OpenVisConf 2017

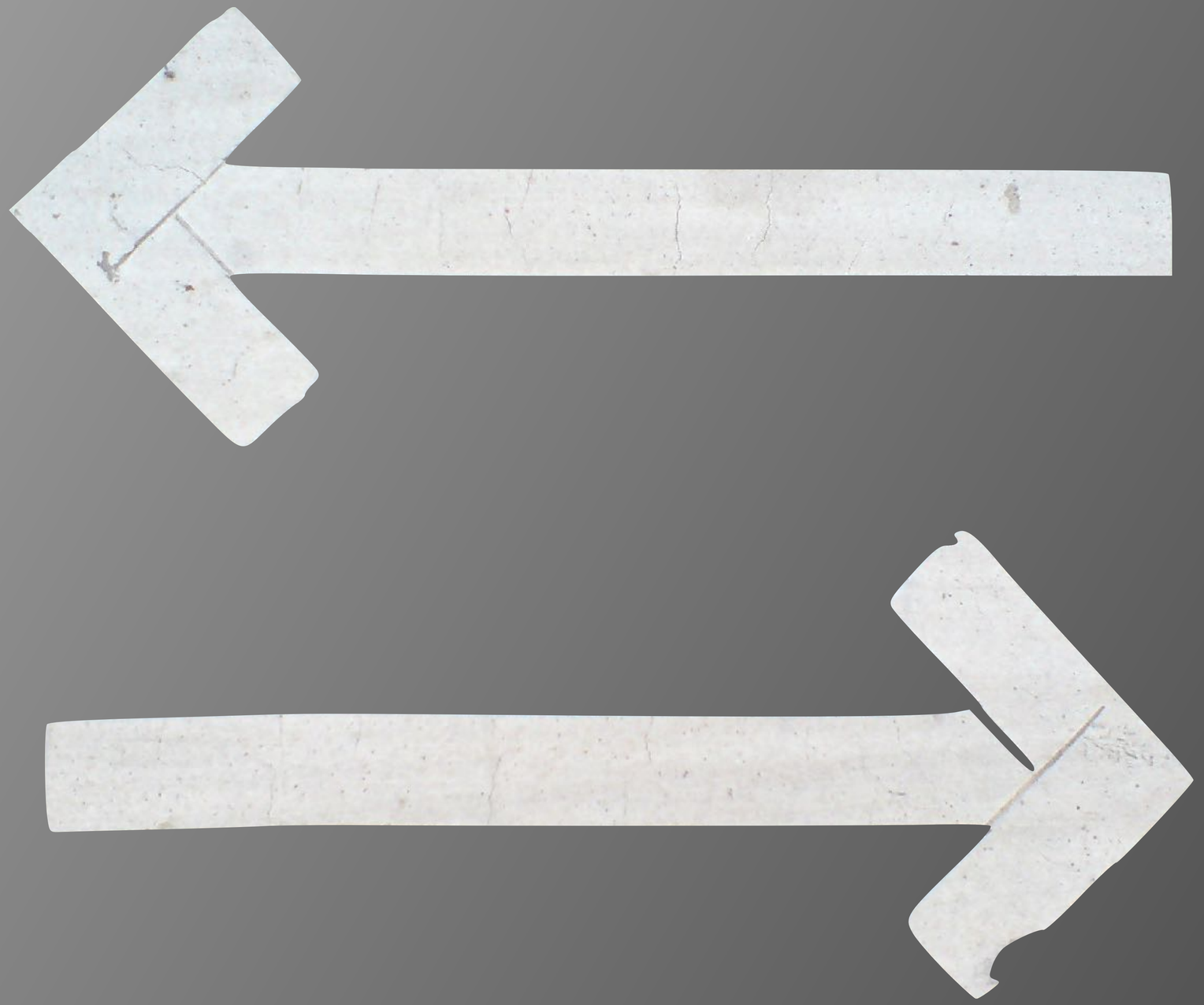
WHAT STORY DOES YOUR TIMELINE TELL?

Matthew Brehmer
Microsoft Research
@mattbrehmer

WHAT STORY DOES YOUR TIMELINE TELL?

WHERE IS

YESTERDAY ?
THE BIG BANG ?
THE 2050s ?
LUNCH TIME ?
NOW ?
THE TRIASSIC PERIOD ?
YOUR 8th BIRTHDAY ?
THE 1980s ?
THE 15th CENTURY ?



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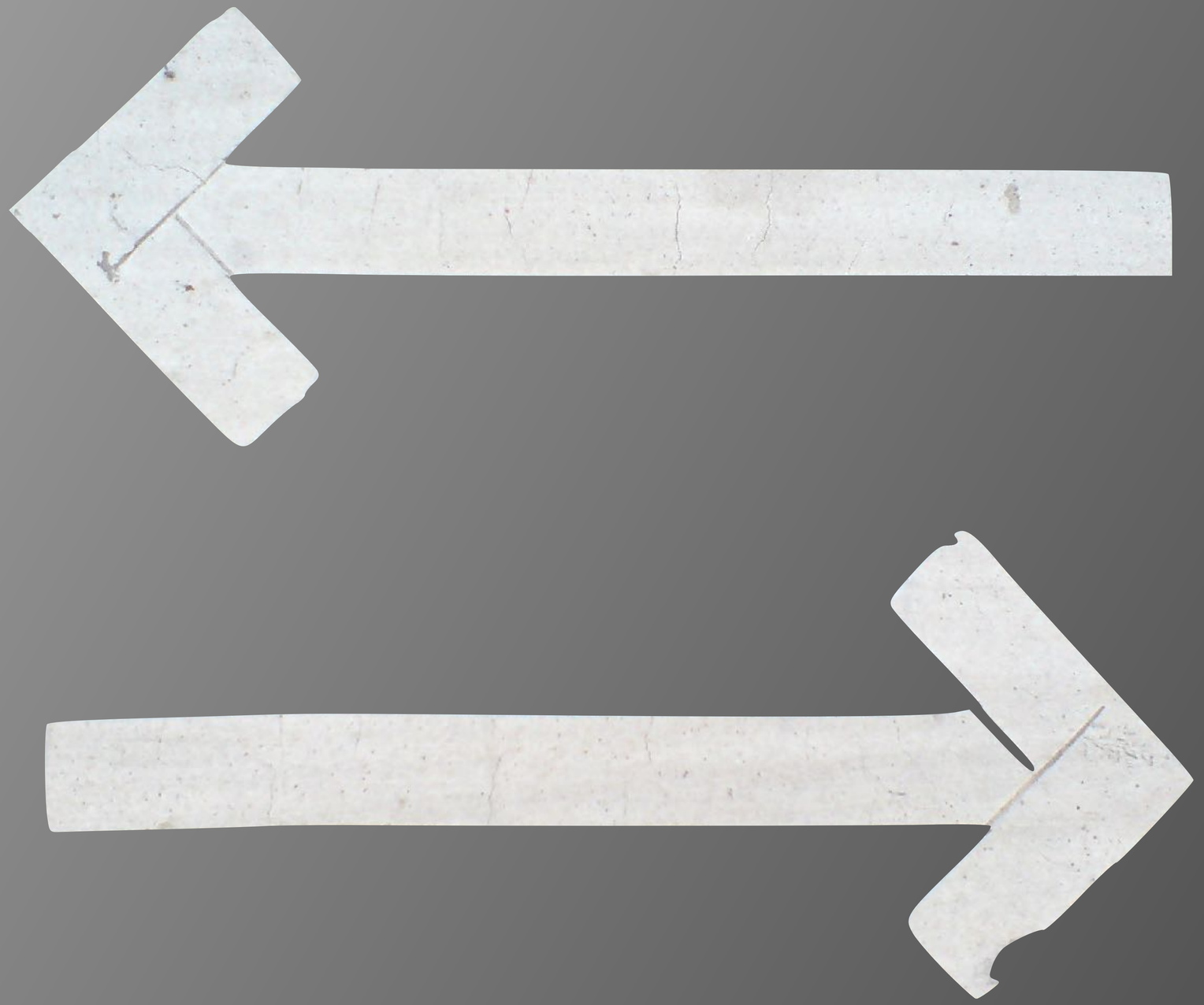
(just a few) VISUAL REPRESENTATIONS OF TIME



