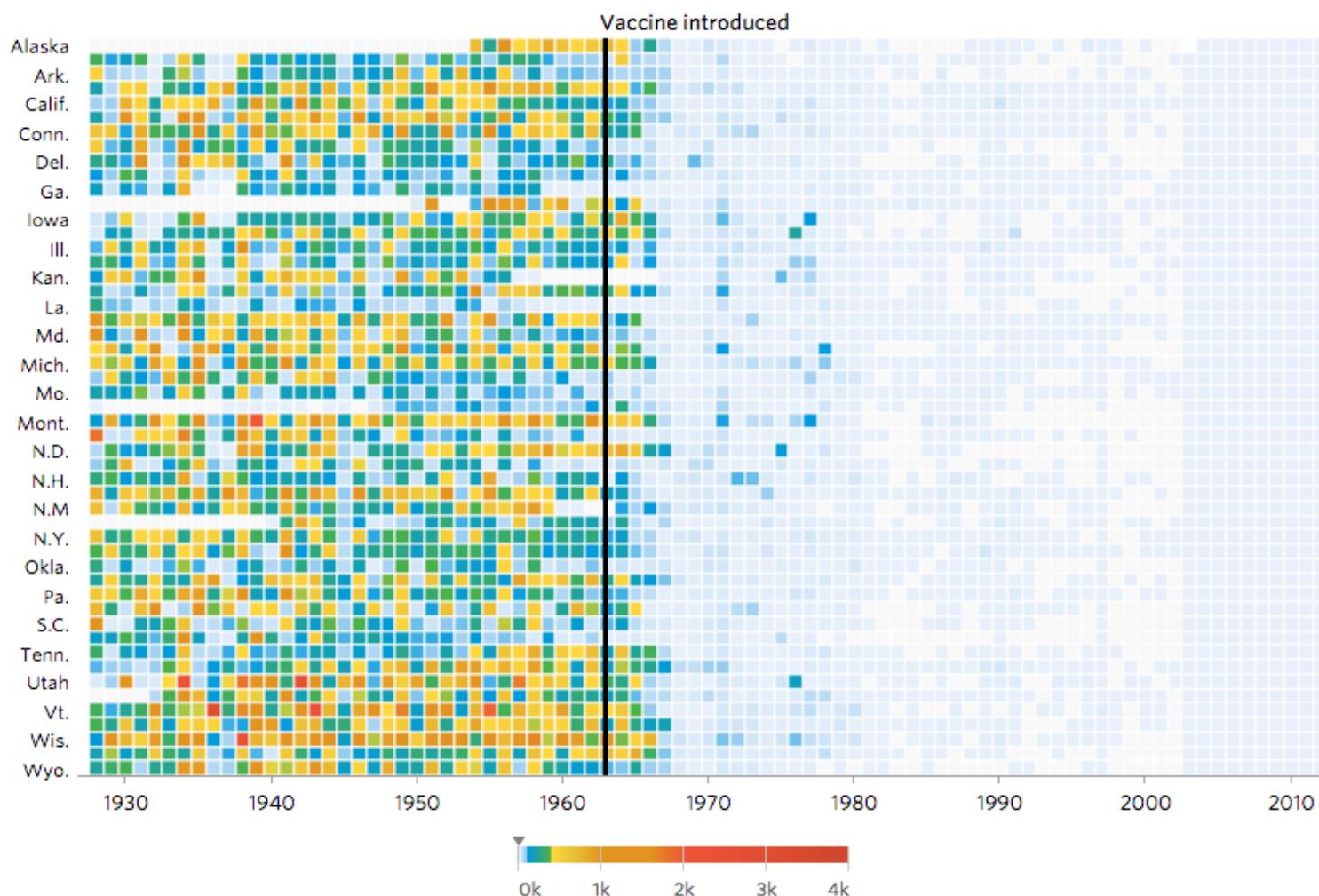


High data-ink ratio

Wall Street Journal – The impact of Vaccines

<http://graphics.wsj.com/infectious-diseases-and-vaccines/>

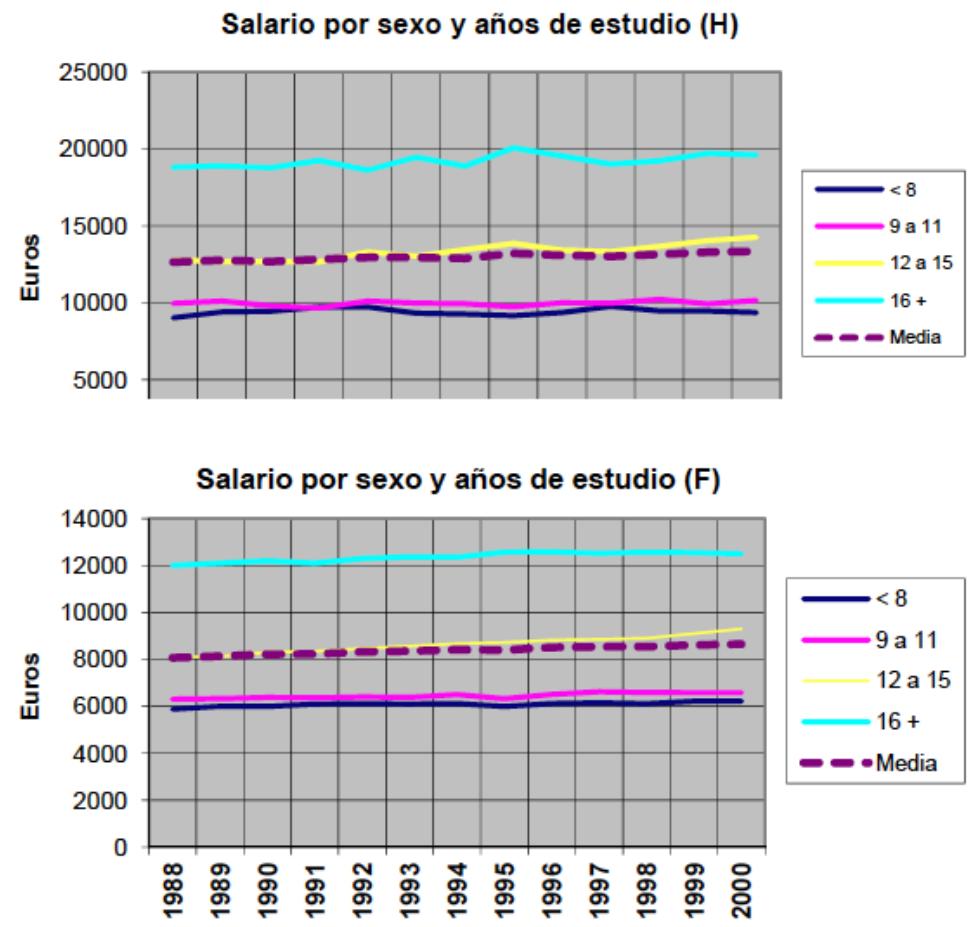
Measles



Do not show what is already trivial

¿What is already evident?

