Visualization Types I

Temporal Visualizations

April 2, 2013 – Michael Porath (@poezn)

Time Series Data

Of 4000 graphics from
15 newspapers and
magazines (’74-’78),
were time series

Tufte

Time Series Data

Of 4000 graphics from
15 newspapers and
magazines (’74-’78),
75% were time series

Tufte

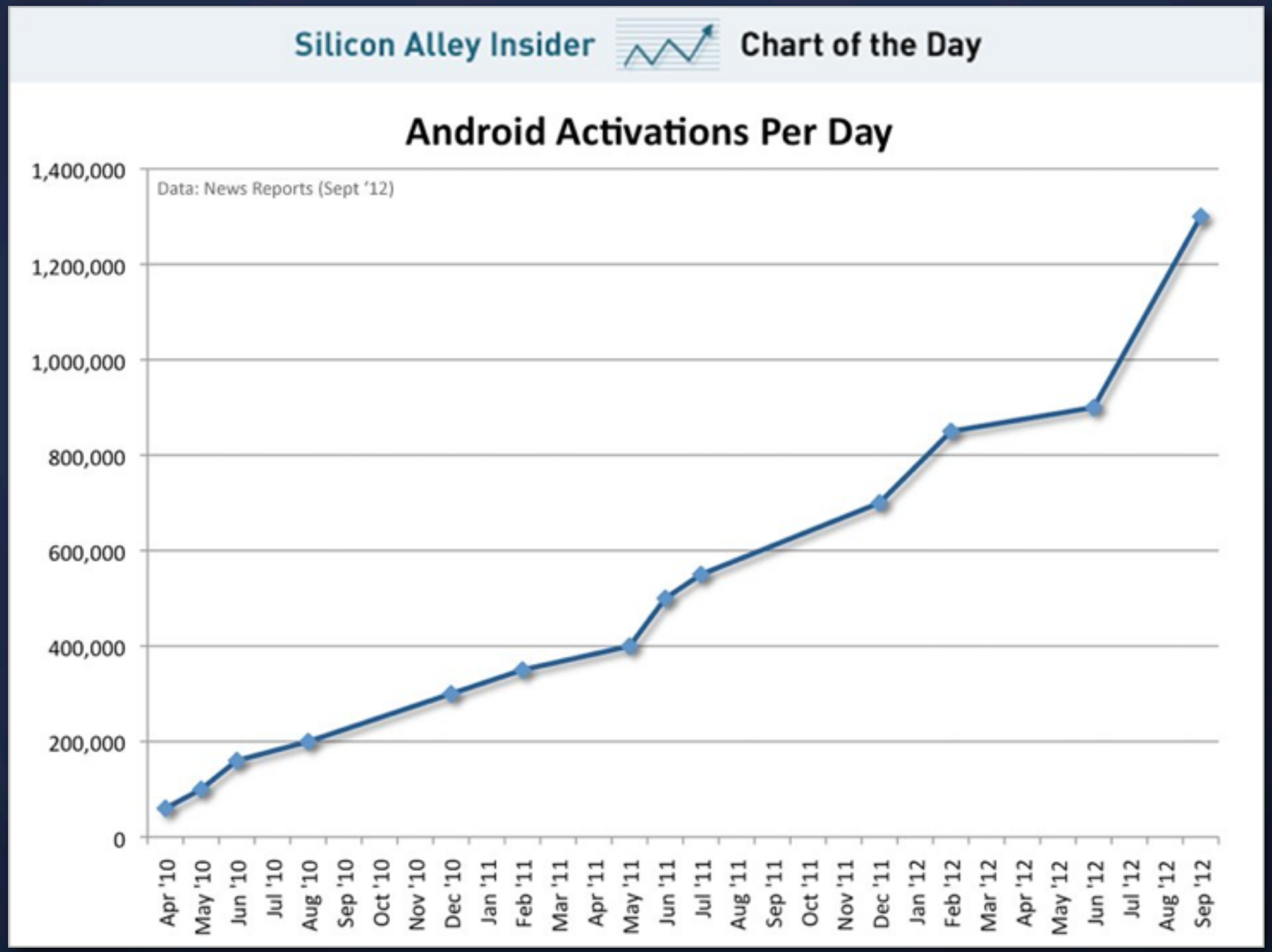
Time Series

Definition

A ***time series*** is a sequence of data points, measured typically at successive points in time spaced at uniform time intervals.

Time Series: Example

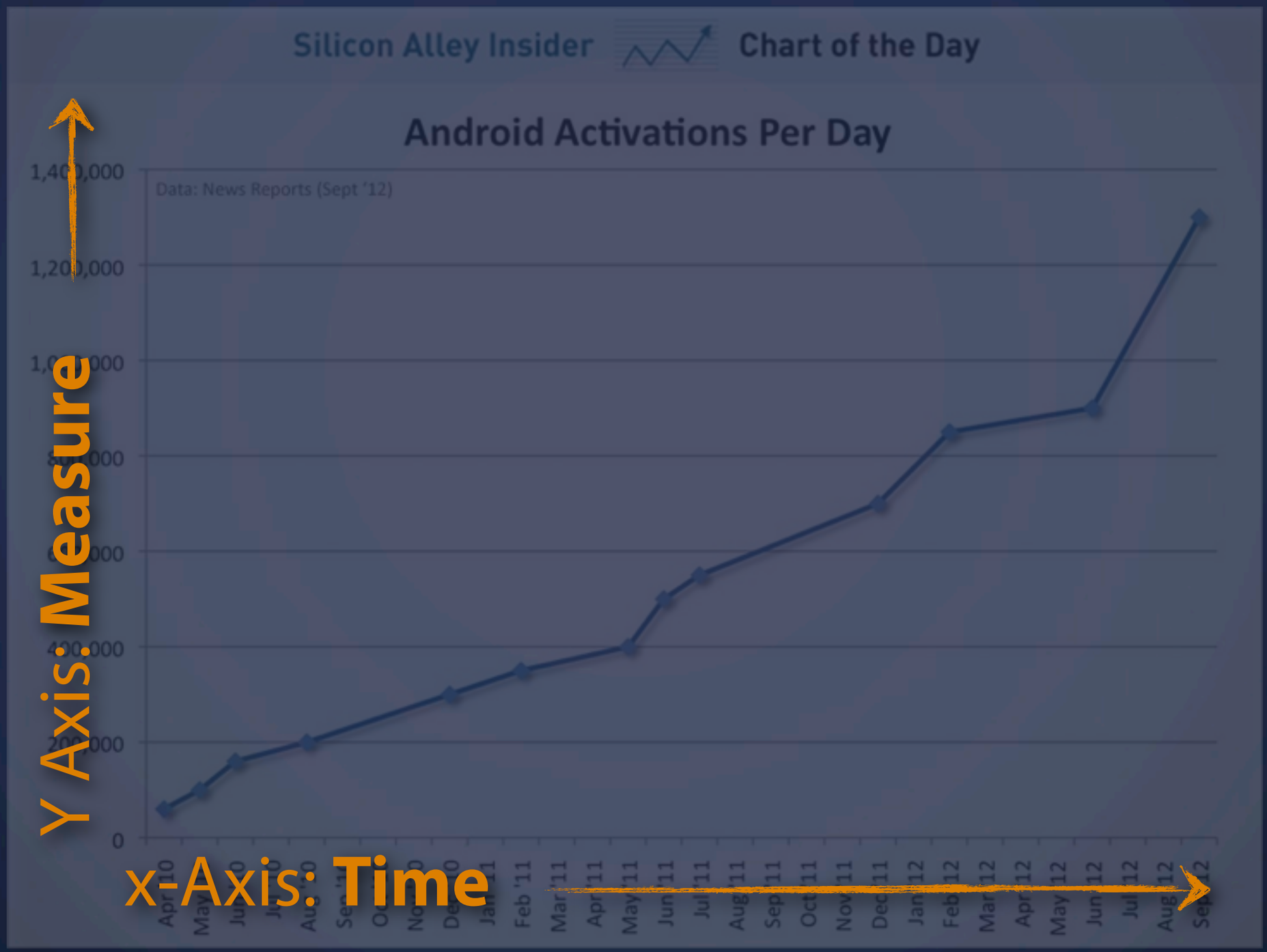
Android Activations per day, measured on the first of each month



http://www.businessinsider.com/chart-of-the-day-android-activations-per-day-2012-9

Time Series: Example

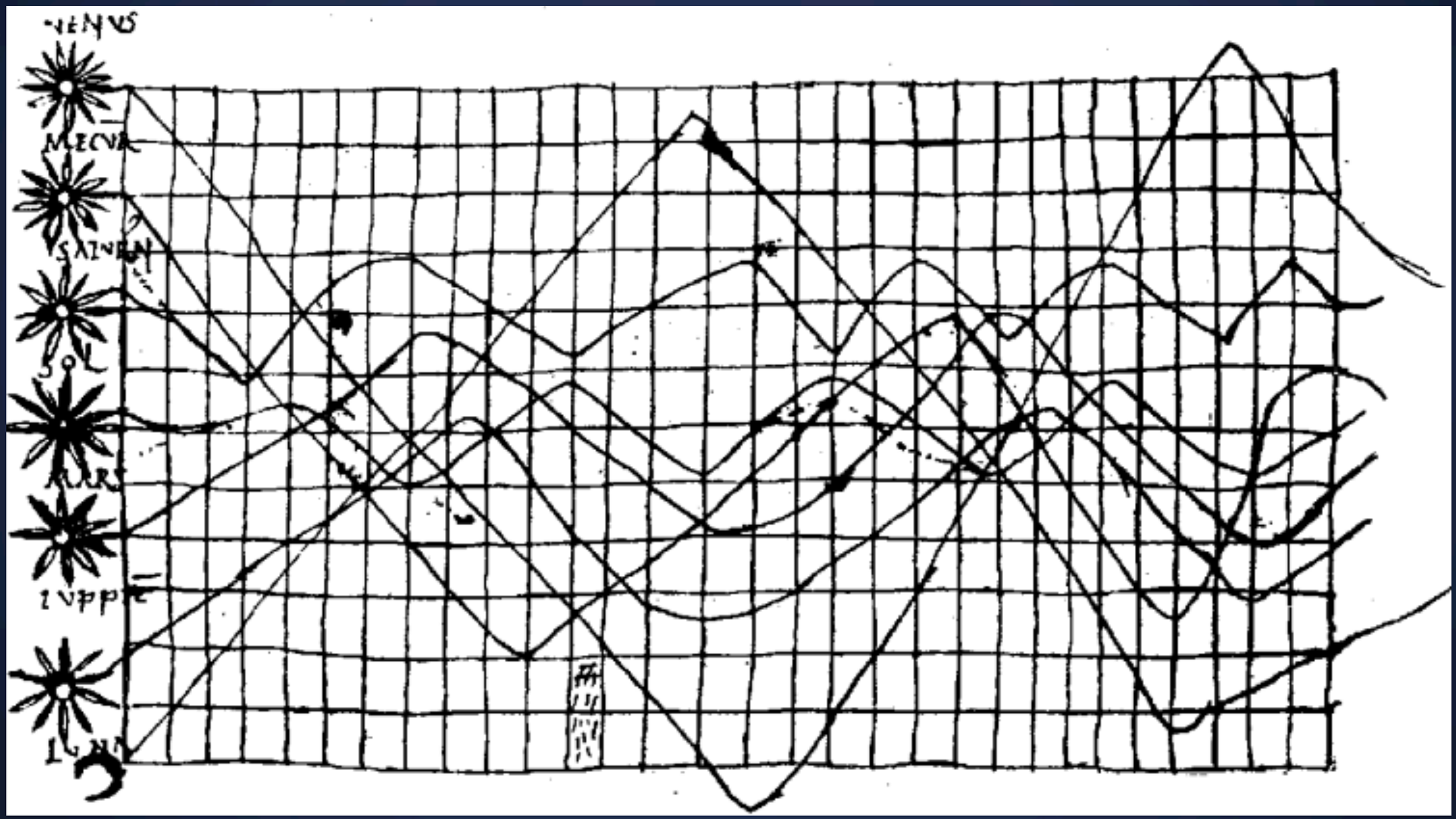
Android Activations per day, measured on the first of each month