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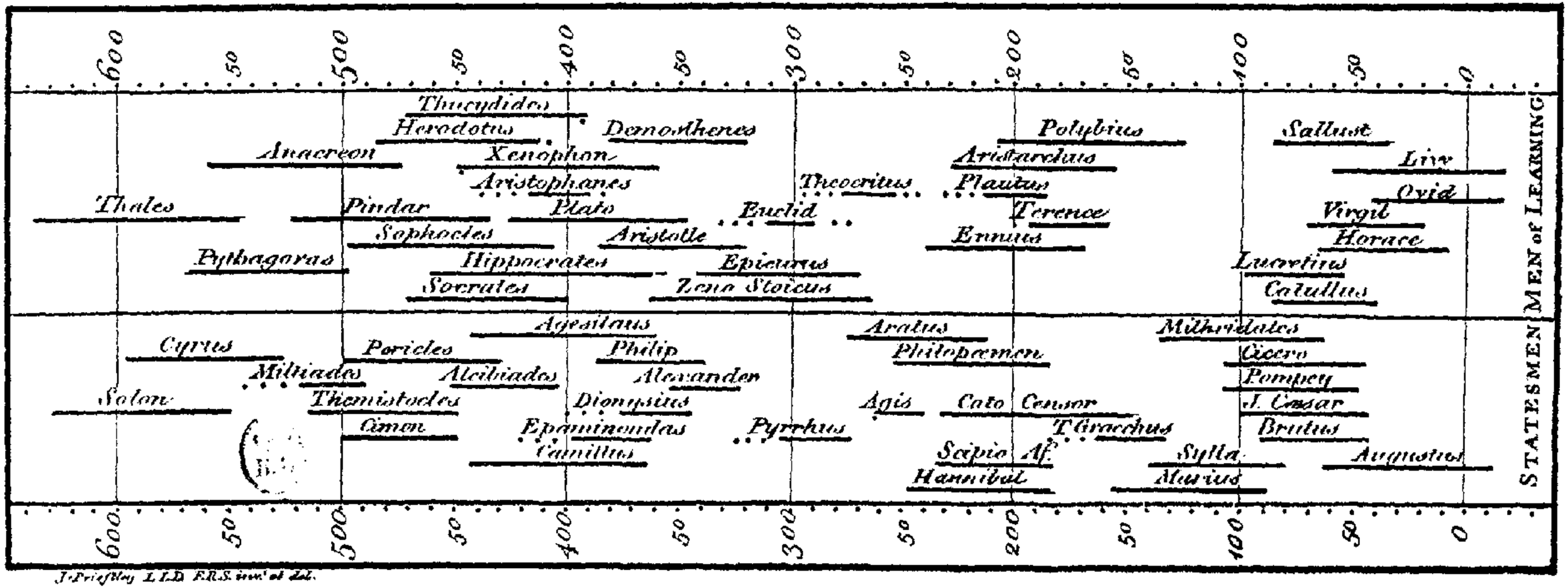
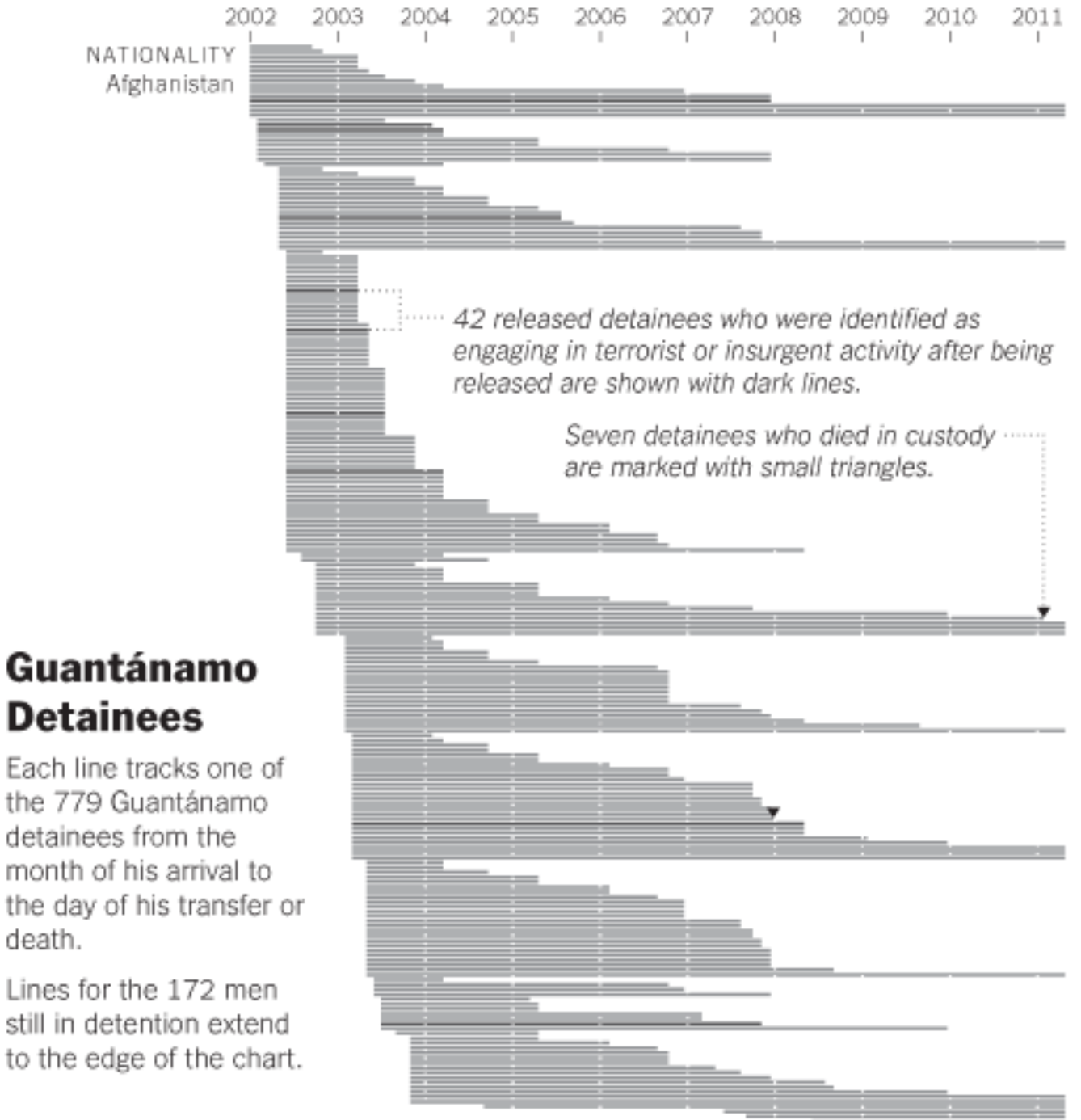
A Specimen of a Chart of Biography.



Joseph Priestley (1765)
(PD) Wikimedia Commons



13pt / Jonathan Corum
The New York Times
Apr 25, 2011

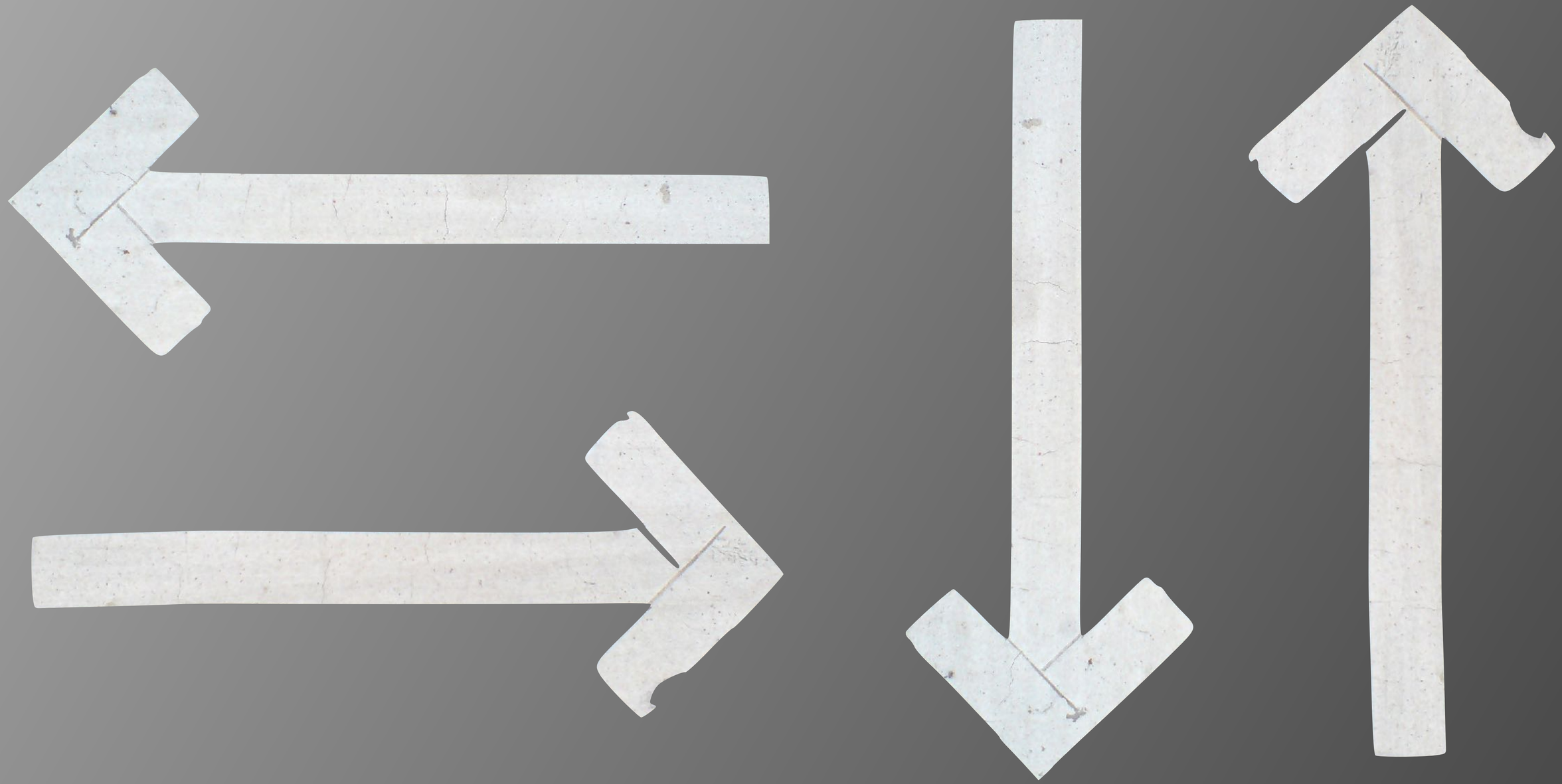


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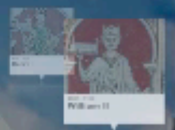
Image courtesy of Matthias Kabel via Wi