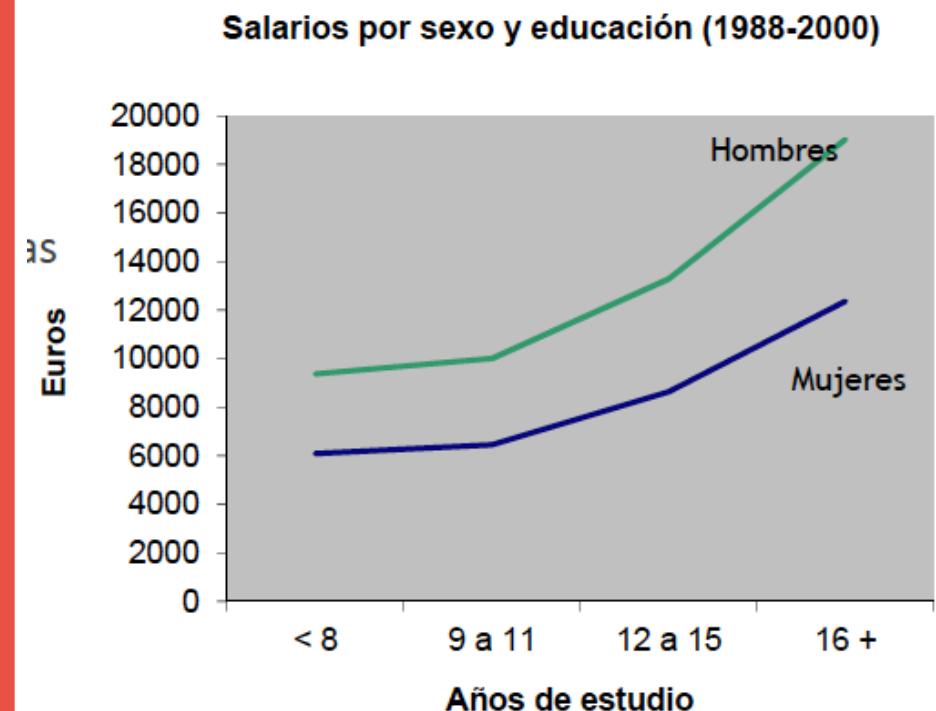
¿What is the message
you want to communicate?



Do not show what is already trivial

¿What is already evident?

¿What is the message
you want to communicate?



Color

Try to avoid pure colors, with high saturation.

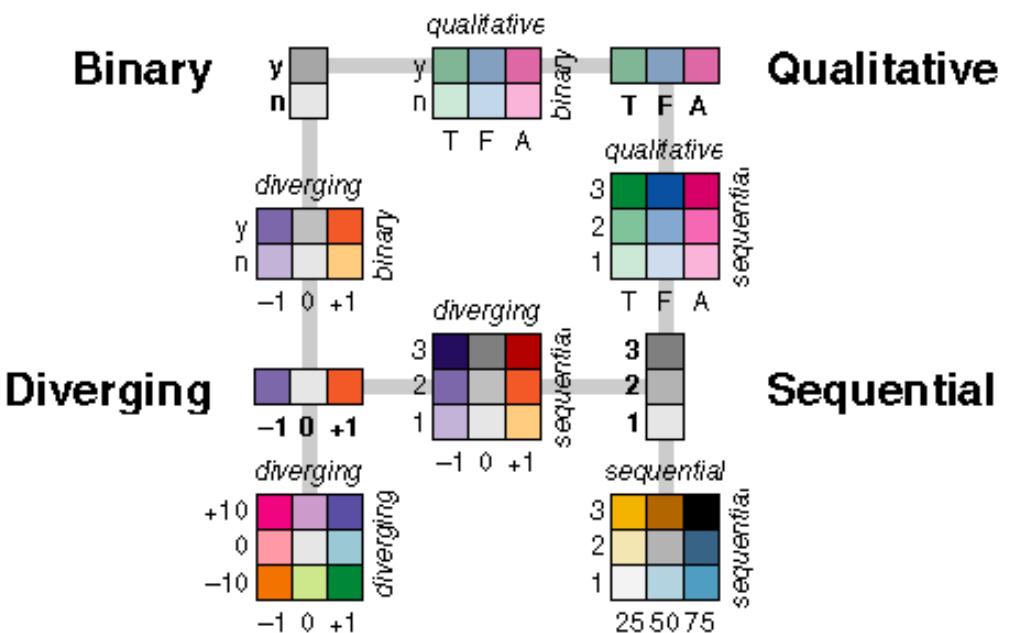
Use saturated color wisely!

They are used in the nature to draw attention so do the same!



Brewer

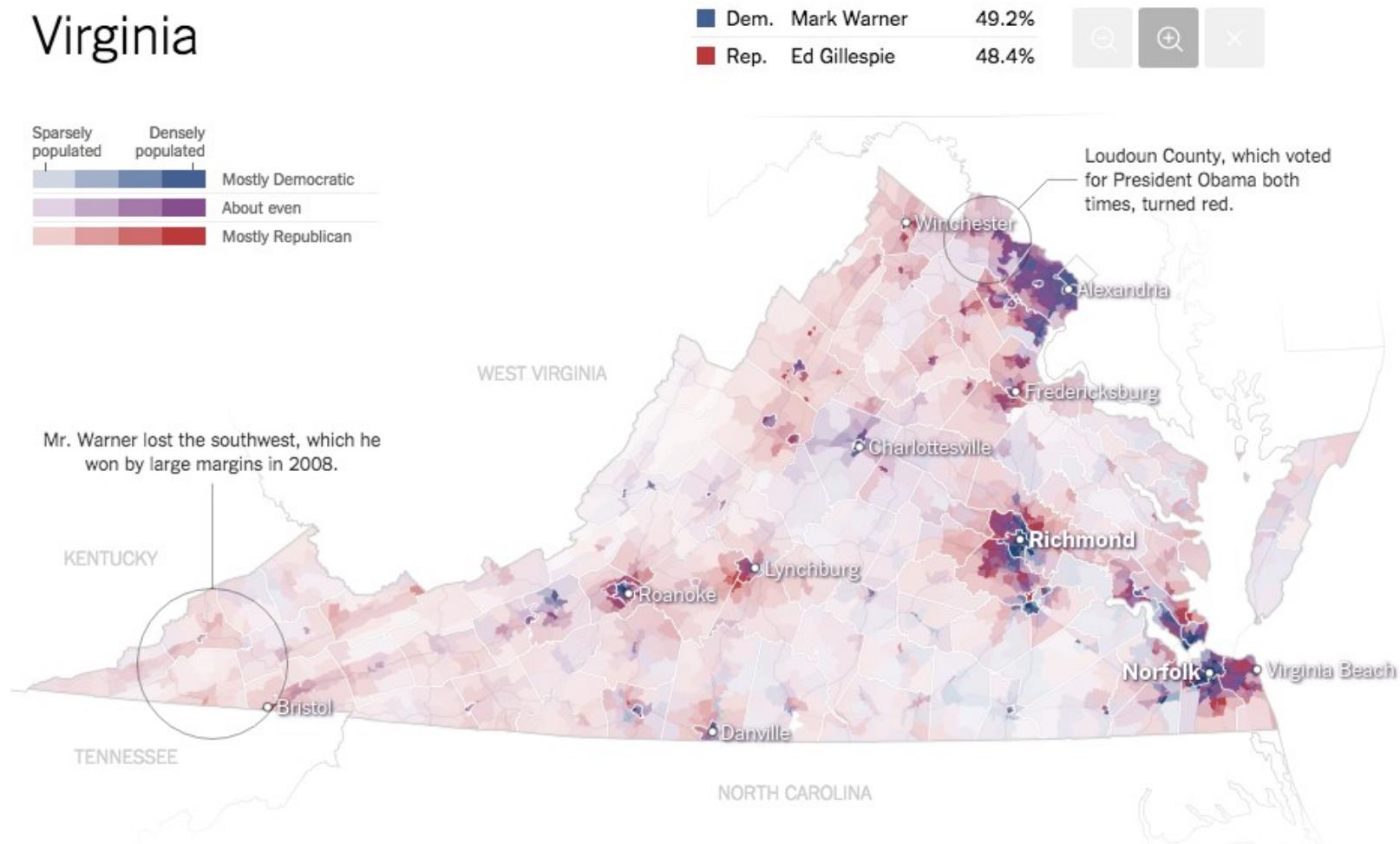
Brewer palettes, designed by Cynthia Brewer: robust color Combinations, selected by its properties to be used in Data Visualization and Information Design.