http://www.businessinsider.com/chart-of-the-day-android-activations-per-day-2012-9

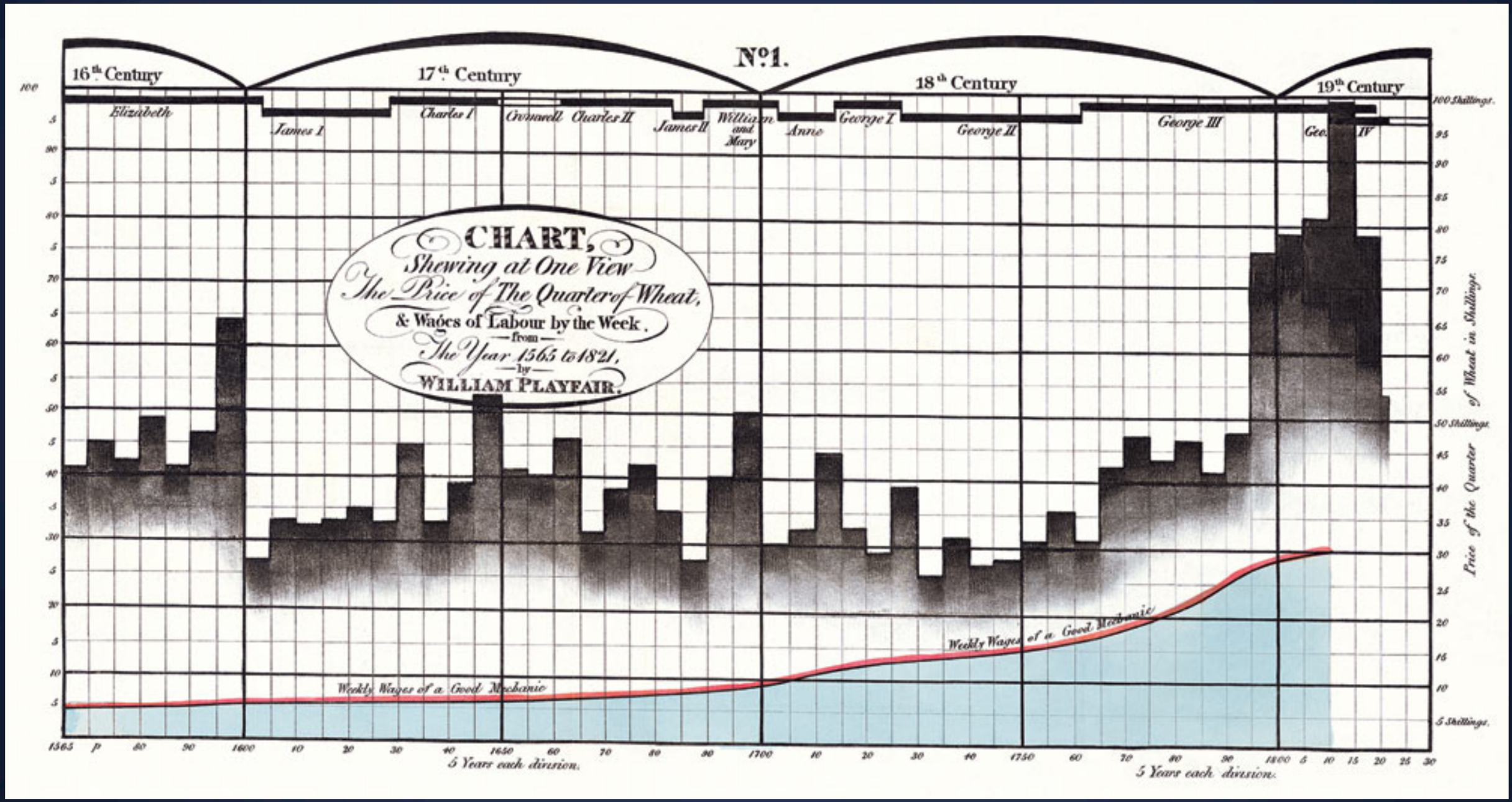
Remember this one?

Funkhouser



Or this one?