orks

1078 - 1100
The White Tower Built



1066 - 1087
William I

1066
The Tower Founded

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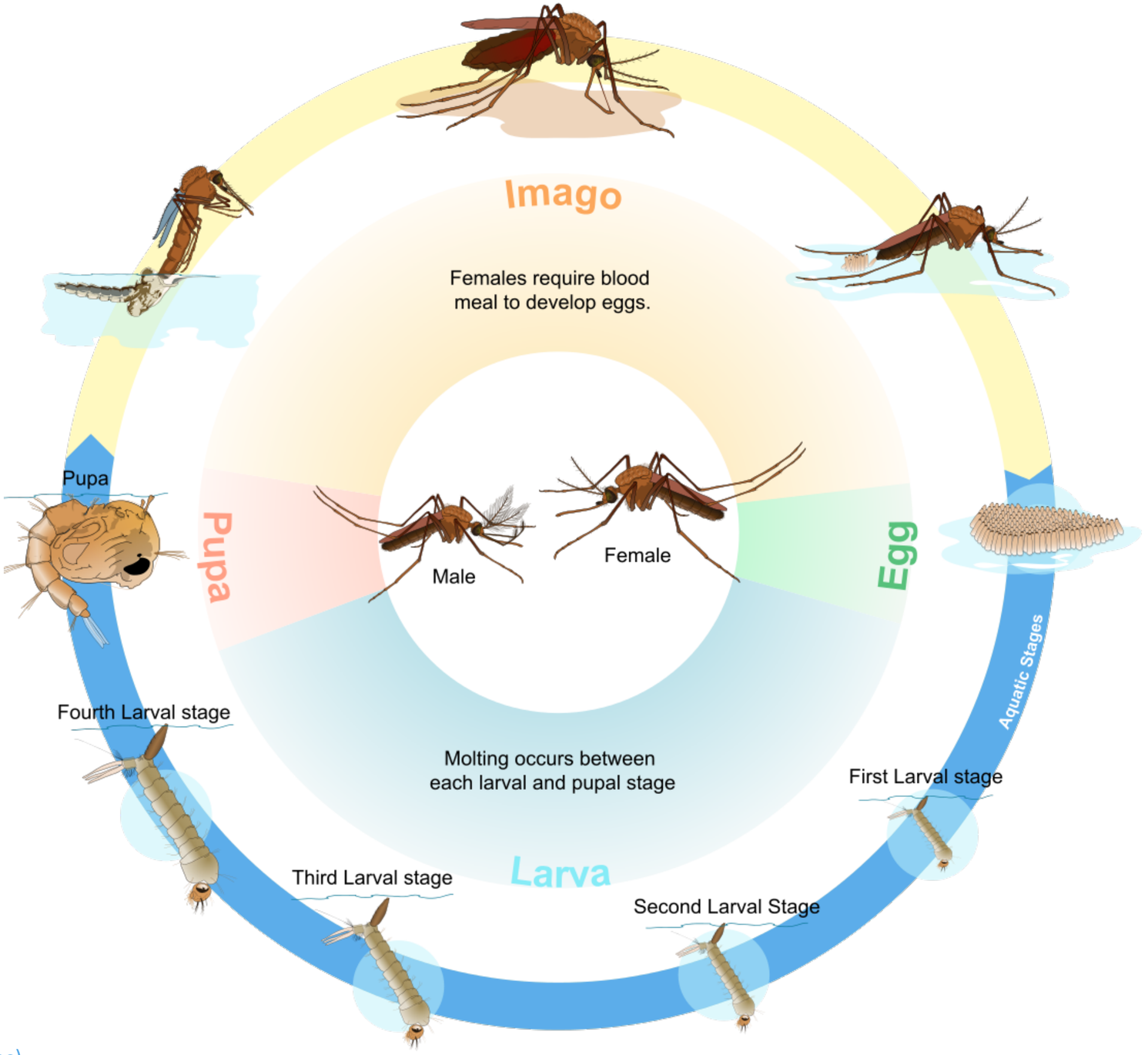
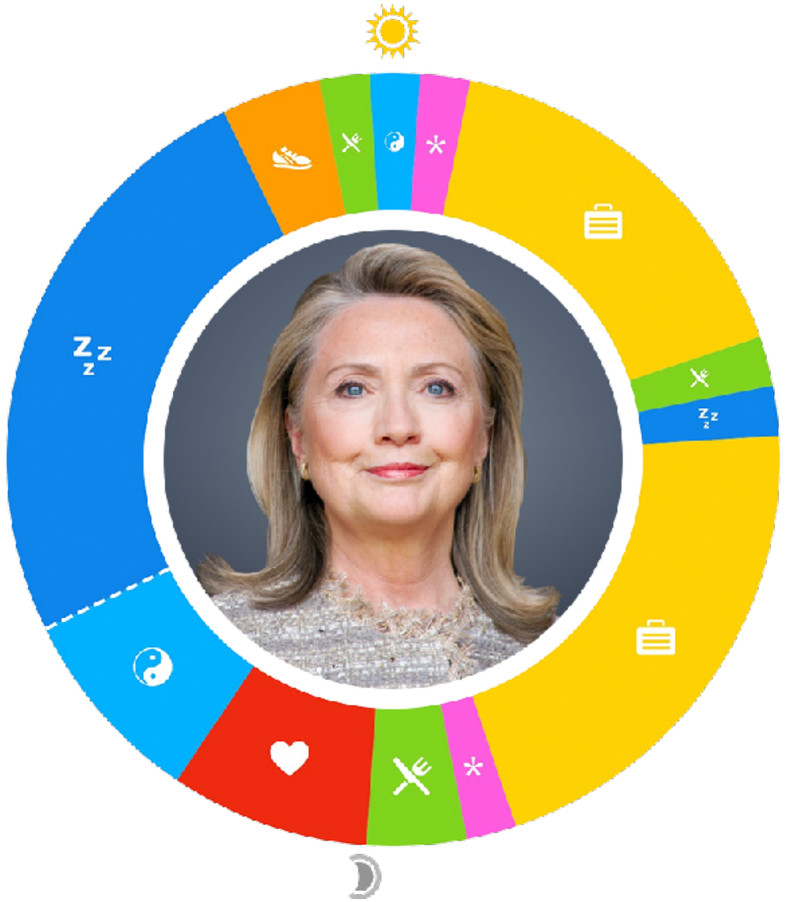


(PD) @LadyofHats (Wikimedia Commons)



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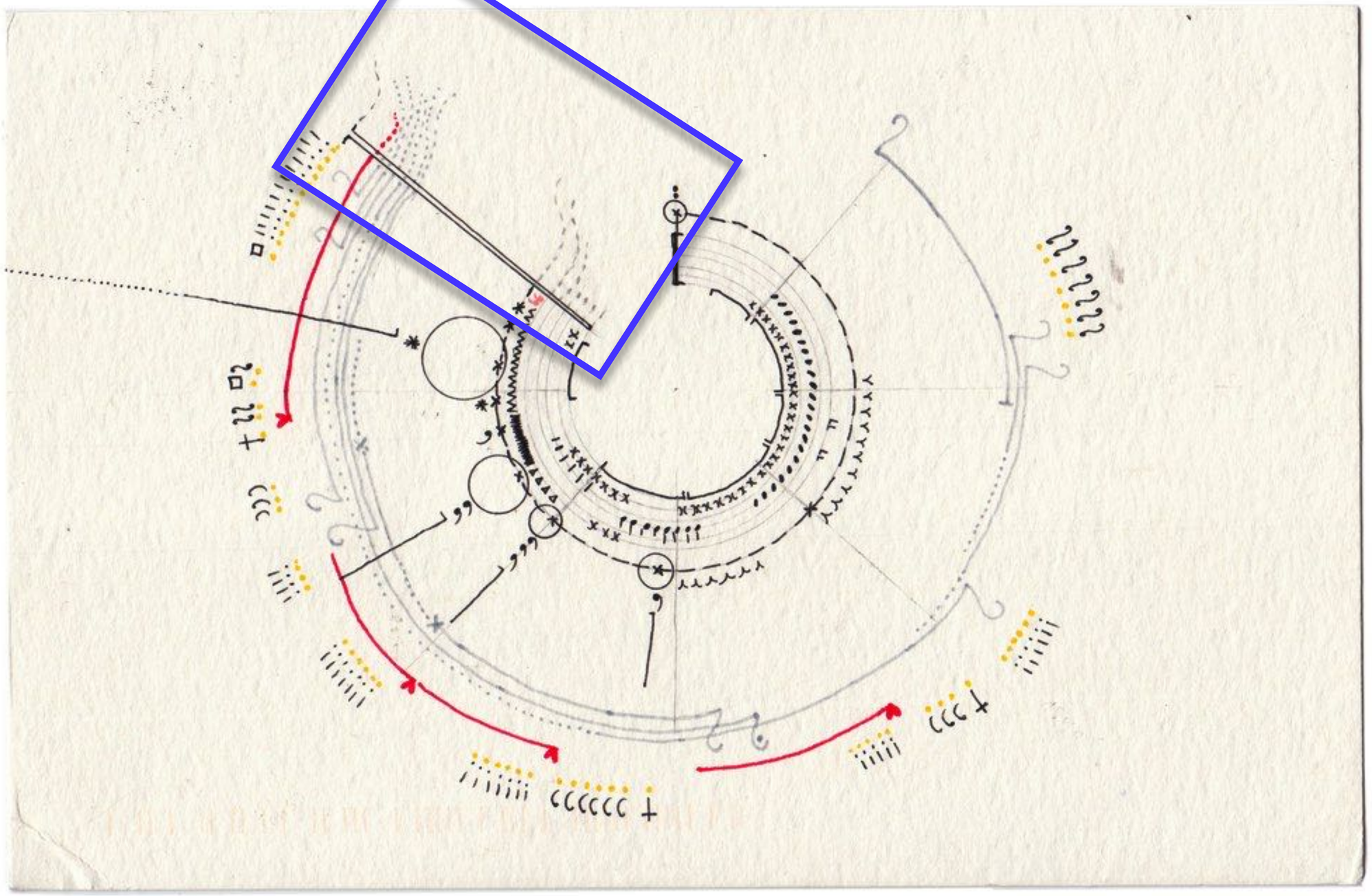
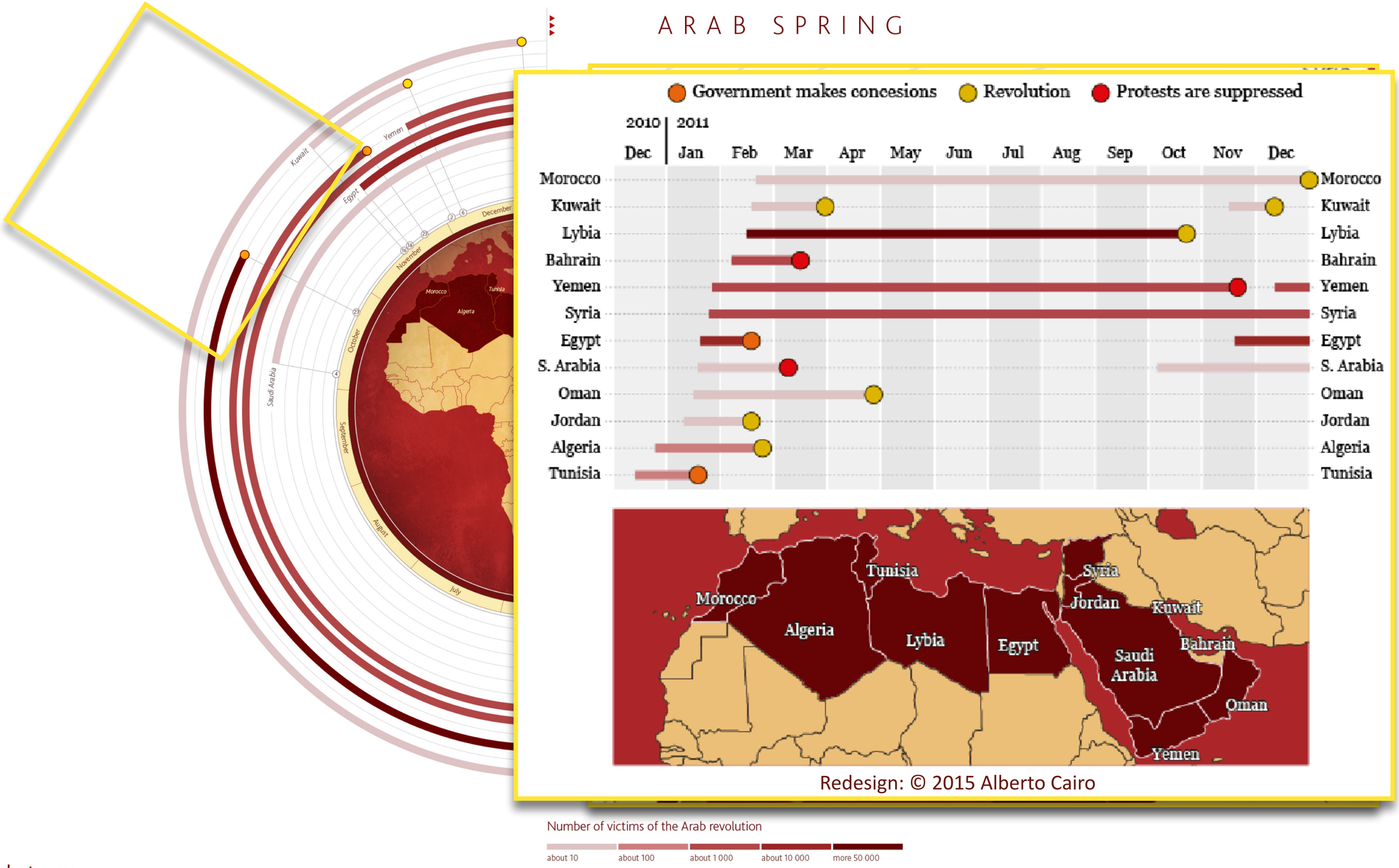
owaves.com/day-plans/