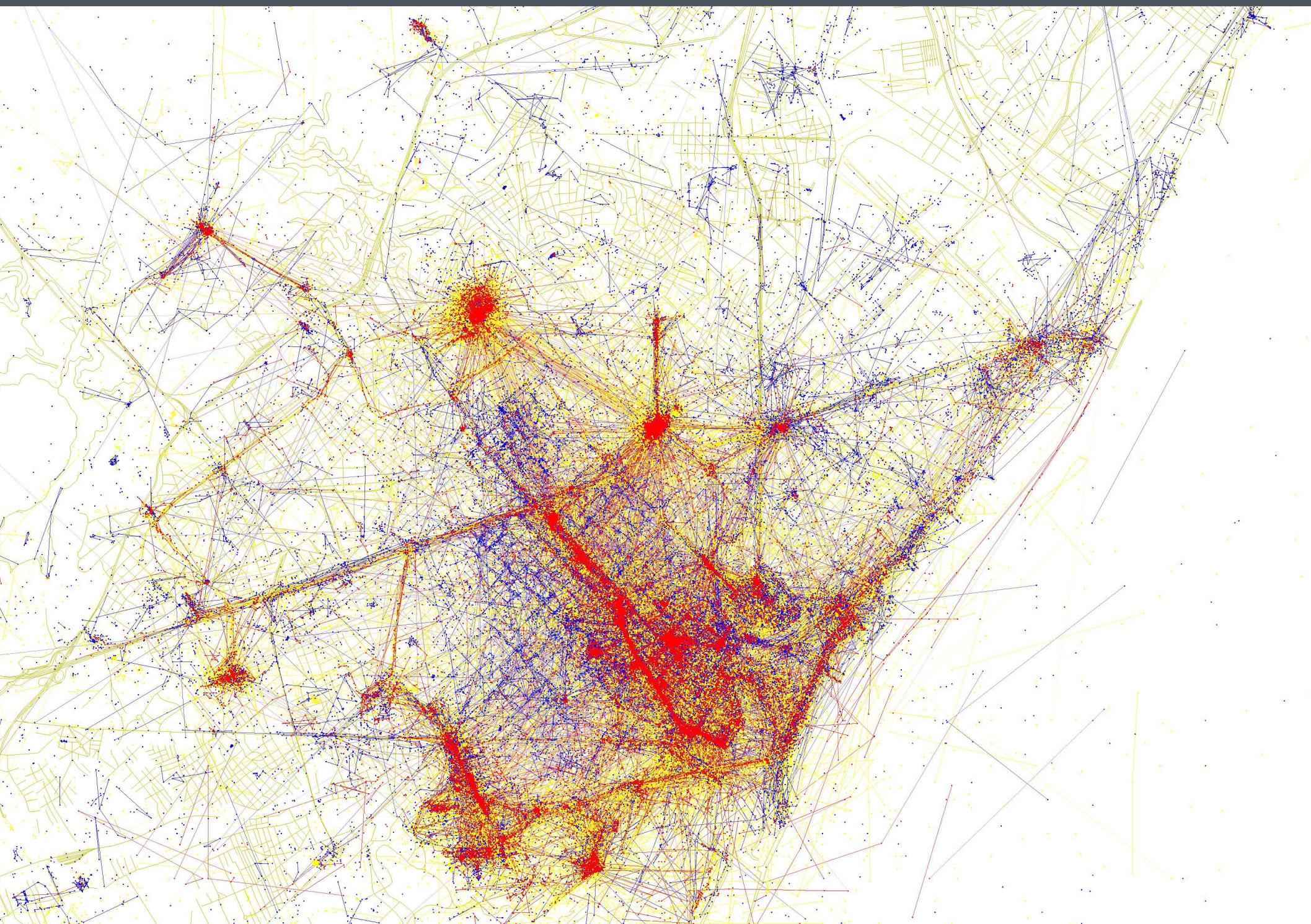
(SOME) VISUALIZATION GUIDELINES

New York Times – Maps from Midterm elections

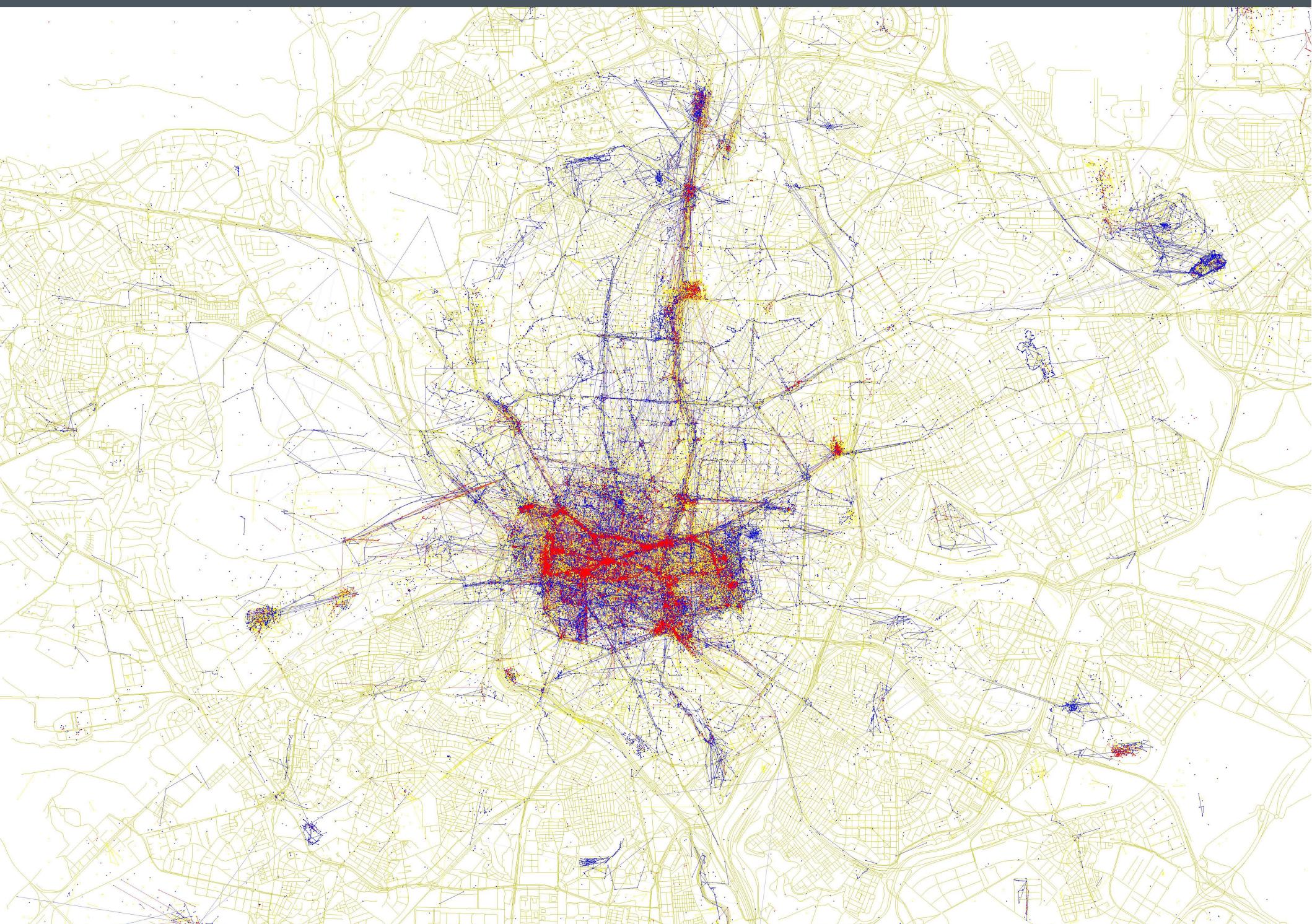
<http://www.nytimes.com/interactive/2014/11/04/upshot/senate-maps.html>