Playfair



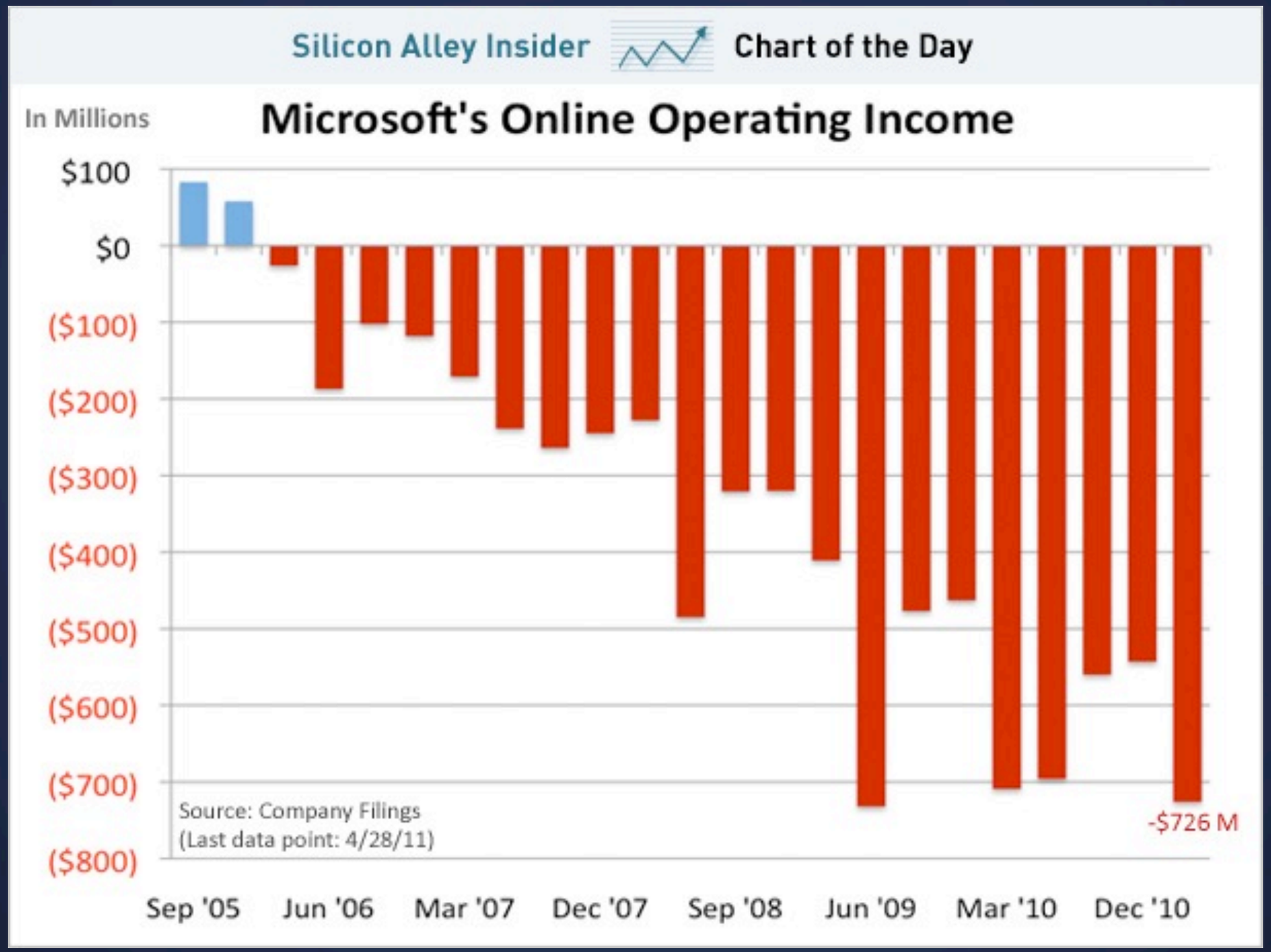
Finance charts

Stock data (AAPL). Line chart

http://www.google.com/finance?q=aapl

Aggregated Data

Better shown as a bar graph



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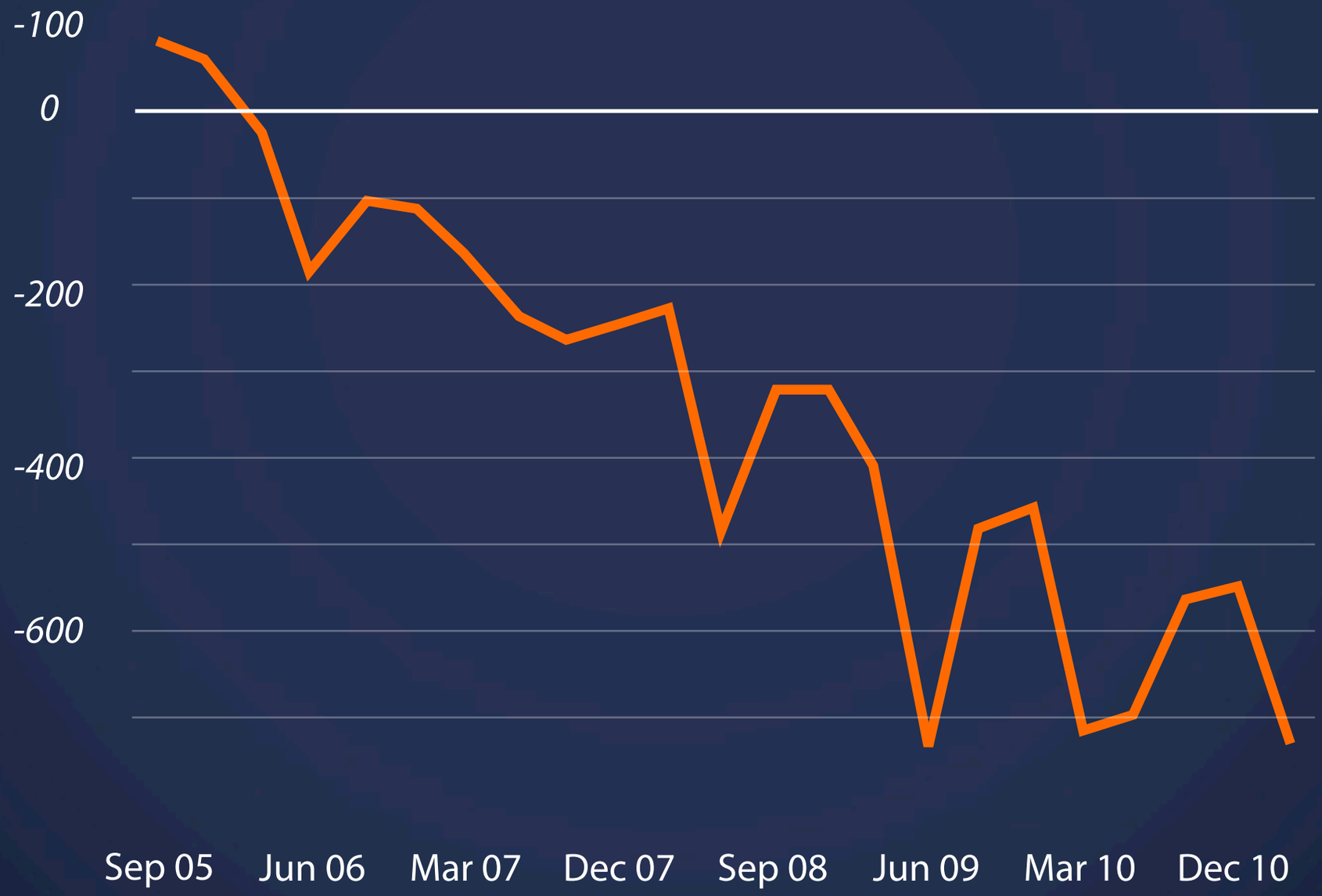
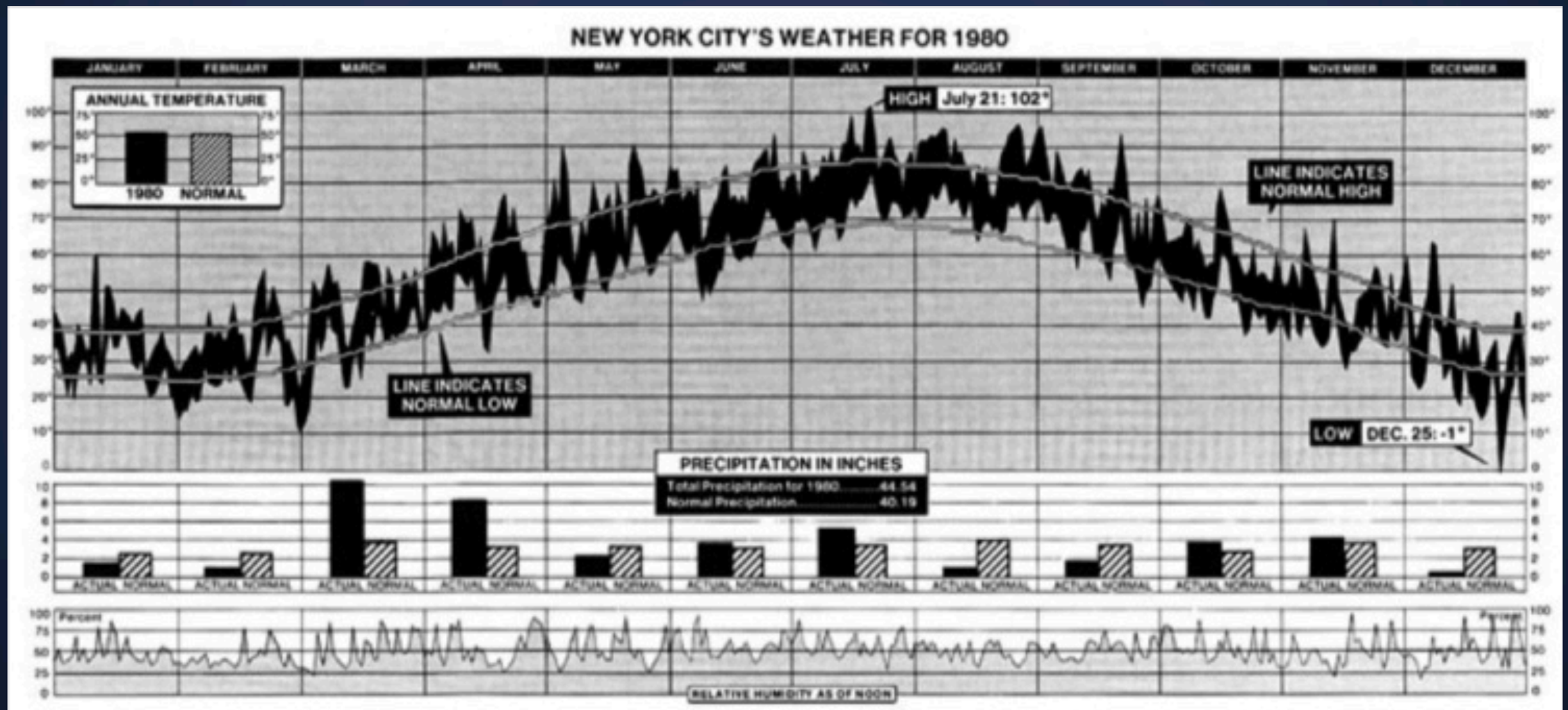


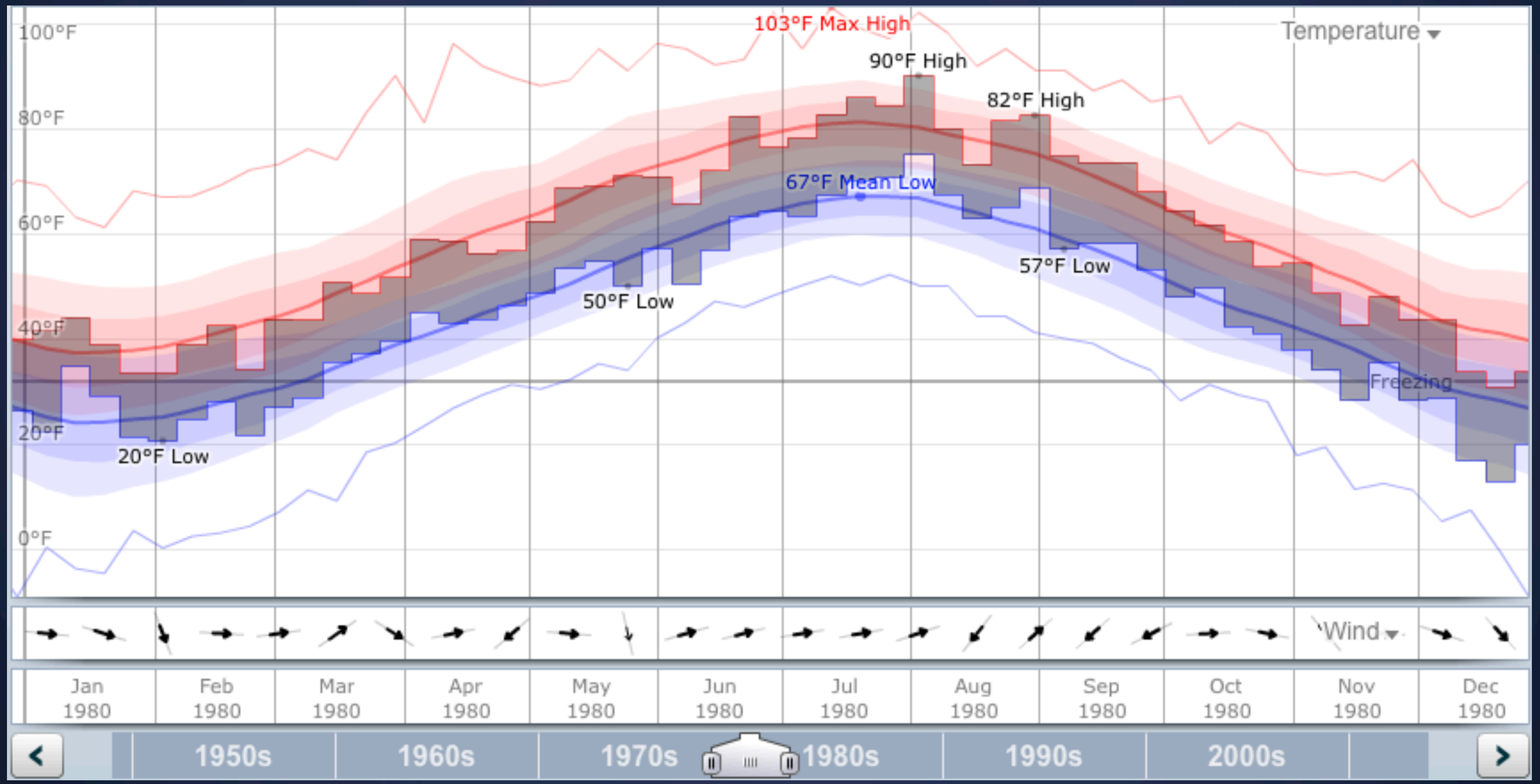
Analyze

New York Weather 1980 (NY Times, 1981)