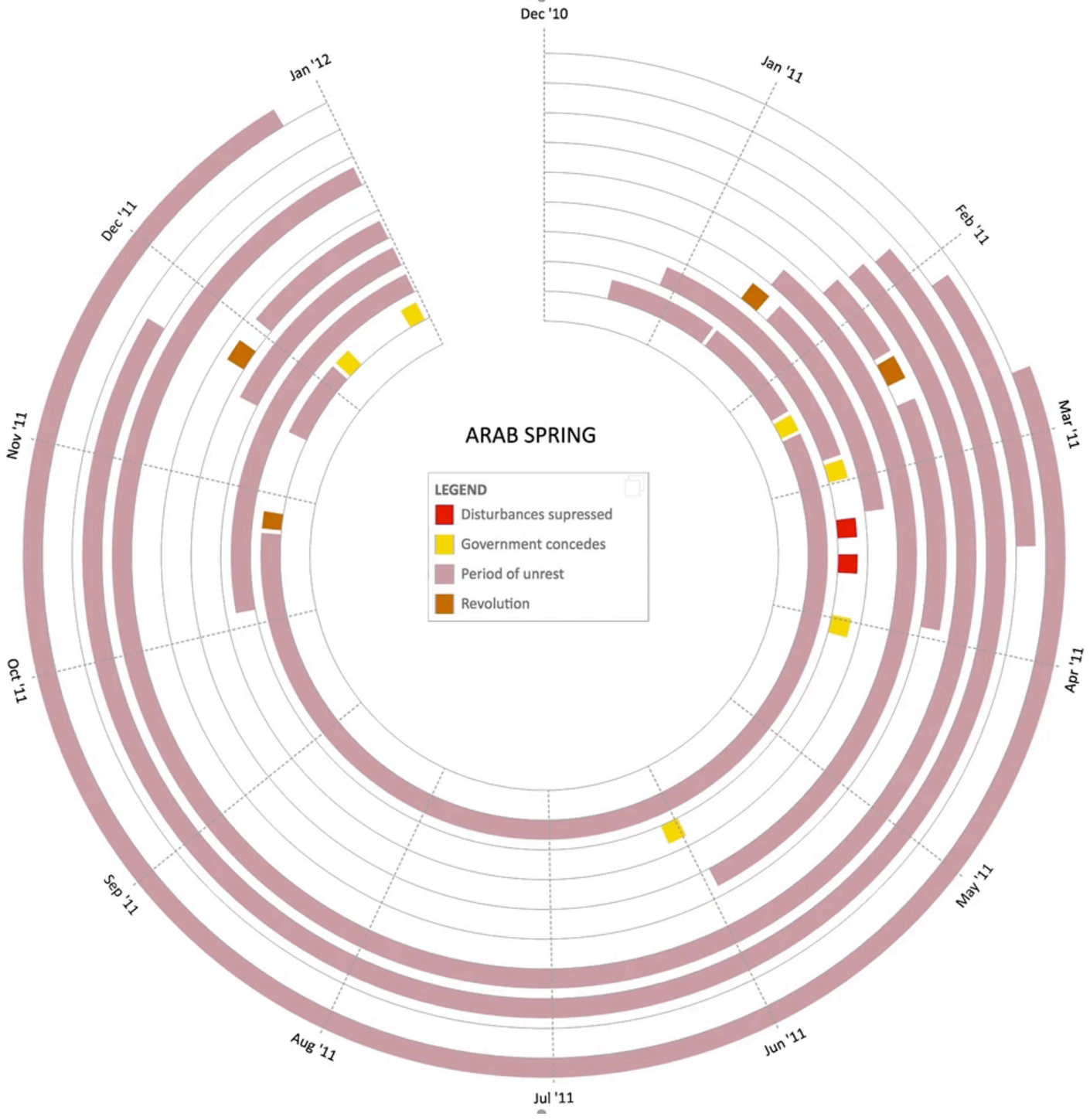
© Giorgia Lupi: dear-data.com/week-22-a-week-in-our-past

ARAB SPRING



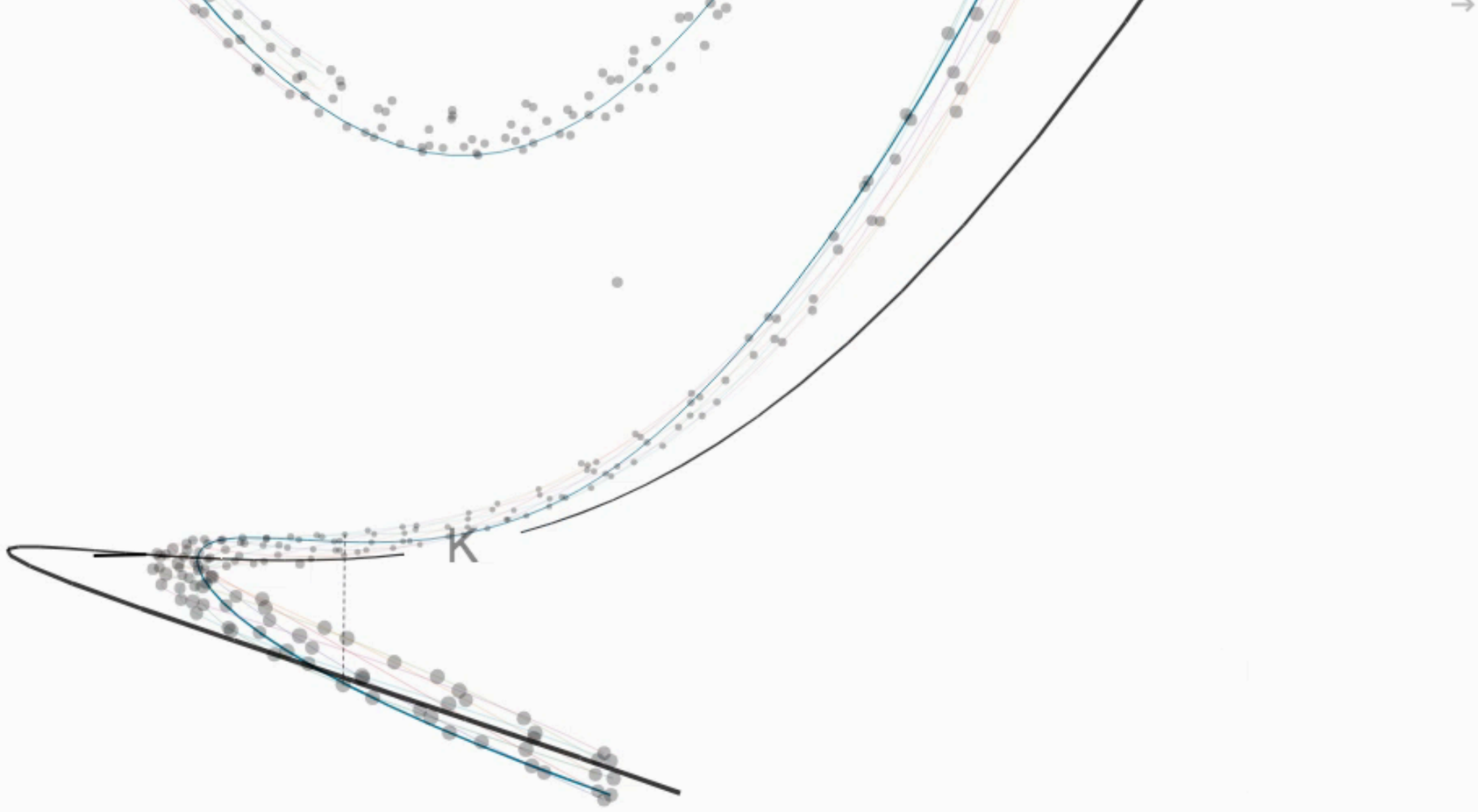
Redesign: © 2015 Alberto Cairo

© 2013 Alexander Katin & Kir Khachaturov
informationisbeautifulawards.com/showcase/113-arab-spring



Produced with **timelinestoryteller.com**
Data from “Arab Spring” by
Alexander Katin & Kir Khachaturov (2013)

(CC) @46704958@N07 (flickr)