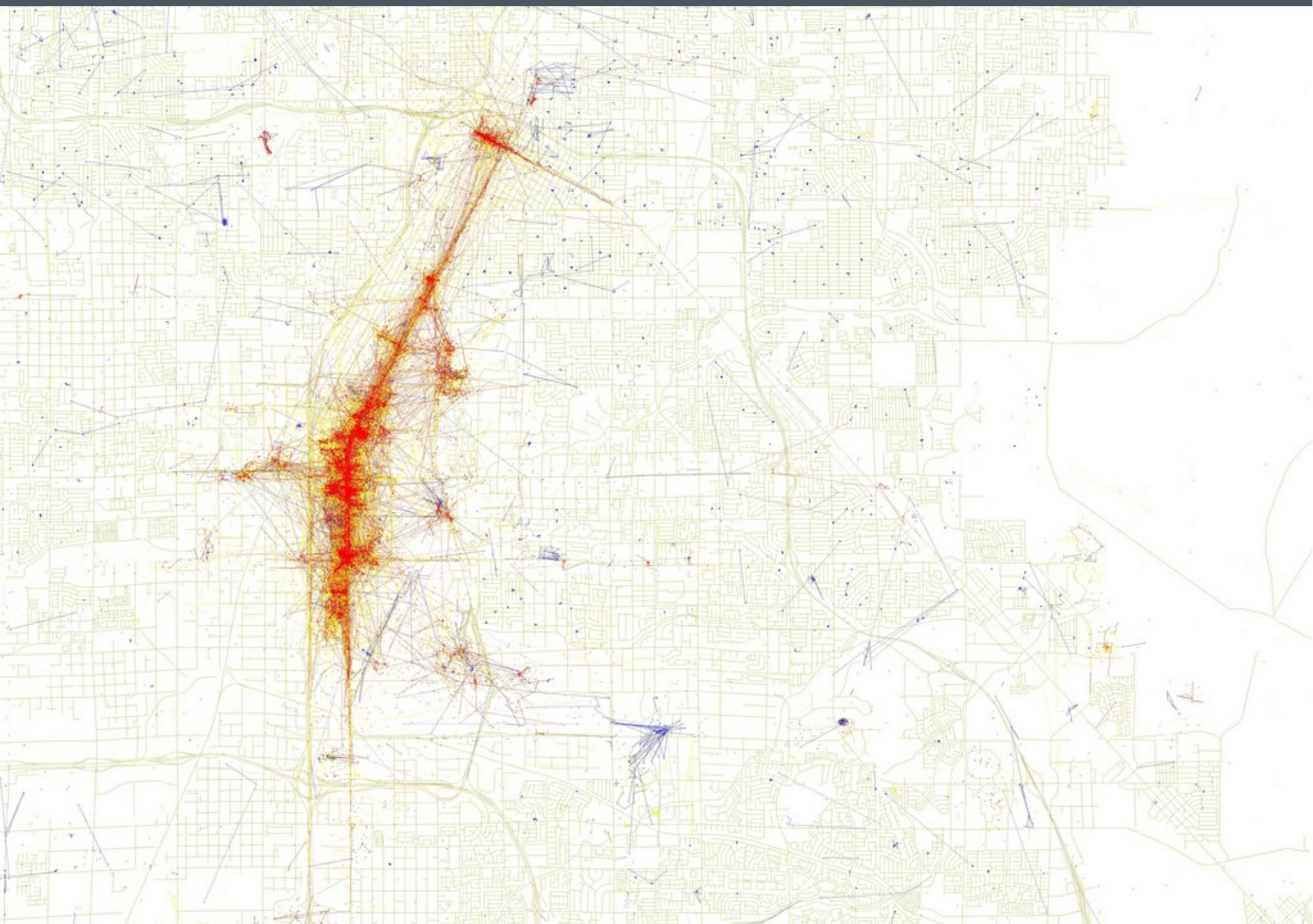
(SOME) VISUALIZATION GUIDELINES



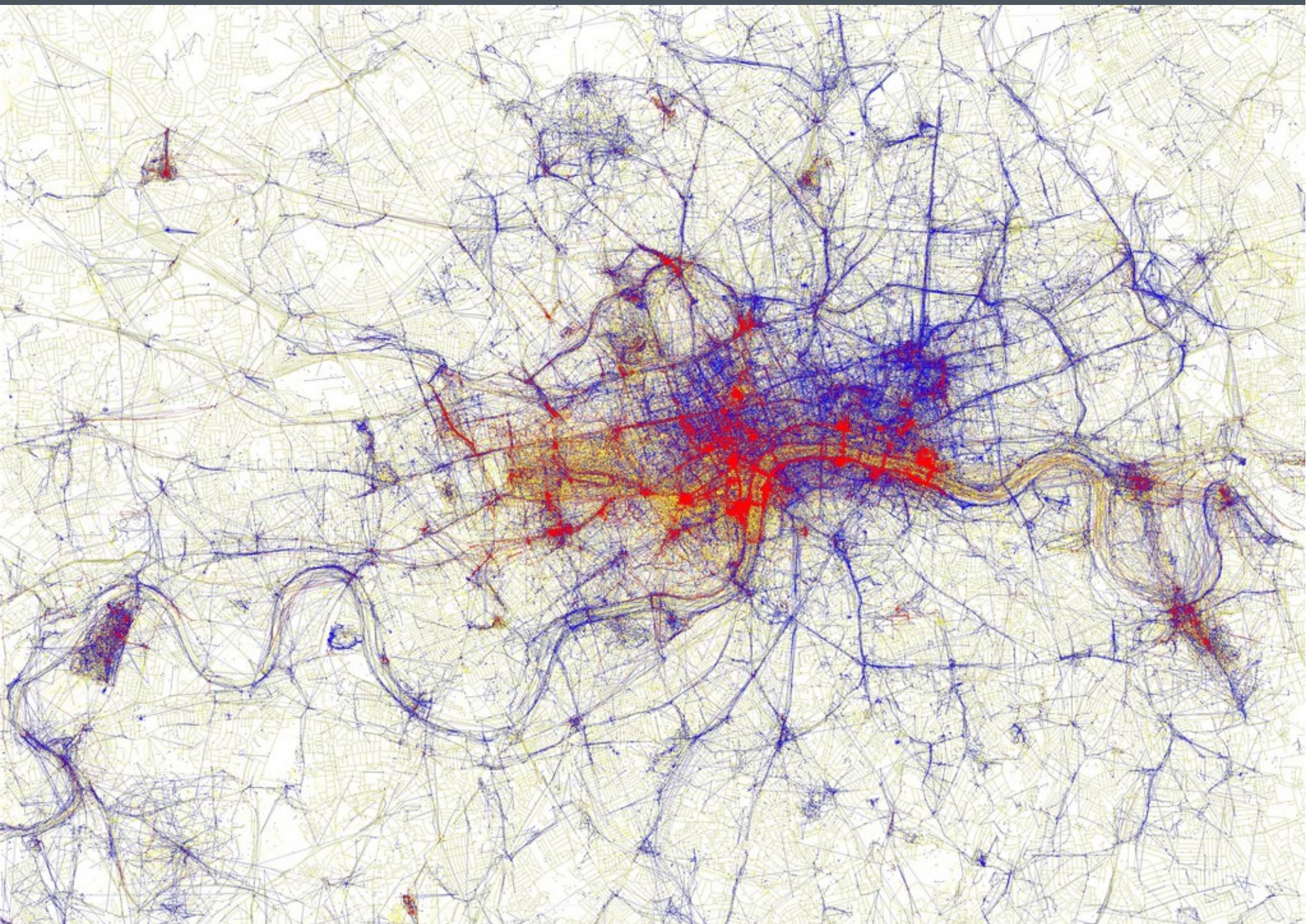