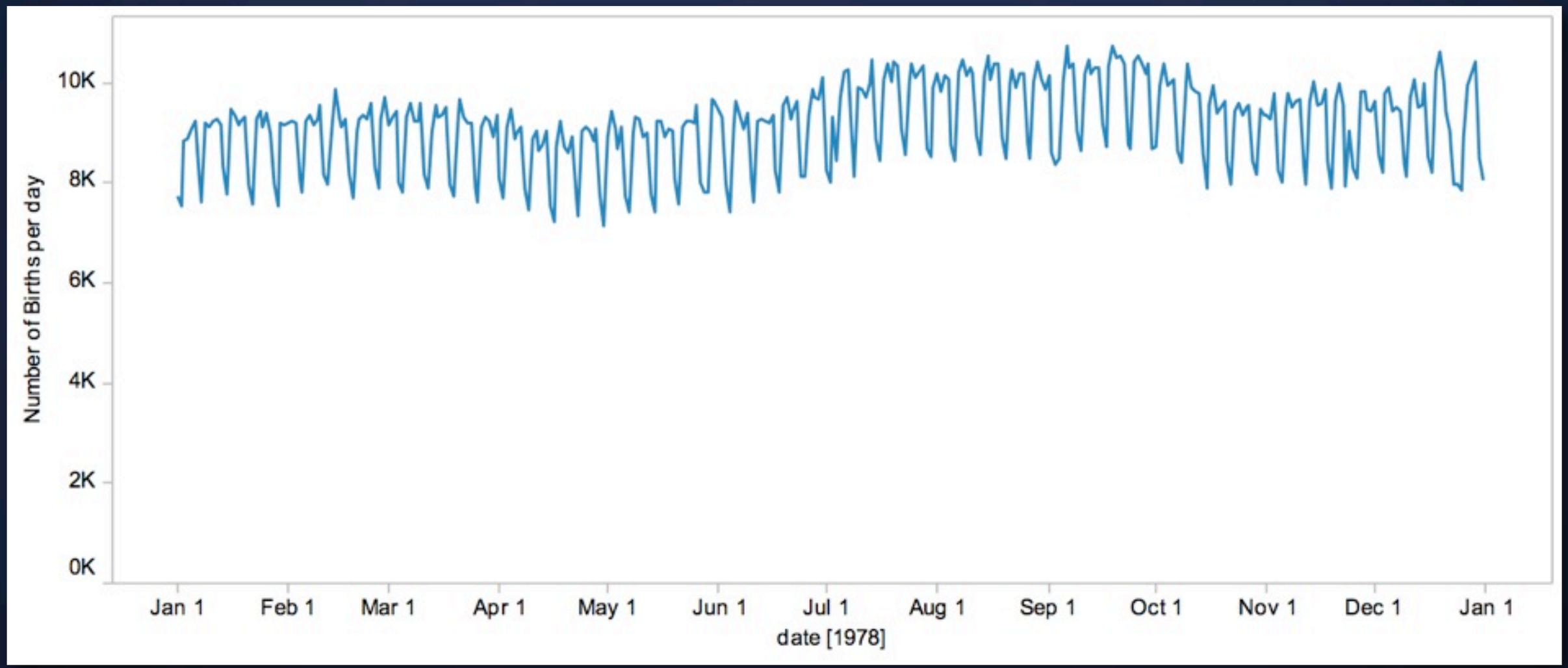
Analyze

New York Weather 1980 (weatherspark.com)



Time Series Data

Number of births in the US for each day in 1978

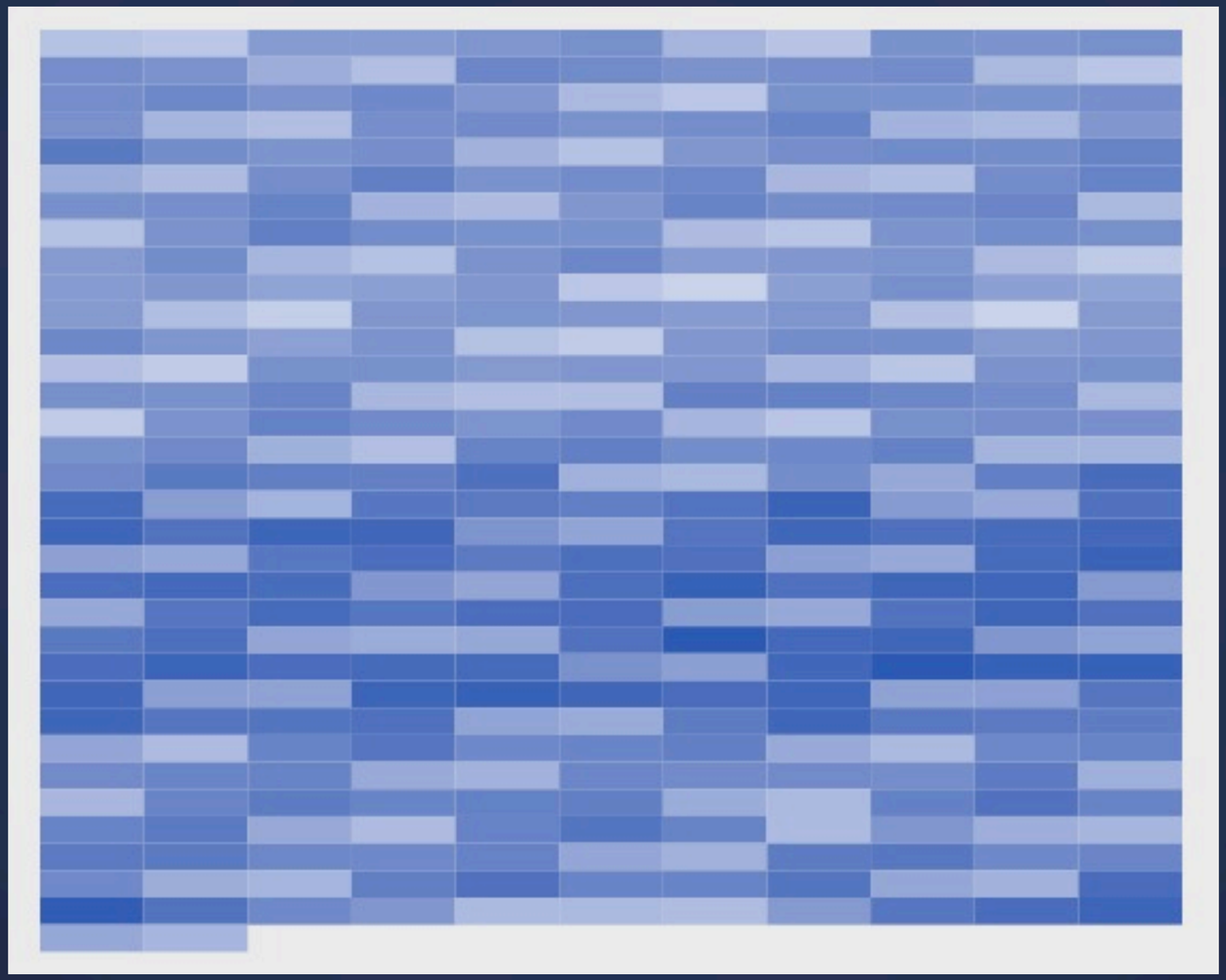


What's the up and down?