12 →
11
1851 CE
10
1688 CE
9
1416 CE
8
800 CE
7
356 BCE
6
1450 BCE
5
3500 BCE
4
10000 BCE
3
25000000 BCE
2
1
K

click to open Ecologies and Mentalities

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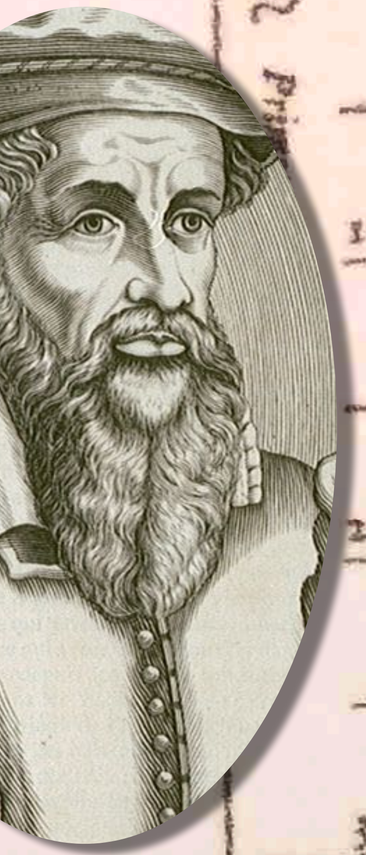
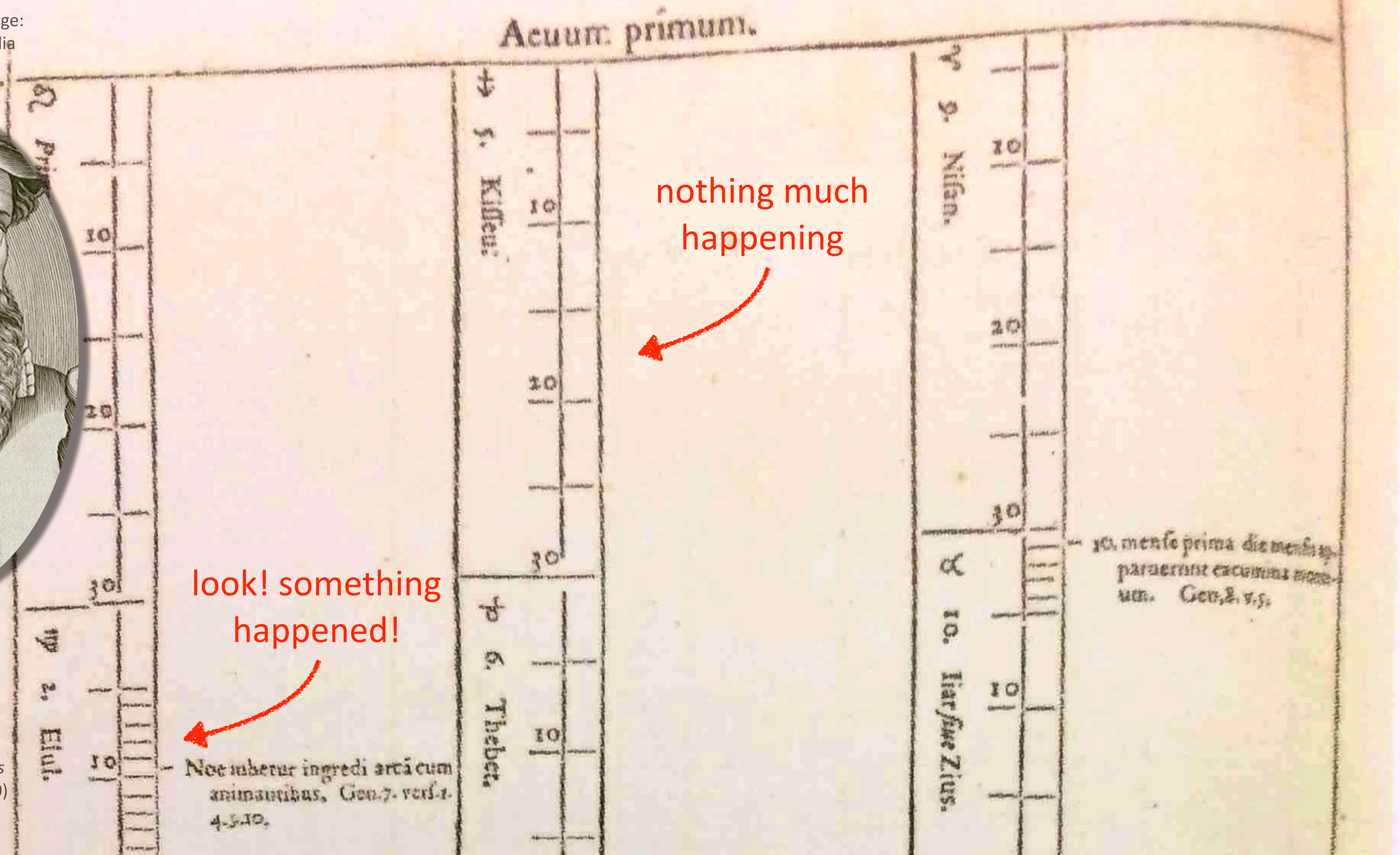
Mercator image:
(PD) Wikimedia

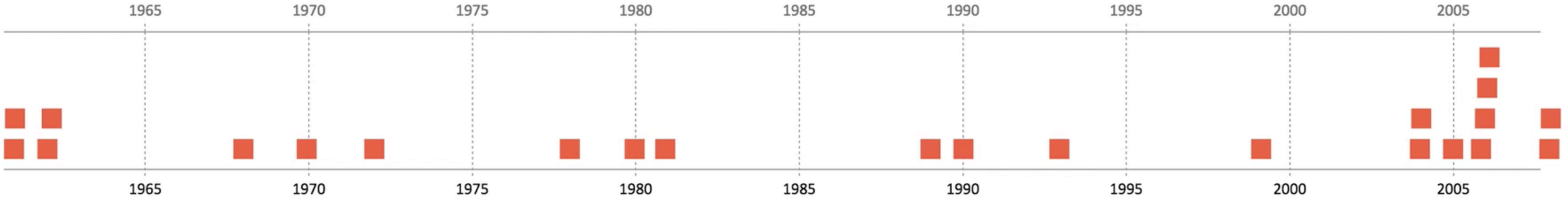




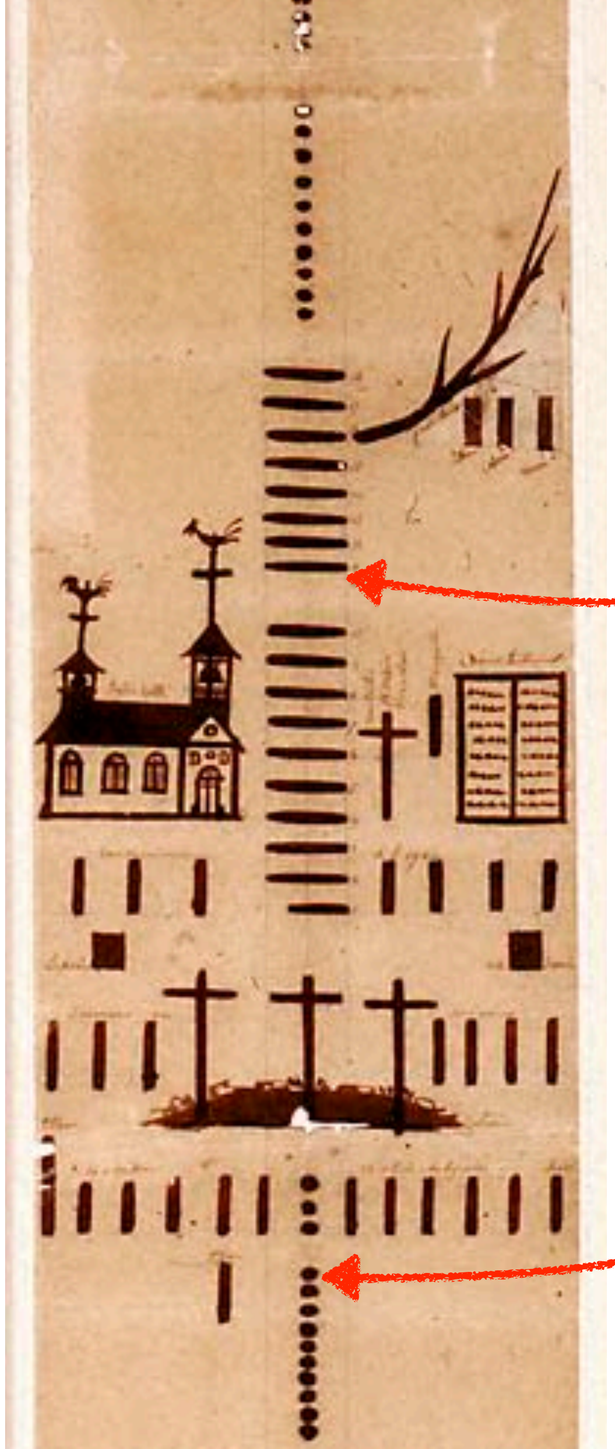
Mercator's *Chronology* (1569)

Reference: *Cartographies of Time* (2010) Rosenberg & Grafton

Time Elapsed Between C5 Hurricanes (1960 – 2010) 5 Hurricanes: 1960 - 2010



Data from aoml.noaa.gov
Produced with **timelinestoryteller.com**



each line = 1 century

each dot = 1 year

Blanchett's *Catholic Ladder* (1838)