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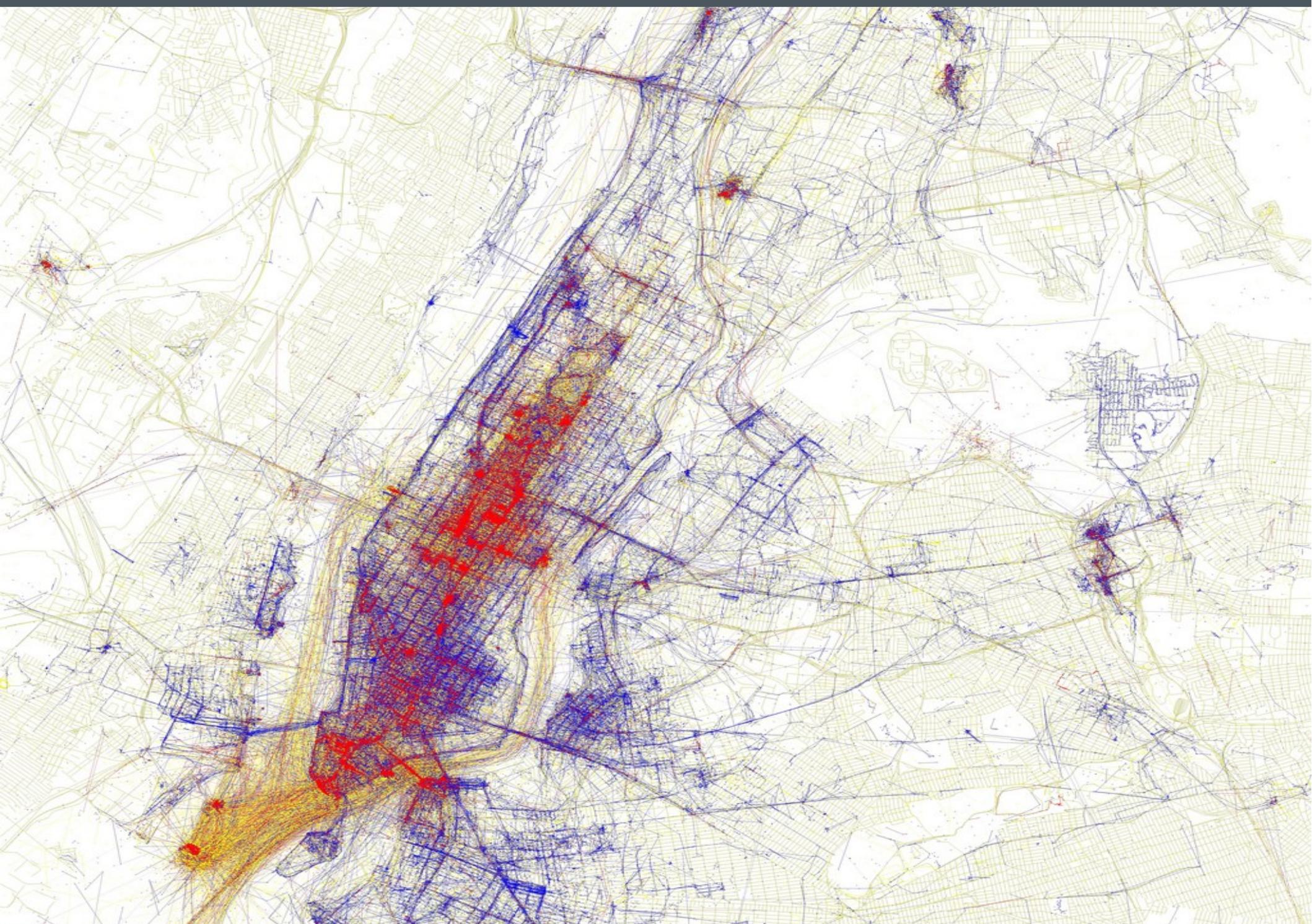
(SOME) VISUALIZATION GUIDELINES