Time Series Data

Number of births in the US for each day in 1978

Jan 1

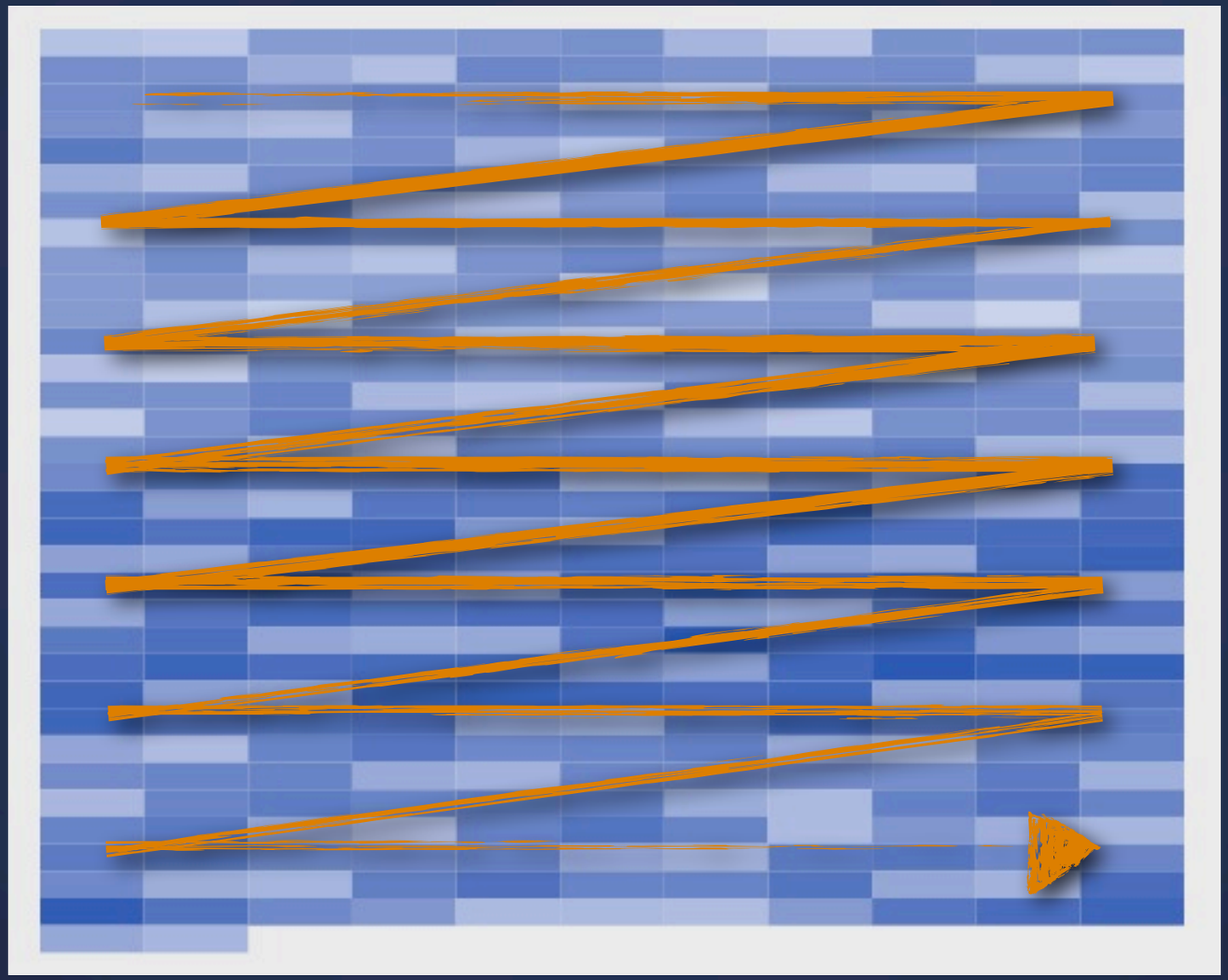


Dec 31

Time Series Data

Number of births in the US for each day in 1978

Jan 1



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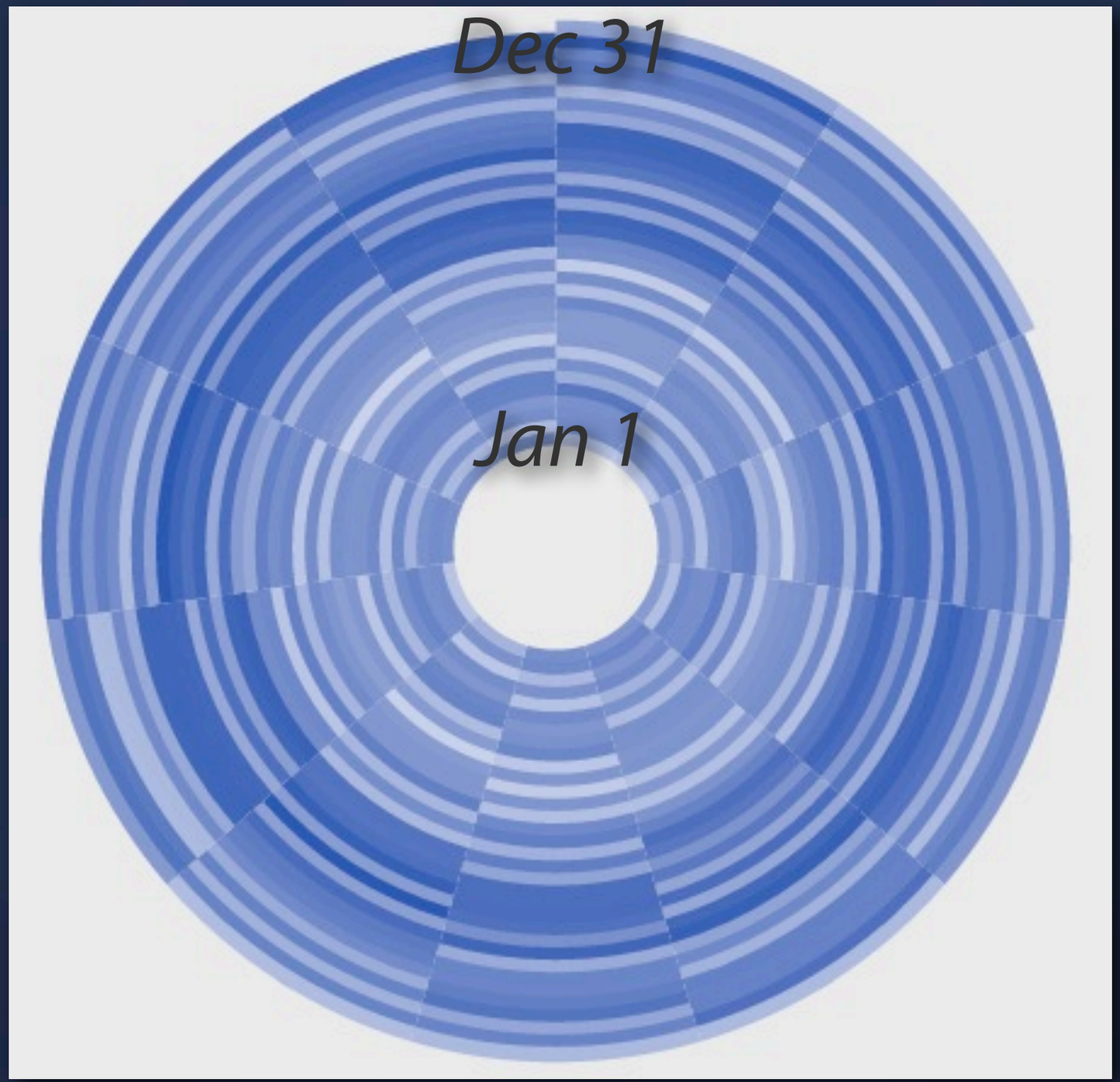

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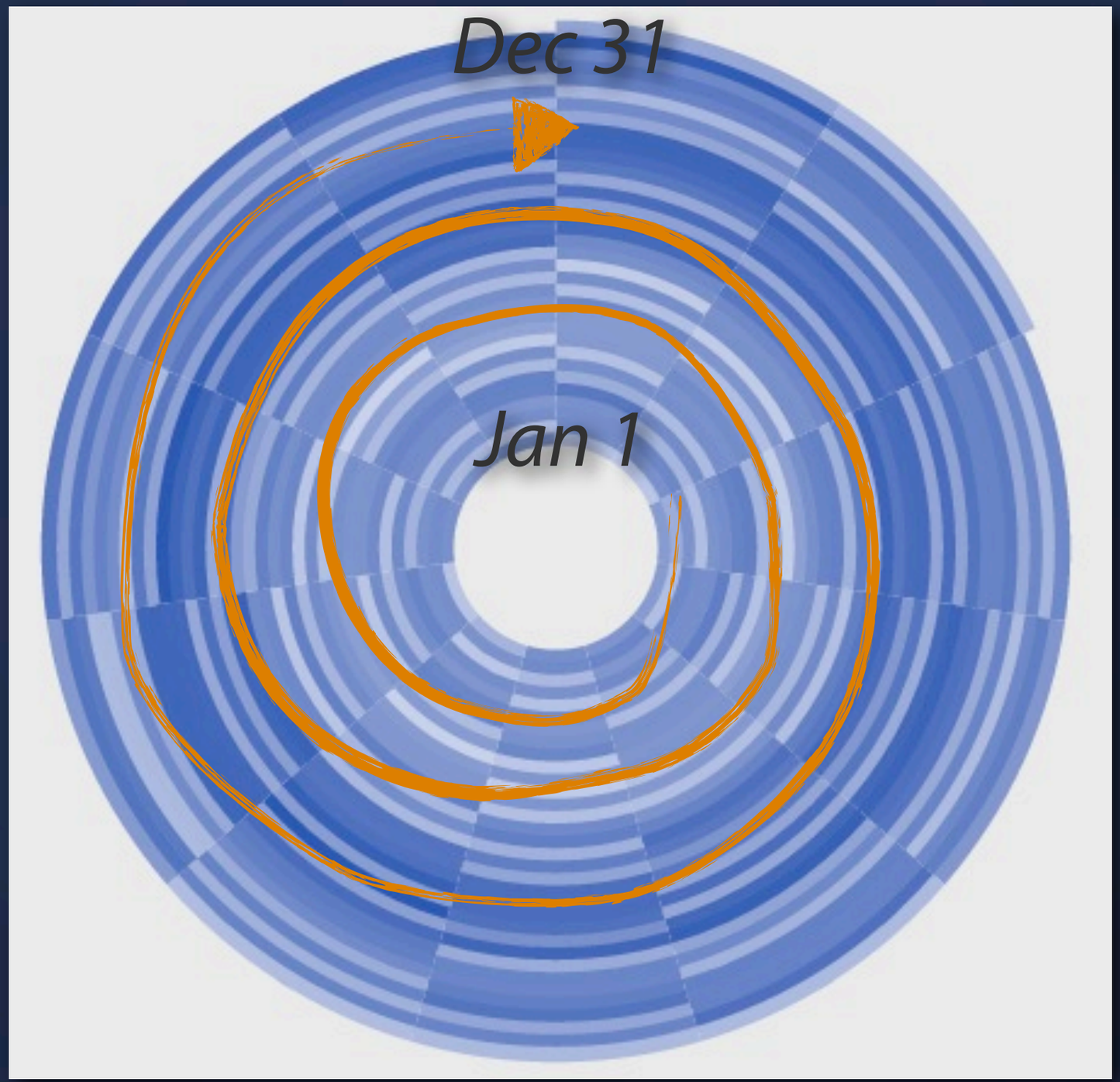

Time Series Data

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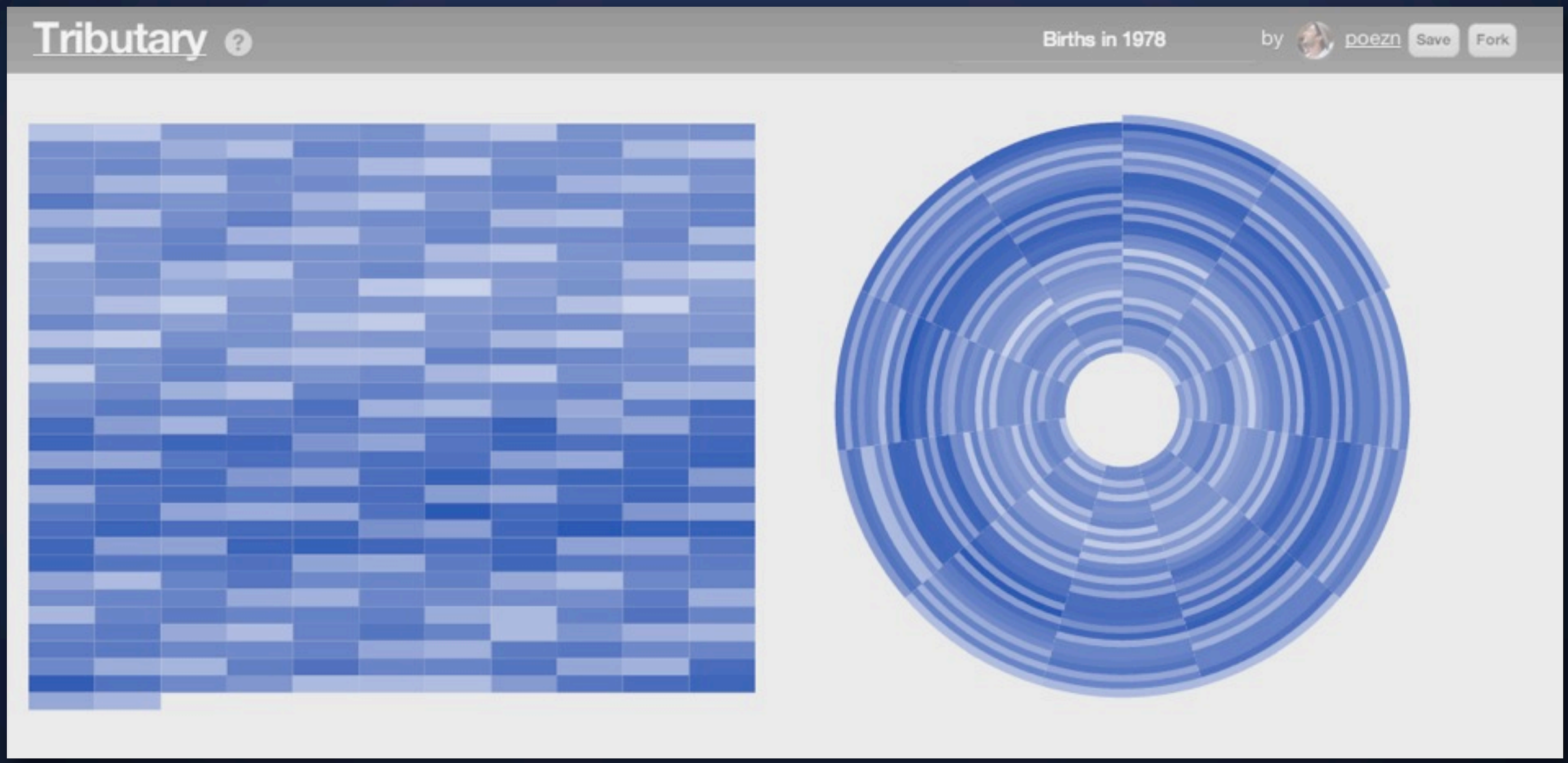