Reference:
Cartographies of Time (2010)
Rosenberg & Grafton

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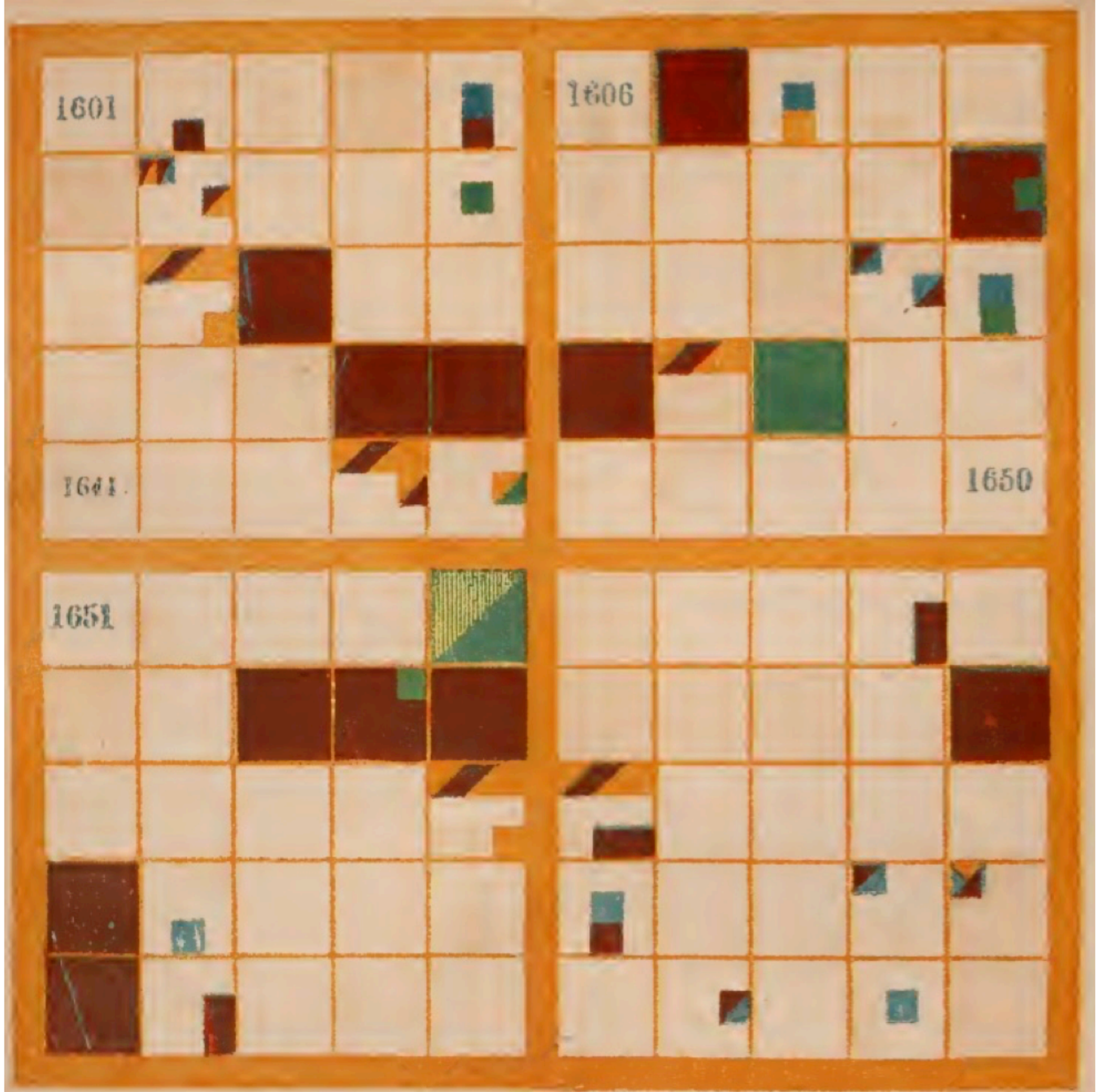
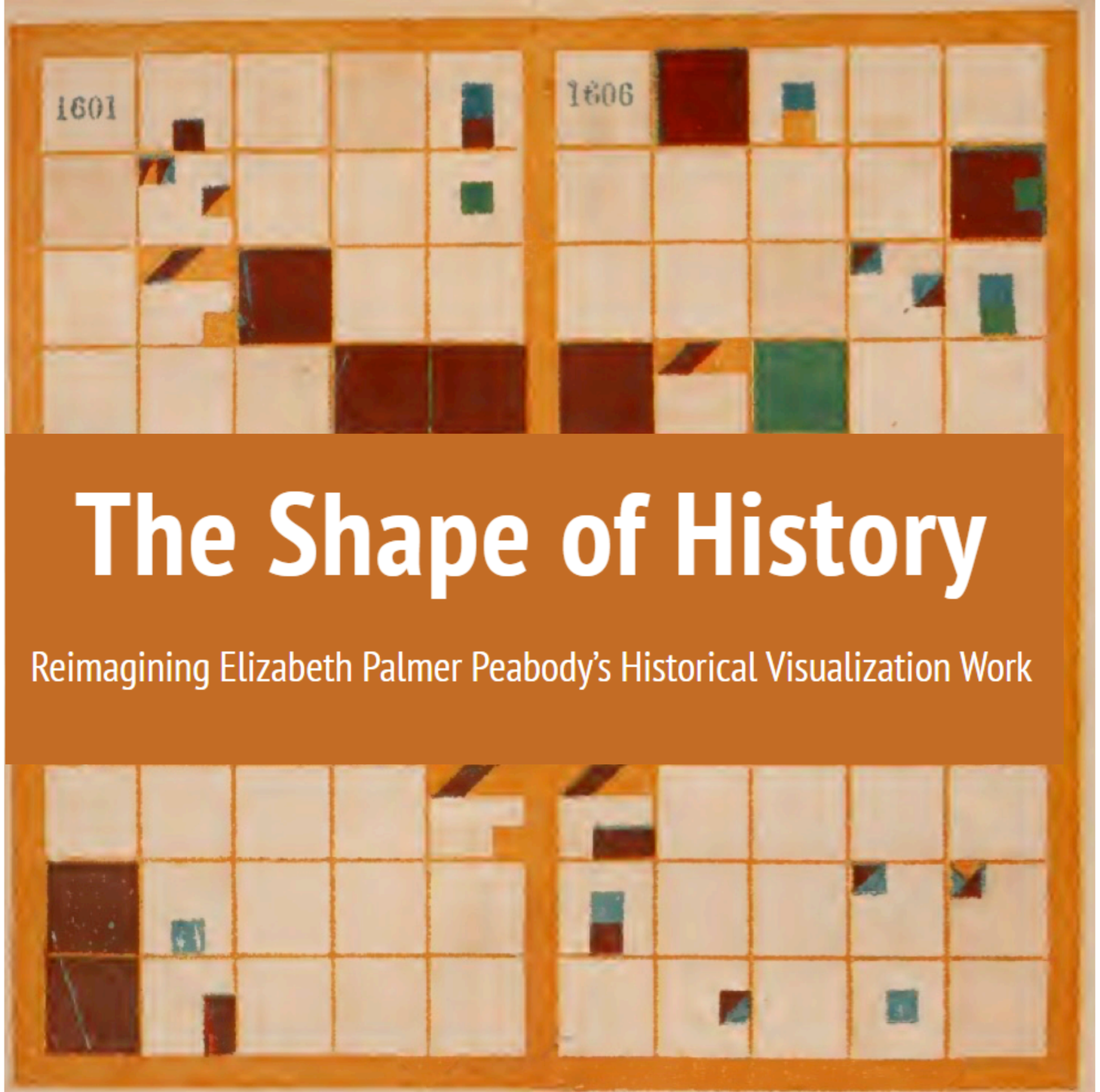
(CC) 38425377@N05 (flickr)



Peabody's
Polish American System of Chronology
(mid 19th century)

Reference:
Cartographies of Time (2010)
Rosenberg & Grafton



The Shape of History

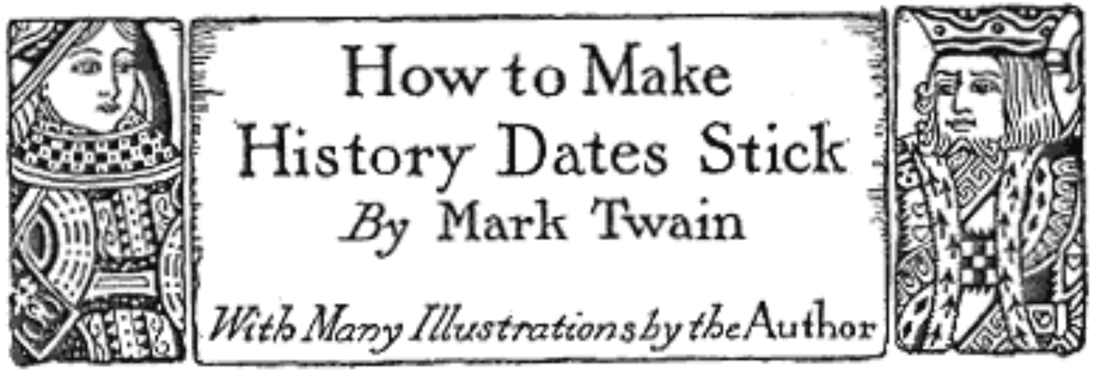
Reimagining Elizabeth Palmer Peabody's Historical Visualization Work