(SOME) VISUALIZATION GUIDELINES



(SOME) VISUALIZATION GUIDELINES



(SOME) VISUALIZATION GUIDELINES

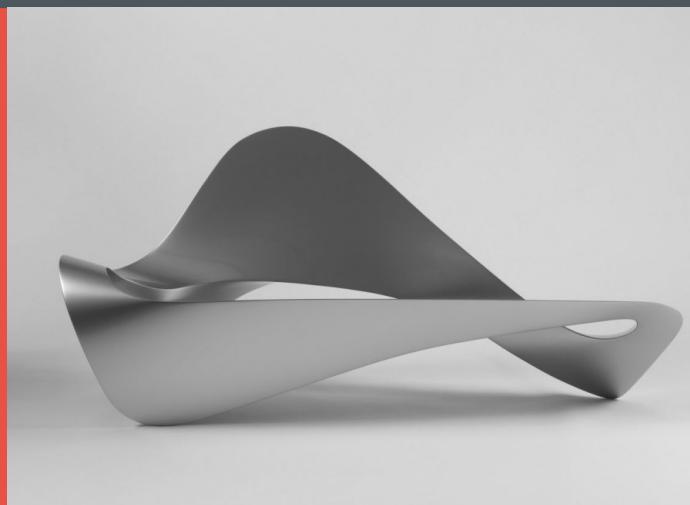
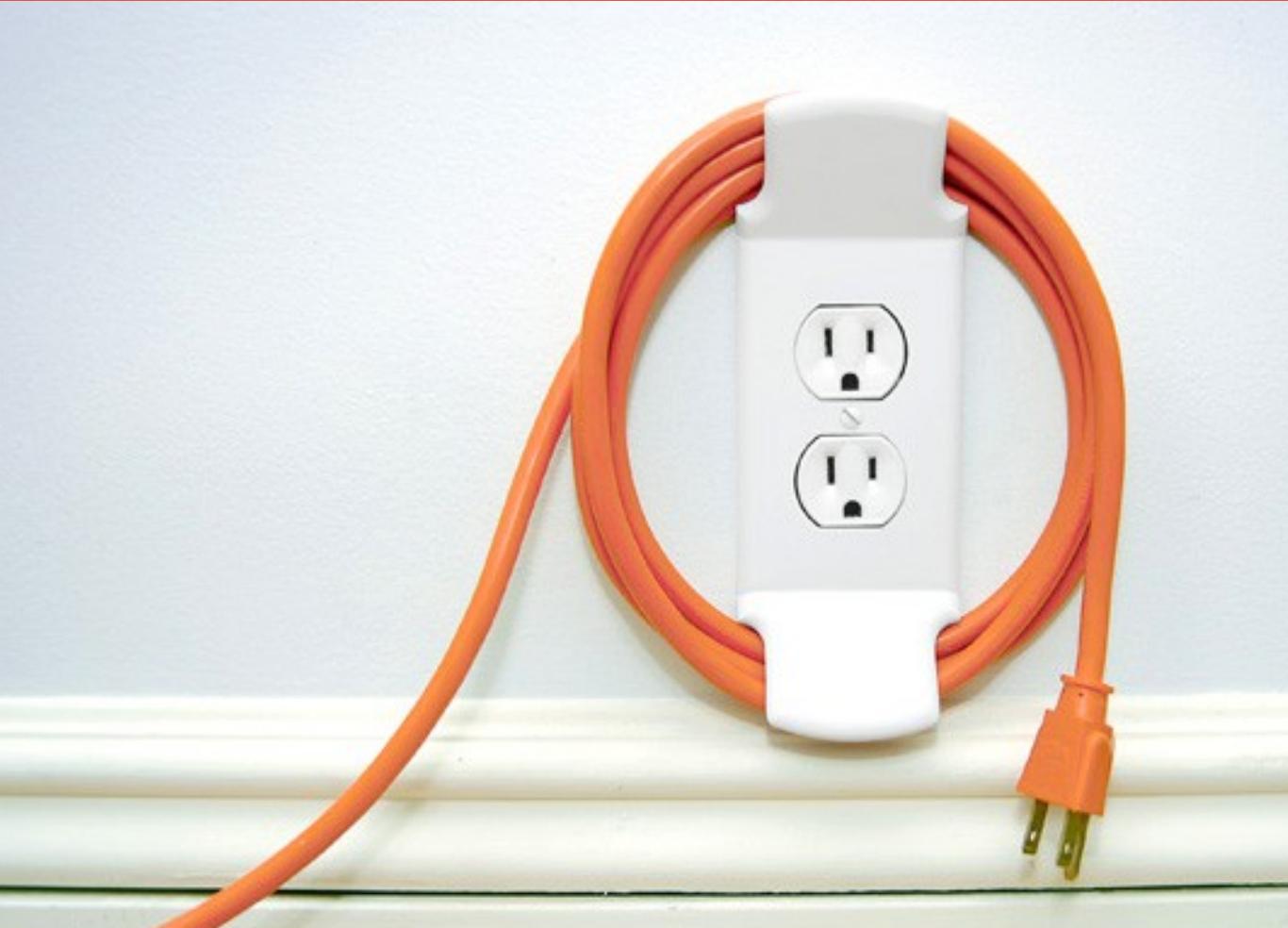


(SOME) VISUALIZATION GUIDELINES

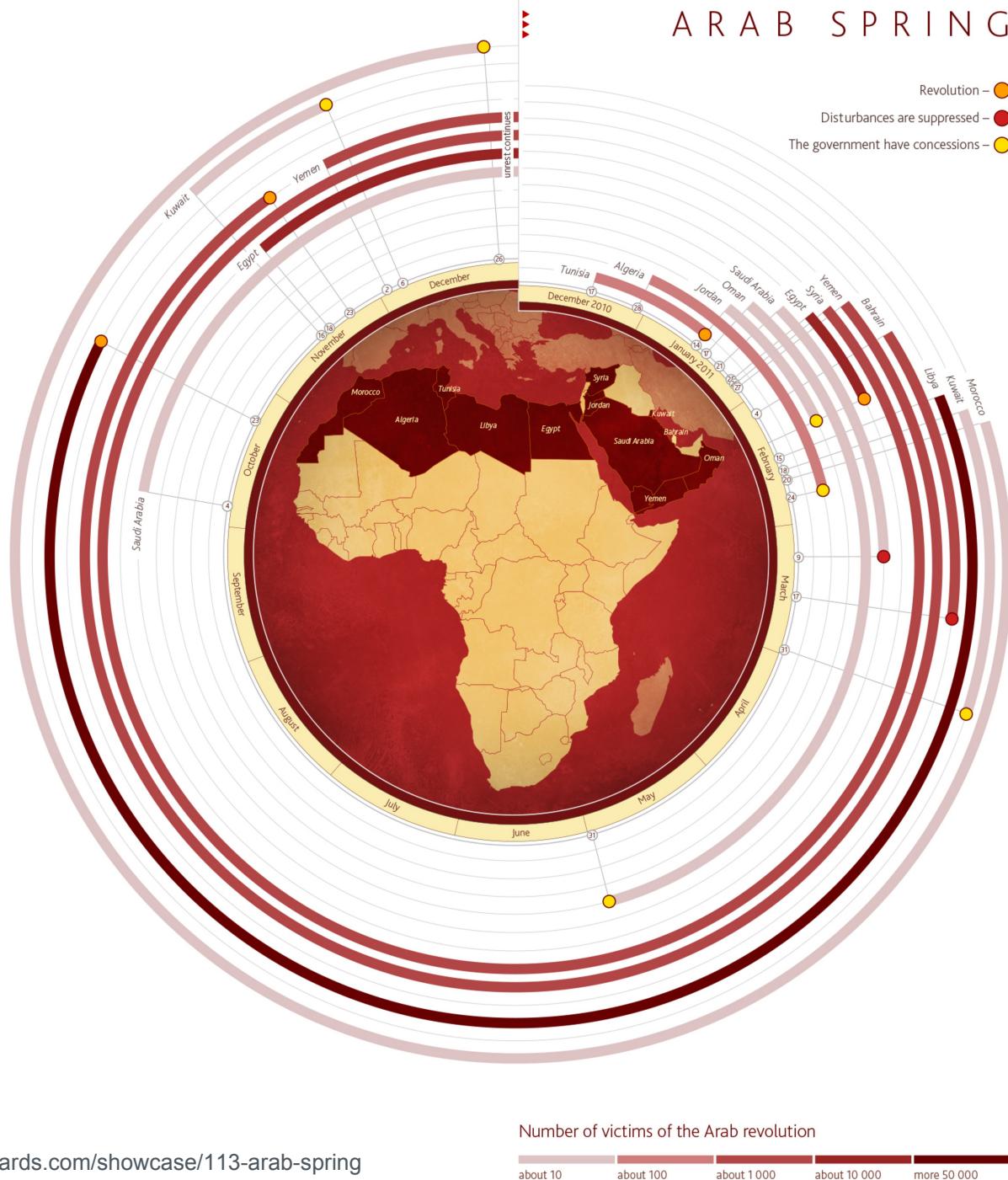
\$11,900 Worldwide cost of financial crisis