http://tributary.io/inlet/5283385

Time Series Data

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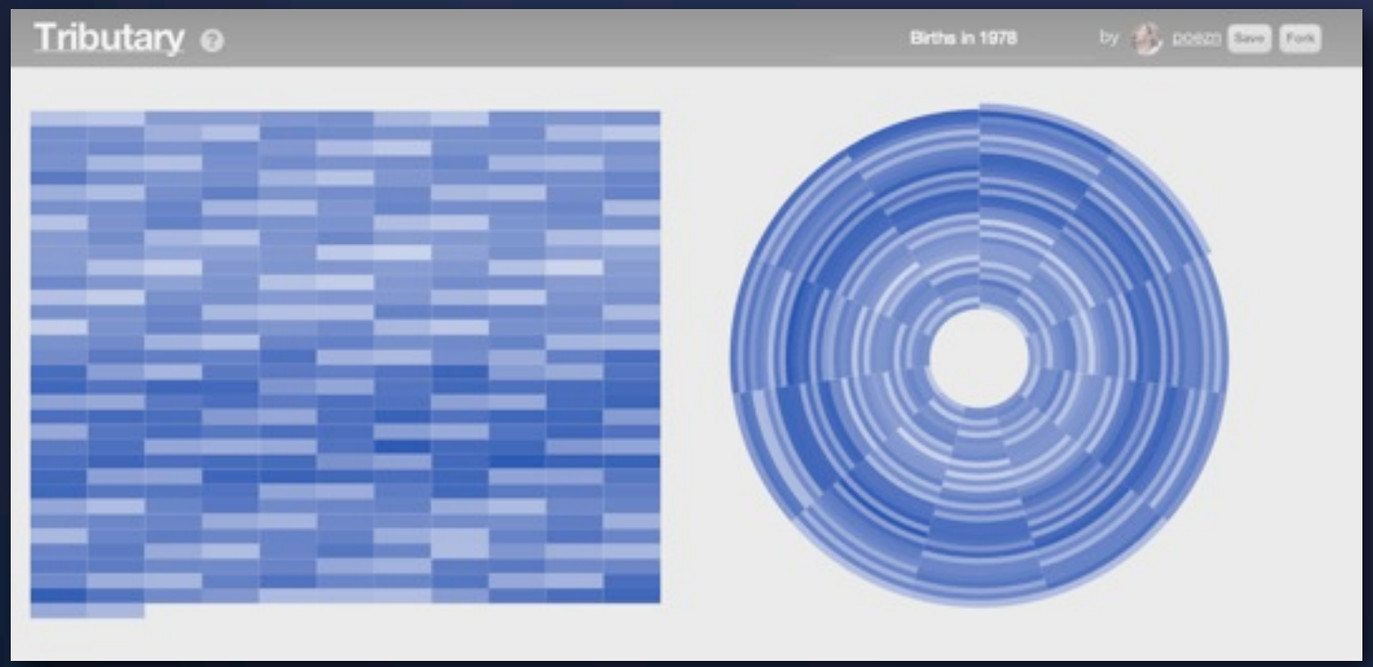


Task / Objective

Is there a periodic pattern?

What's the pattern?

What other tasks?

What is the reader’s task when looking at a visualization of time series data?

Tasks

Whole time series

- When was something at **min/max**?
- Is there a **pattern**?
- Do any of the series **match a pattern**?
- Two series **similar**?

Muller & Schumann ’03

Tasks

Individual data elements

- Does a data element **exist** at t?
- **When** does a data element exist?
- **How long** does it exist?
- **How often** does it exist?
- **How fast** is the data changing?
- In **what order** do data elements appear?
- Do data elements **exist together**?

Muller & Schumann '03

Other representations

Time Travel

http://www.informationisbeautiful.net/visualizations/timelines/

Other Representations

Frame-by-frame overlays

Other Representations

Iso-chronic lines

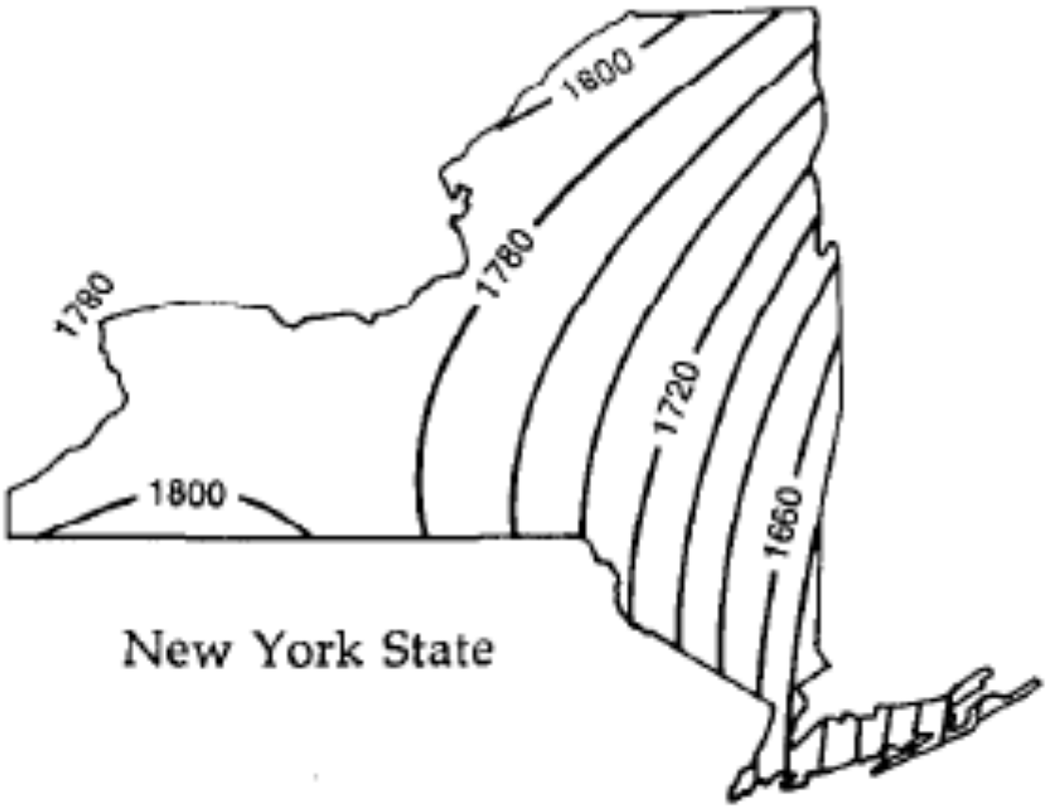
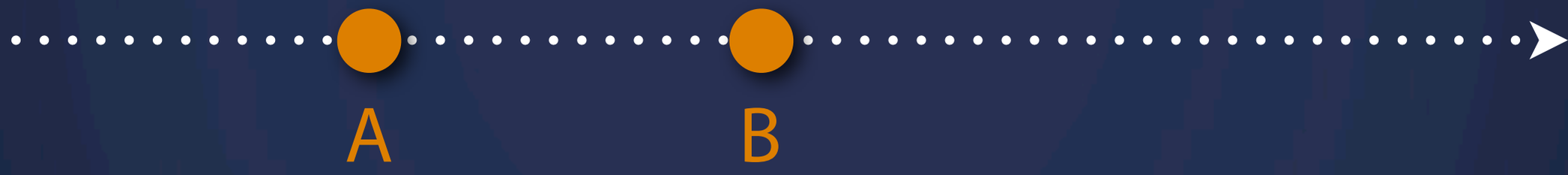


FIGURE 14. *Quadratic polynomial trend surface showing general pattern of the time of first settlement of New York State counties.*