Lauren Klein & colleagues (2016)
Georgia Tech Digital Humanities Lab

shapeofhistory.net

HARPER'S MONTHLY MAGAZINE

Vol. CXXX December, 1914. No. DCCLXXV



How to Make History Dates Stick

By Mark Twain

With Many Illustrations by the Author

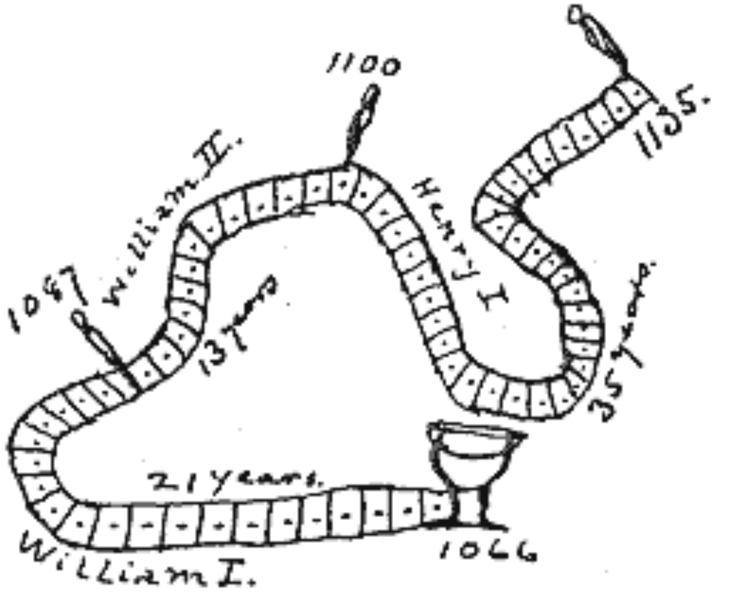


FIG. 2

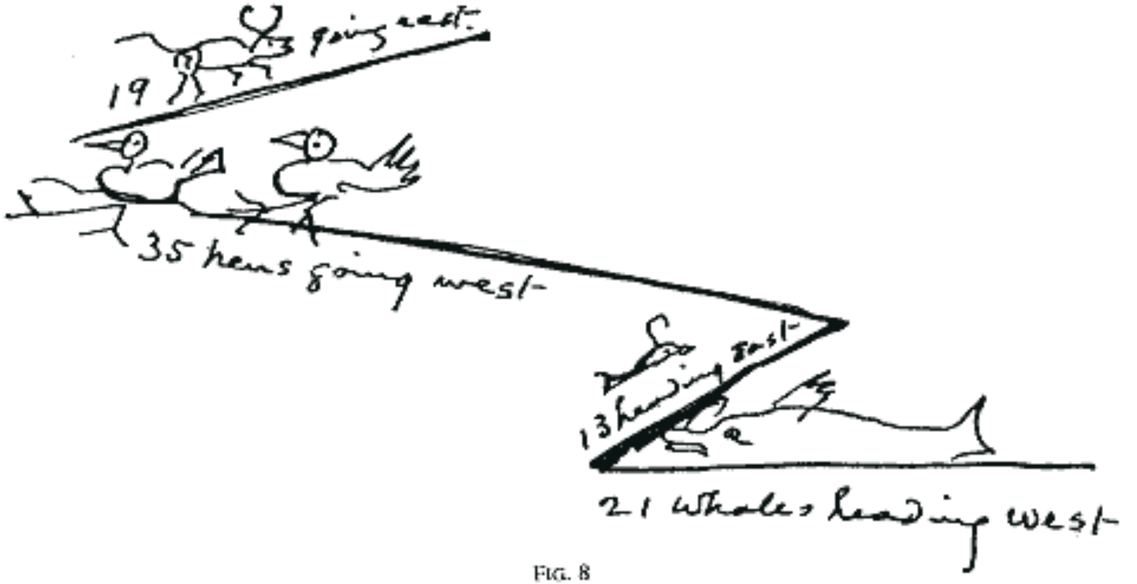
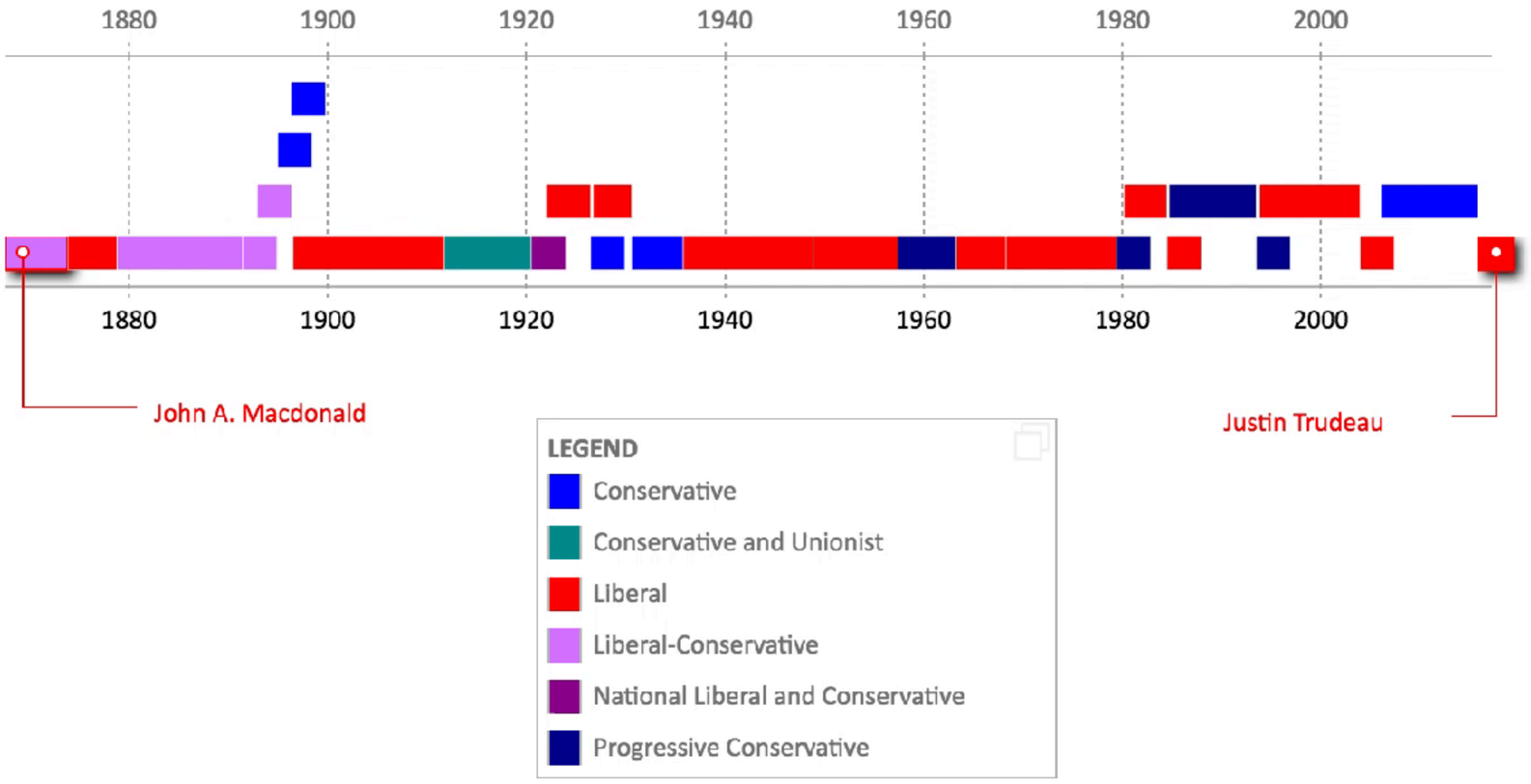


FIG. 8

M. Twain.
How to make history dates stick.
Harper's Monthly Magazine 1914

Prime Ministers of Canada



Data from Wikipedia
Produced with **timelinestoryteller.com**

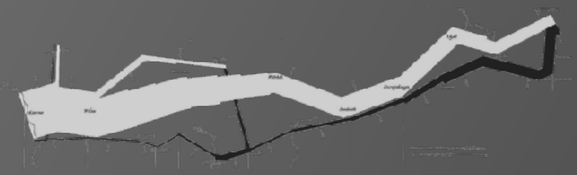
(just a few) VISUAL REPRESENTATIONS OF TIME

WHAT STORY DOES YOUR TIMELINE TELL?

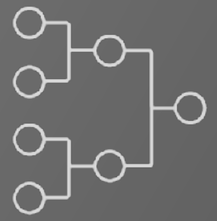
WHAT HAPPENED WHEN?

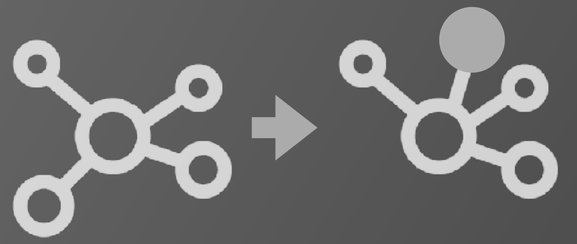
WHEN & HOW MUCH?

WHERE, WHAT, & WHEN?

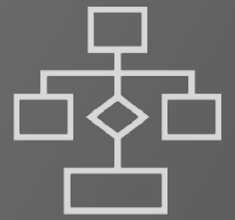


WHAT WAS RELATED WHEN?





WHAT IF & WHEN?

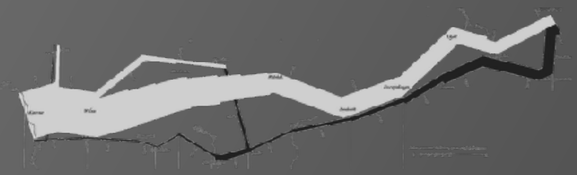


Minard graphic: (PD) Wikimedia Commons
Noun Project icons (CC): @olsjoe, @mabusafiah, @b4bb, @makeiev, @mordarius, @barracuda, @ratch0013

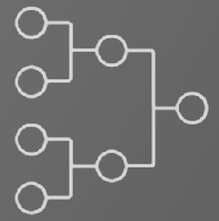
WHAT HAPPENED WHEN?

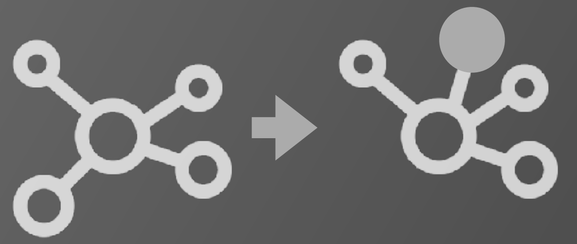
WHEN & HOW MUCH?

WHERE, WHAT, & WHEN?

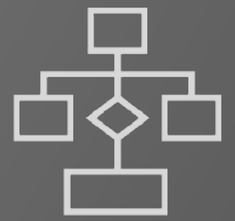


WHAT WAS RELATED WHEN?





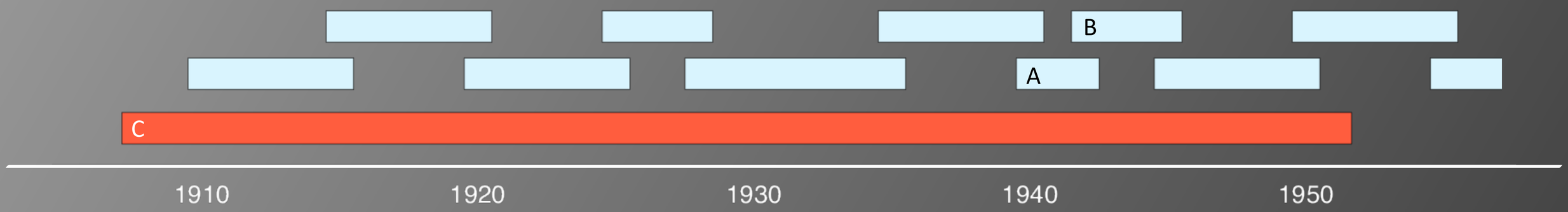
WHAT IF & WHEN?



Minard graphic: (PD) Wikimedia Commons
Noun Project icons (CC): @olsjoe, @mabusafiah, @b4bb, @makeiev, @mordarius, @barracuda, @ratch0013

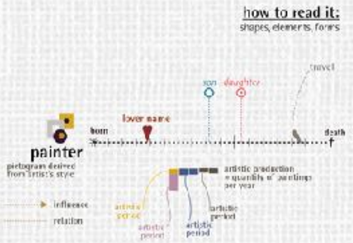
WHAT HAPPENED WHEN?

in what sequence?
for how long?
did events A and B co-occur?
when, relative to event C?