1° Functionality

2° Aesthetics

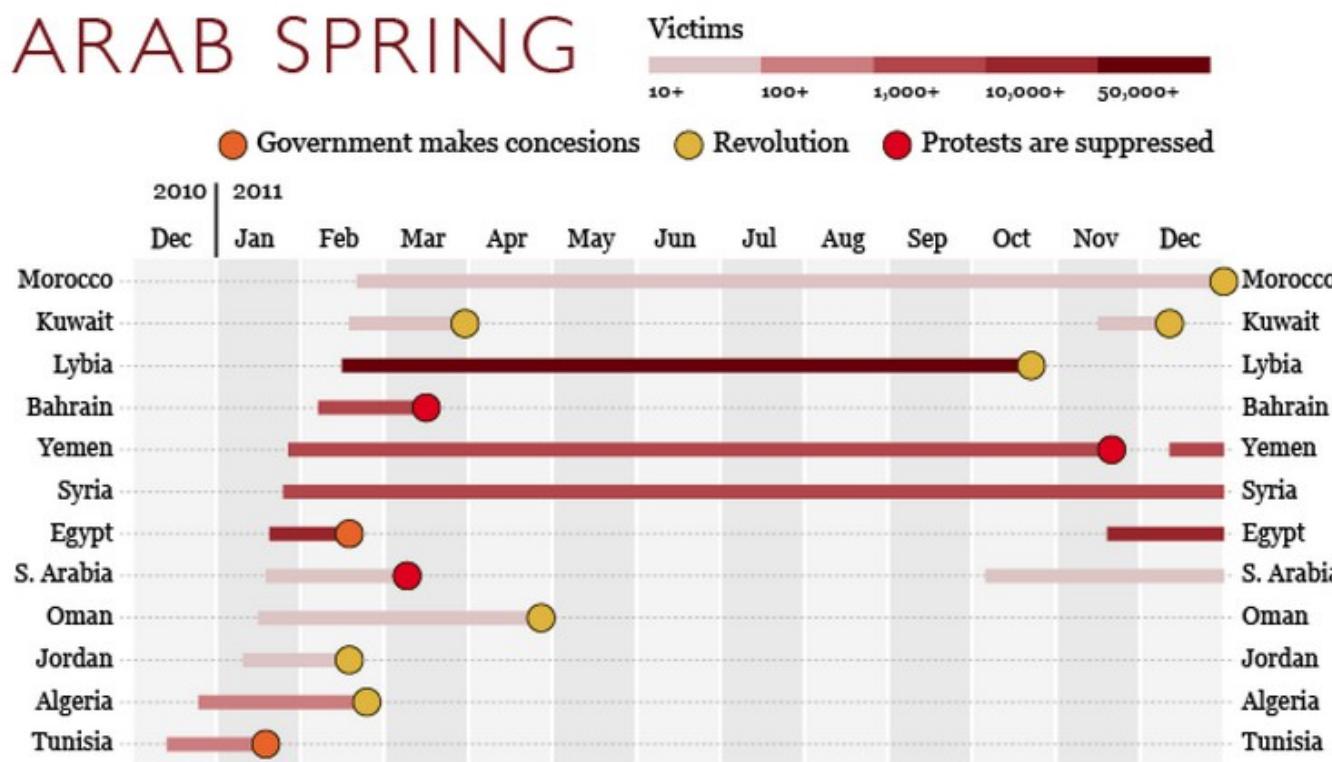


(SOME) VISUALIZATION GUIDELINES

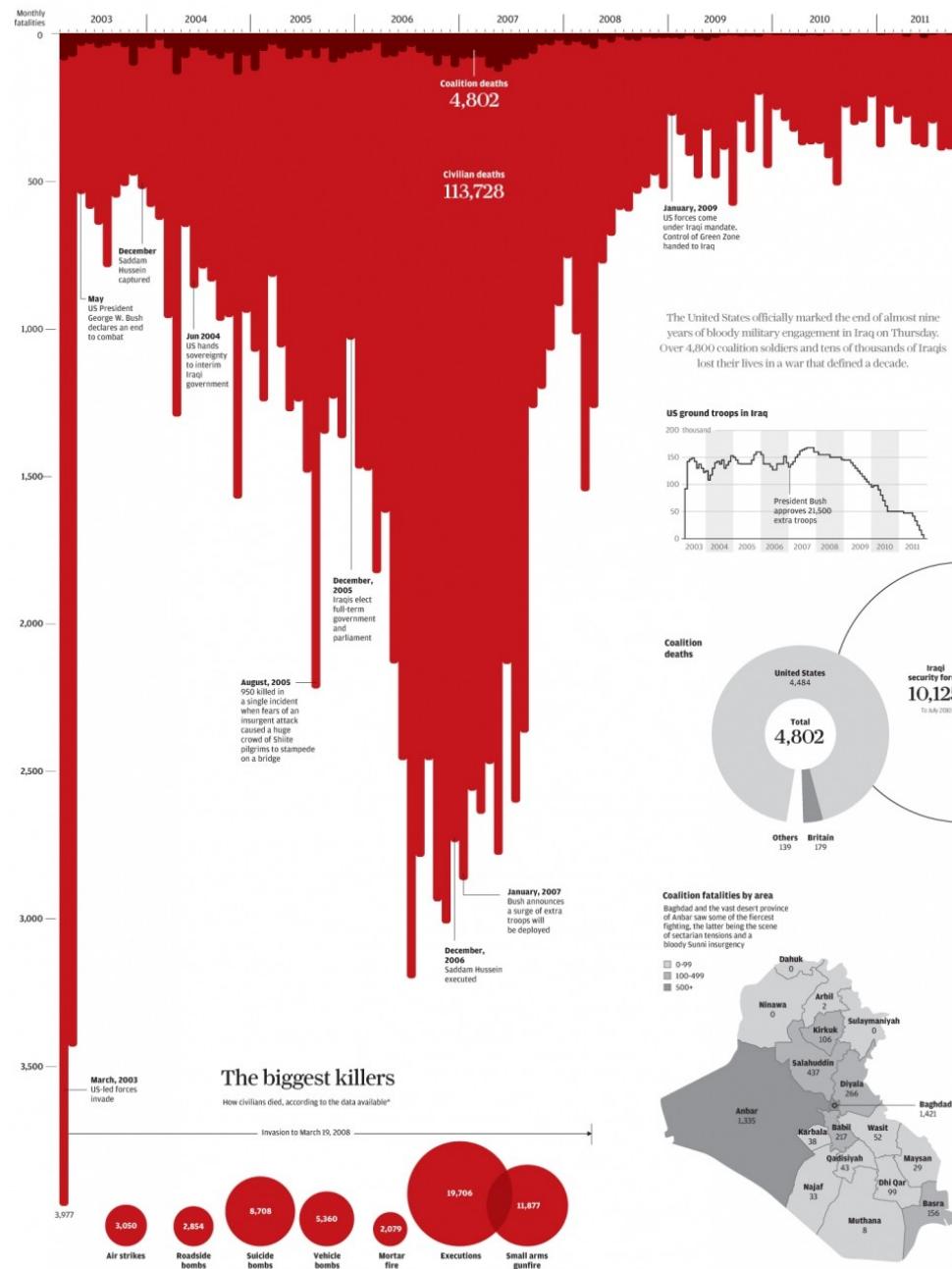


(SOME) VISUALIZATION GUIDELINES

ARAB SPRING

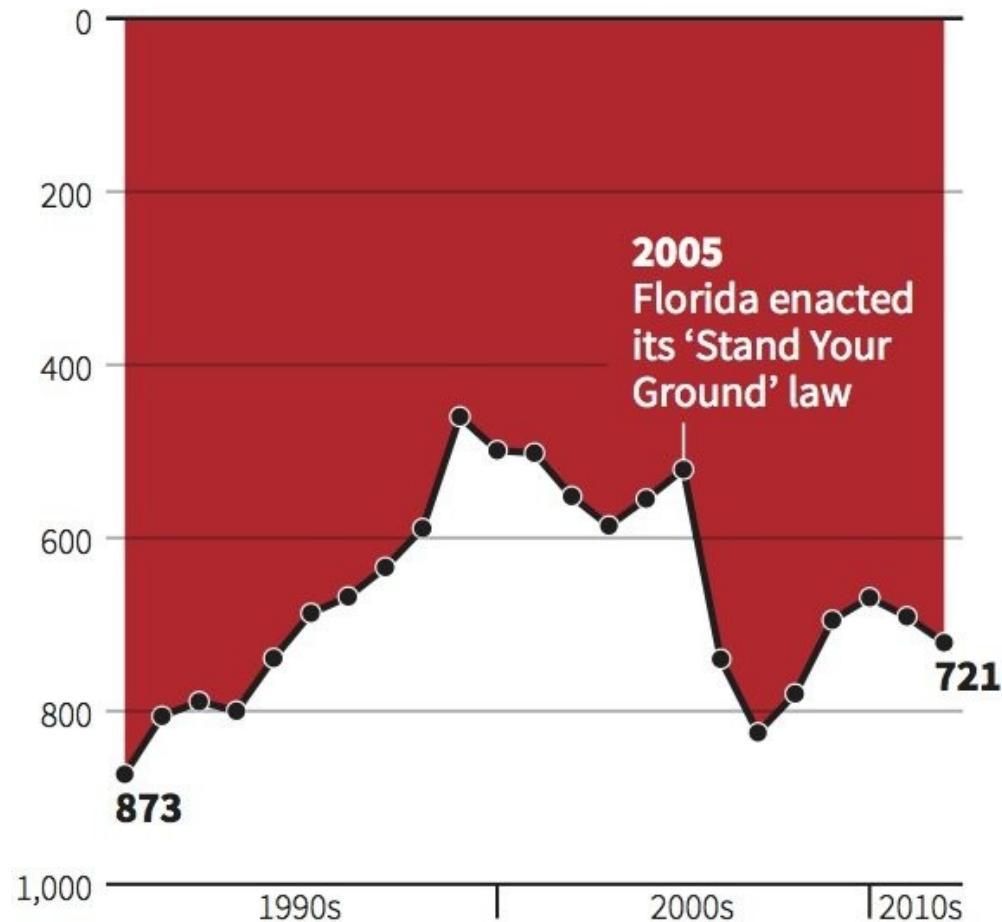


Iraq's bloody toll



Gun deaths in Florida

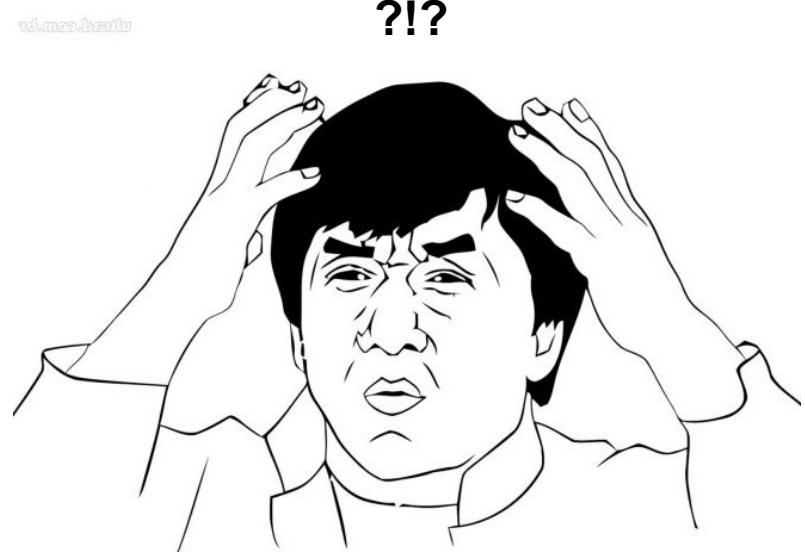
Number of murders committed using firearms



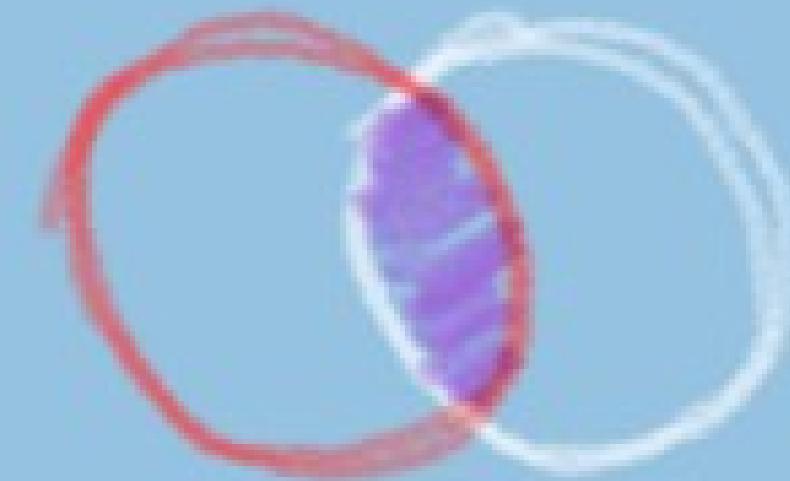
Source: Florida Department of Law Enforcement

C. Chan 16/02/2014

REUTERS



The Grammar Visualization Interaction
of Graphics Guidelines everywhere



←
More

Level of
academicality

→
Less

“The use of computer-supported, interactive, visual representations of abstract data to amplify cognition.”

[Stuart Card et al., 1999]

<http://worrydream.com/#!/ExplorableExplanations>

Explorable Explanations

Bret Victor / March 10, 2011

What does it mean to be an **active reader**?

An active reader asks questions, considers alternatives, questions assumptions, and even questions the trustworthiness of the author. An active reader tries to generalize specific examples, and devise specific examples for generalities. An active reader doesn't passively sponge up information, but uses the author's argument as a springboard for critical thought and deep understanding.

Do our reading environments encourage active reading? Or do they utterly oppose it? A typical reading tool, such as a book or website, displays the author's argument, and nothing else. The reader's line of thought remains internal and invisible, vague and speculative. We form questions, but can't answer them. We consider alternatives, but can't explore them. We question assumptions, but can't verify them. And so, in the end, we blindly trust, or blindly don't, and we miss the deep understanding that comes from dialogue and exploration.

Explorable Explanations is my umbrella project for ideas that *enable and encourage truly active reading*. The goal is to change people's relationship with text. People currently think of text as *information to be consumed*. I want text to be used as an *environment to think in*.