Monmonier, Strategies for the Visualization of Geographic Time Series Data

Properties of Time

$$D = \{(t1,d1),(t2,d2),\ldots(tn,dn)\}$$



A before B

Properties of Time

Dichotomies

Discrete

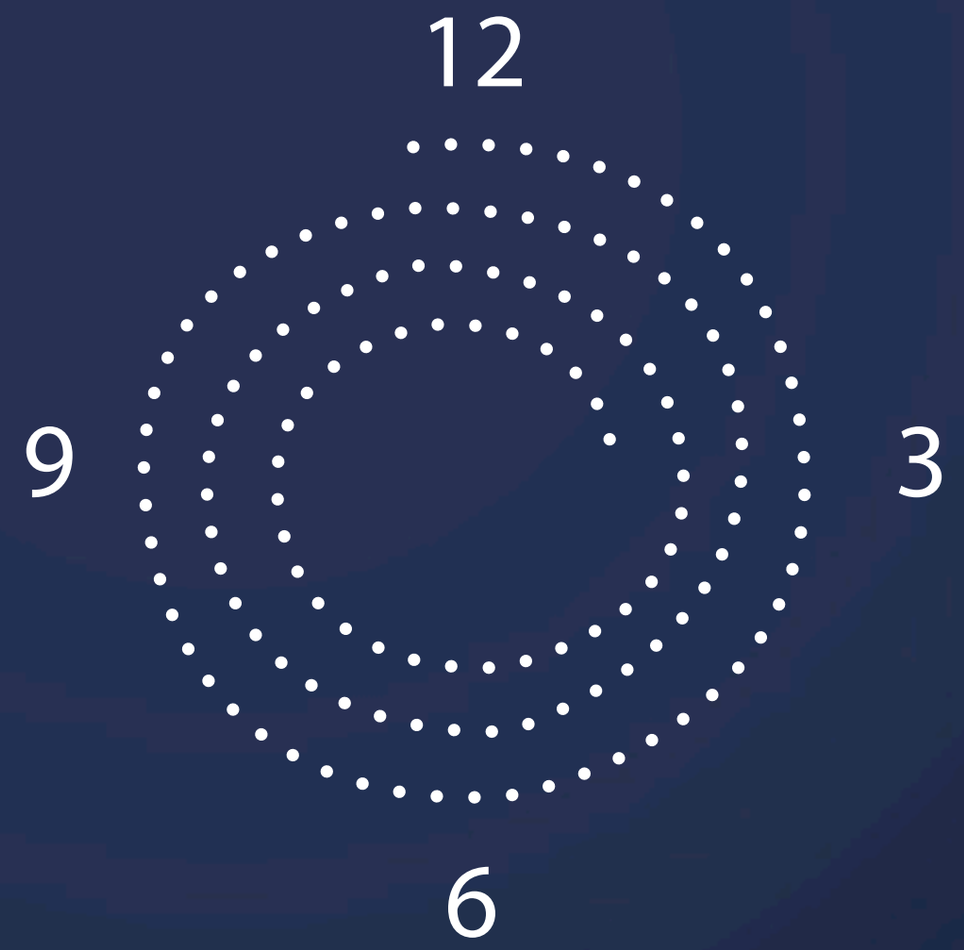
Interval

Properties of Time

Dichotomies

Linear

Cyclical /
Repetitive

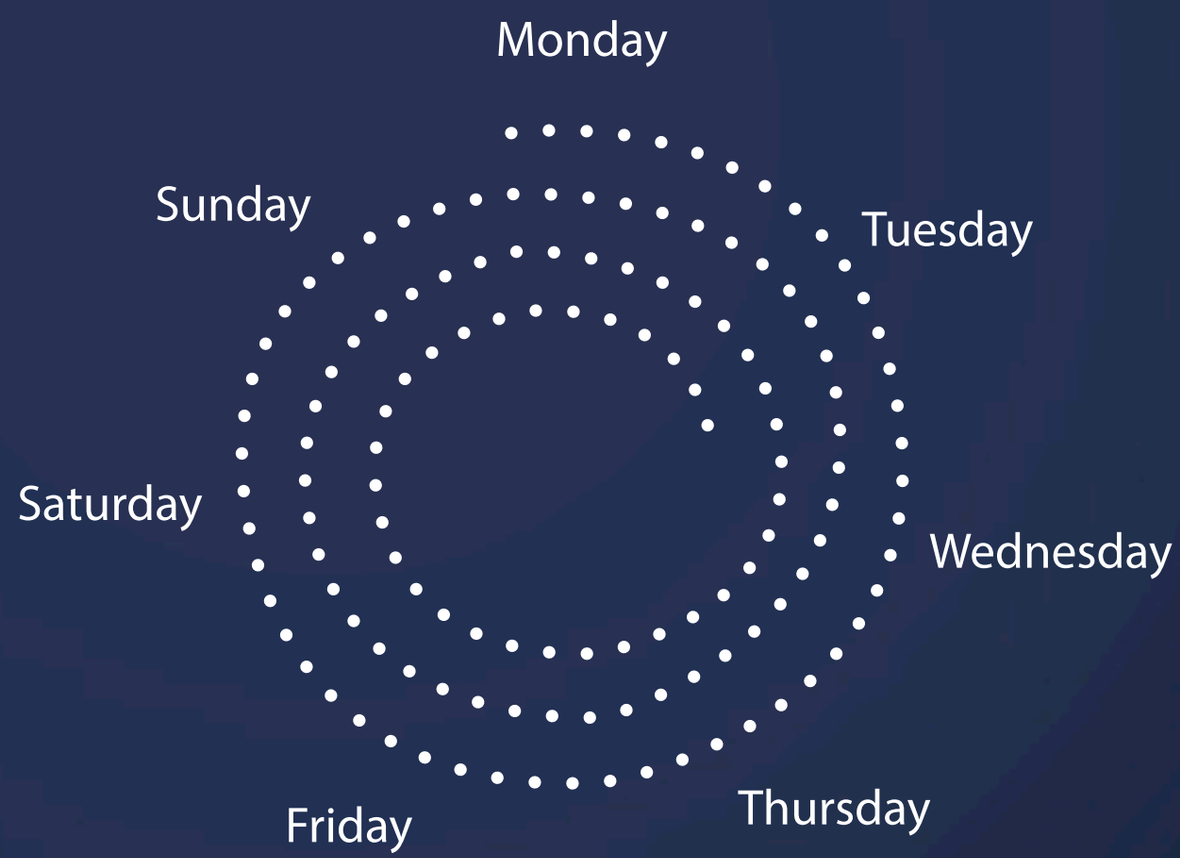


Properties of Time

Dichotomies

Linear

Cyclical / Repetitive



Properties of Time

Dichotomies

Ordinal

Continuous
(Often Sampled)

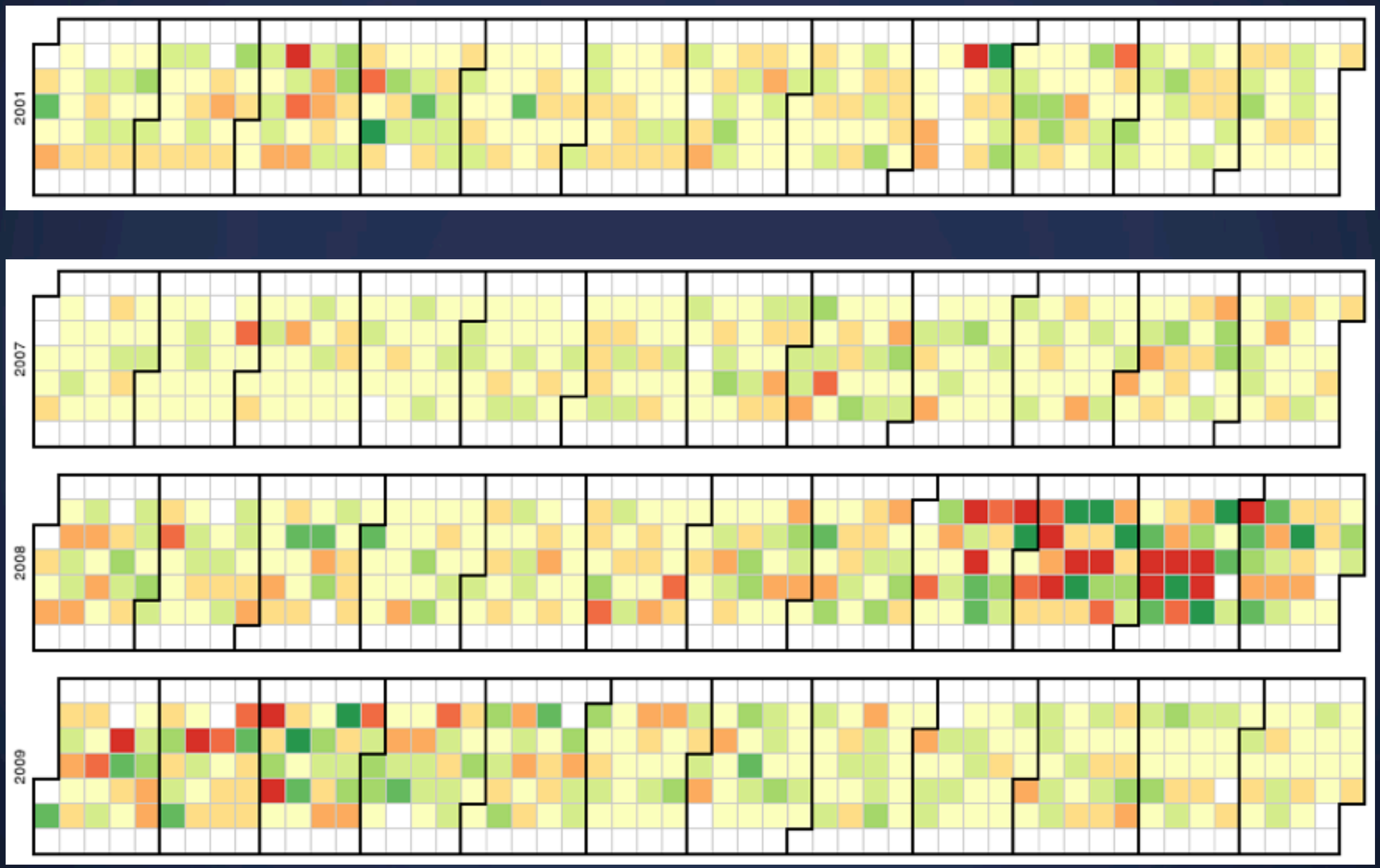
Design considerations

static *vs* dynamic

series *vs* events

Case Study

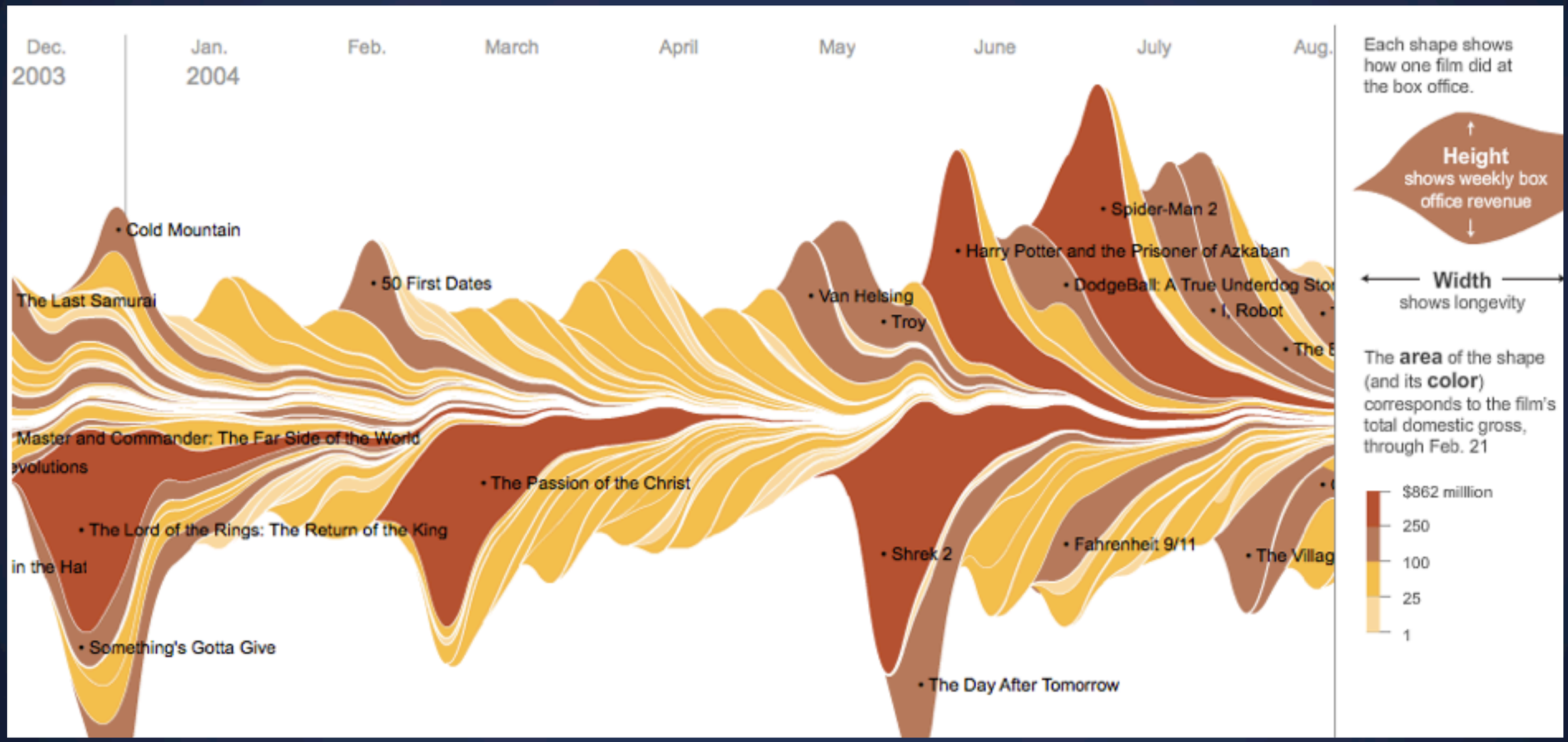
Calendar View; Dow Jones



Mike Bostock

Case Study

Movie Revenues (NY Times)



http://www.nytimes.com/interactive/2008/02/23/movies/20080223_REVENUE_GRAPHIC.html

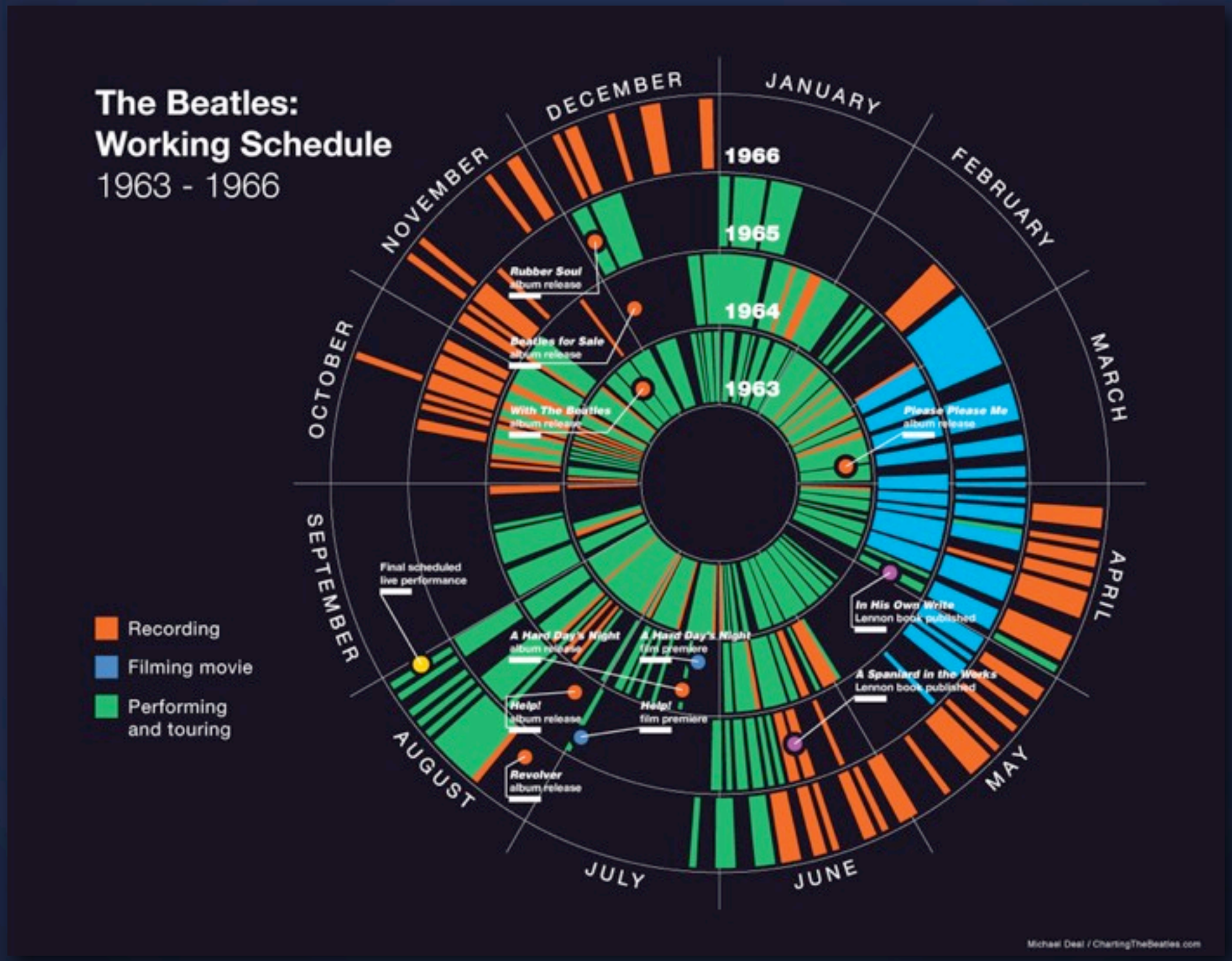
Case Study

Draught in the US (NY Times)

http://www.nytimes.com/interactive/2012/07/20/us/drought-footprint.html?ref=business&_r=0

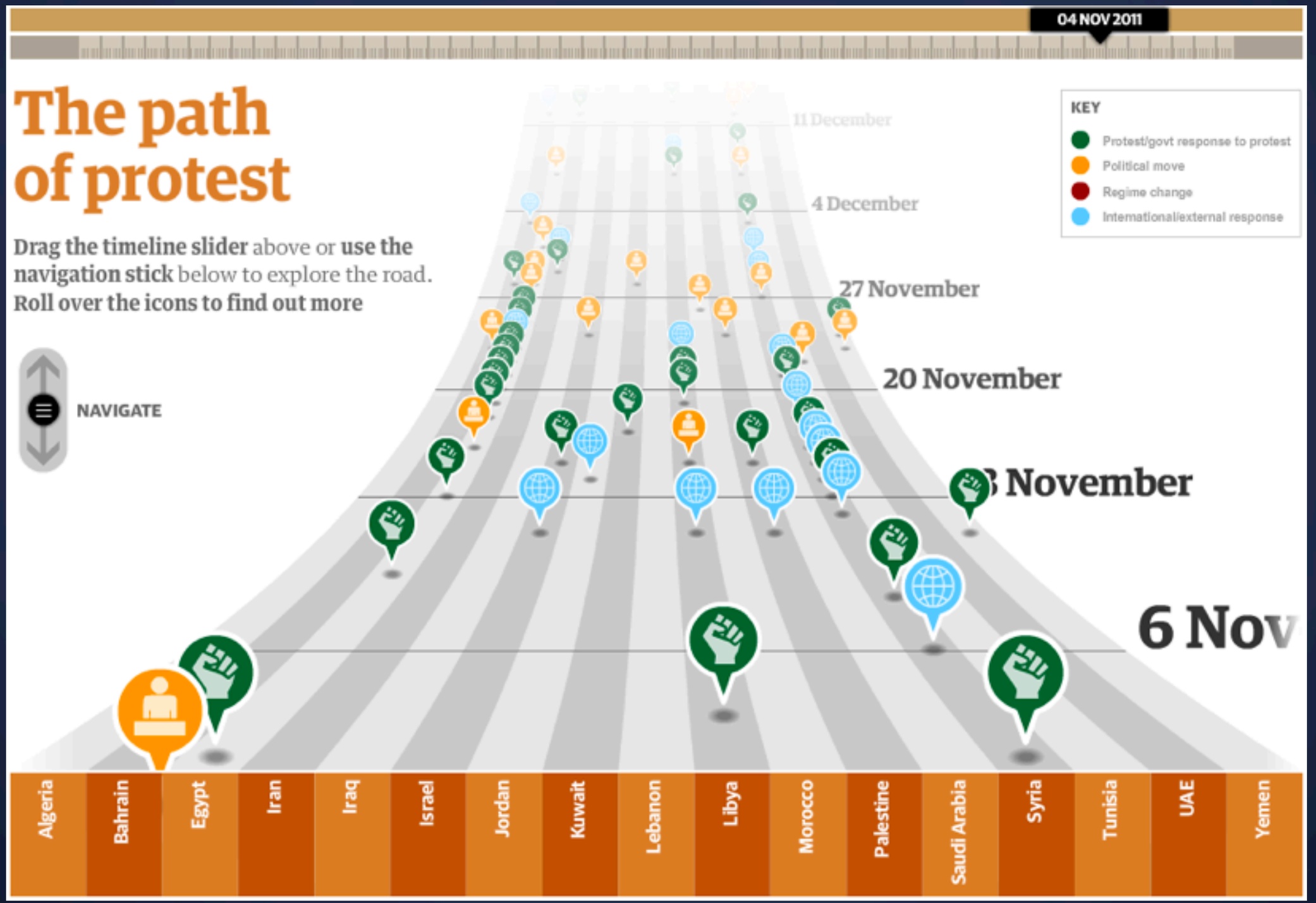
Case Study

Spiral Visualizations



Case Study

Arab Spring; events over time in different countries



http://www.guardian.co.uk/world/interactive/2011/mar/22/middle-east-protest-interactive-timeline

Recap

Lab Thursday

D3.js Part III

Next Lecture

Types of Visualization II: Text