Visualising painters' lives

a project by Accurat (www.accurat.it)
directed by Giorgia Lupi and Michela Buttignol



Pollock

1912
Jan. 28
Cody, United States

Echo Park, New York, Springs, Lee Krasner, Ruth Kligman
Expressionism, Abstract Art, Action Painting

1956
Aug. 11
Springs, United States
43 y. o.

Dalì

1904
May 11
Figueres, Spain

Madrid, Barcelona, Paris, London, United States, Barcelona, Paris, New York, Paris, Figueres
Augusta Ryoff
Neoclassicism, Impressionism, Cubism, Post-impressionism, Surrealism, Naive, Realism, Fauvism, Expressionism, Symbolism

1989
Jan. 23
Figueres, Spain
84 y. o.

Miró

1893
Apr. 20
Barcelona, Spain

Paris, Netherlands, Montroig, Barcelona, Palma, Majorca, Barcelona, Paris, Palma, Majorca, United States
Pilar Juncosa Iglesias
Surrealism, Abstract Art

1983
Dec. 25
Palma, Majorca, Spain
90 y. o.

Boccioni

1882
Oct. 19
Reggio Calabria, Italy

Forlì, Genoa, Padua, Catania, Rome, Paris, Russia, Paris, Verona
Augusta Popoff, Vittoria Colonna
Post-impressionism, Impressionism, Expressionism, Futurism

1916
Aug. 17
Verona, Italy
33 y. o.

Picasso

1881

Corunna, Barcelona, Madrid, Paris, Barcelona, Paris, Paris, Antibes, La Californie, Vallauris, Mougins
Fernande Olivier, Eva Gouel, Olga Kokhlova, Marie-Therese Walter, Dora Maar, Françoise Gilot, Geneviève Laporte, Jacqueline Roque
Blue Period, Rose Period, African Period, Cubism, Neoclassicism & Surrealism

1973
Apr. 8
Mougins, France
91 y. o.

Klee

1879
Dec. 18
Münchenbuchsee bei Bern, Switzerland

Munich, Rome, Bern, Paris, Feld, Ely Stumpf, Weimar, Dusseldorf, Muralto
Expressionism, Surrealism, Cubism, Abstract Art, Fauvism

1940
Jun. 29
Muralto, Switzerland
60 y. o.

Mondrian

1872
Mar. 7
Amersfoort, Netherlands

Winterswijk, Amsterdam, Brabant, Amsterdam, Paris, Brabant, Paris, London, New York
Impressionism, Post-impressionism, Fauvism, Cubism, Neoplasticism

1944
Feb. 1
New York, United States
71 y. o.

Matisse

1869
Dec. 31
Le Cateau-Cambrésis, France

Paris, Paris, Saint-Quentin, London, Corsica, Paris, Marguerite, Jean-Pierre, Paris, Morocco, Russia, Paris, Nice, Italy, Venice, United States
Caroline Joblau, Amélie Noëlie Parayre, Lydia Delectorskaya
Realism, Post-impressionism, Divisionism, Impressionism, Expressionism, Fauvism, Cubism, Primitivism, Abstract Art, Color field painting

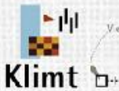
1954
Nov. 3
Vence, France
84 y. o.

Kandinsky

1866
Dec. 16
Moscow, Russia

Odessa, Moscow, Dessau, Moscow, Berlin, Weimar, Dessau, Neuilly-sur-Seine
Anna Chimyakina, Gabriele Münter, Vasiliev, Ely Stumpf
Post-impressionism, Expressionism, Abstract Art

1944
Dec. 13
Neuilly-sur-Seine, France
78 y. o.



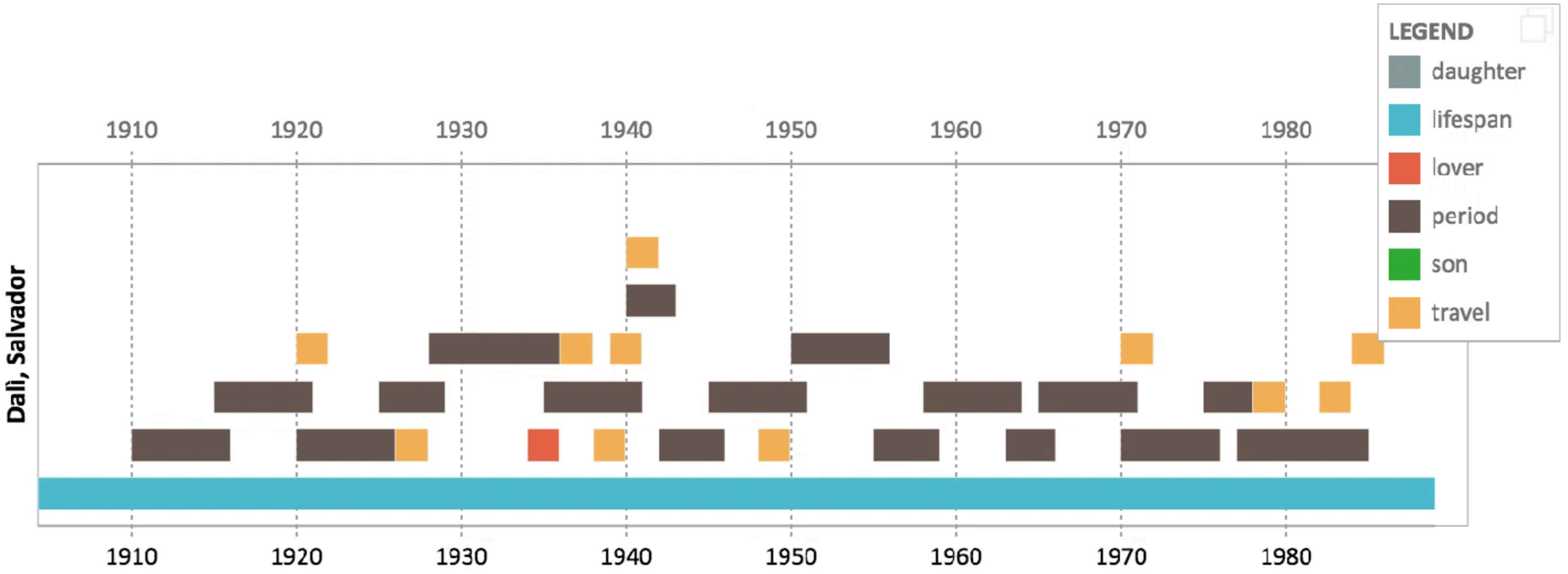
Klimt

1862

Vienna, Ernst, Gustav, Otto, Venice
Emilie Louise Flöge, Mizzi Zimmermann, Maria Ucicky
Realism, Neoclassicism, Romanticism, Symbolism, Art Nouveau, Japonism

1918
Feb. 6
Vienna, Austria
55 y. o.

© Accurat (2013)



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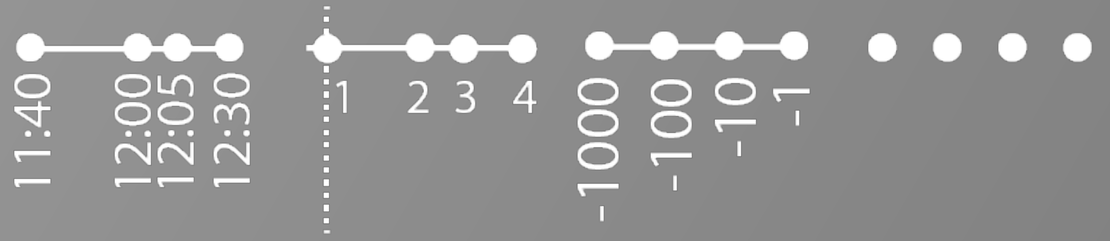
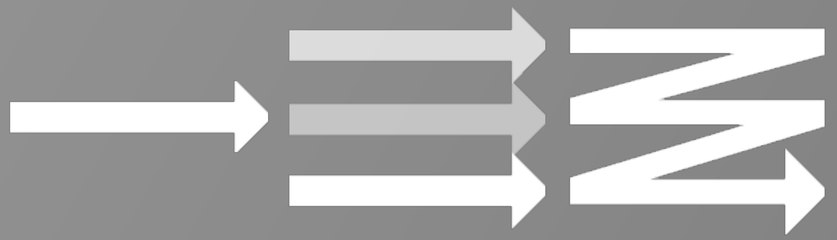
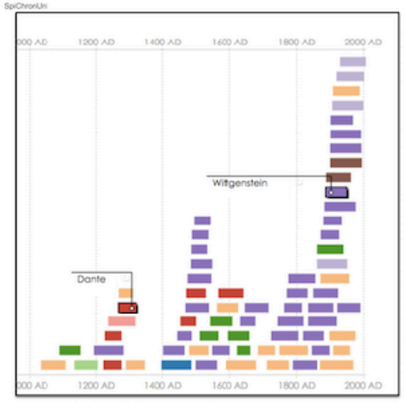
REPRESENTATION

SCALE

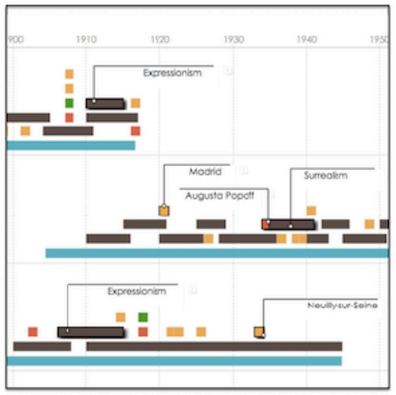


LAYOUT

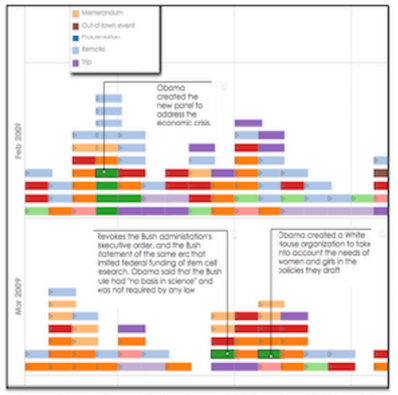




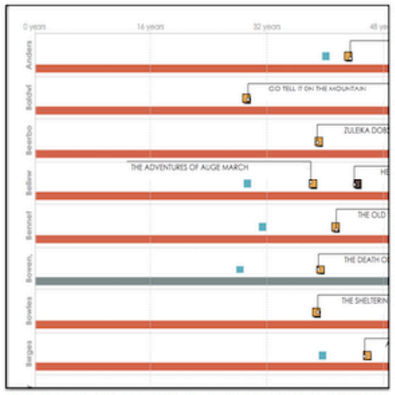
Narrative point: present chronology, duration of events.
Perceptual task: bar length and position judgment.
Comment: supported by most tools.



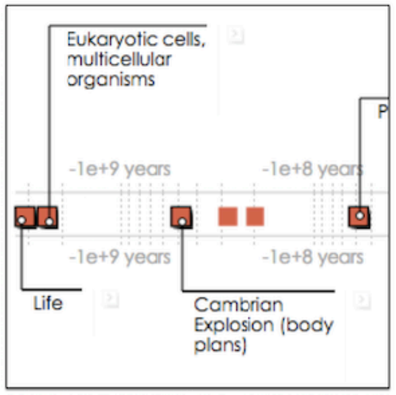
Narrative point: compare chronology, duration of events between facets; present synchronicities (coinciding events).
Perceptual task: bar length and position comparisons.



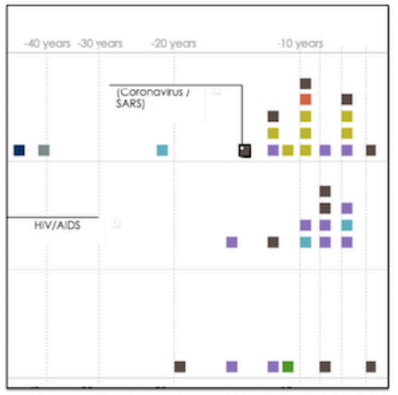
Narrative point: compare chronology, duration, periodicity of events between segments.
Perceptual task: bar length and position comparisons.



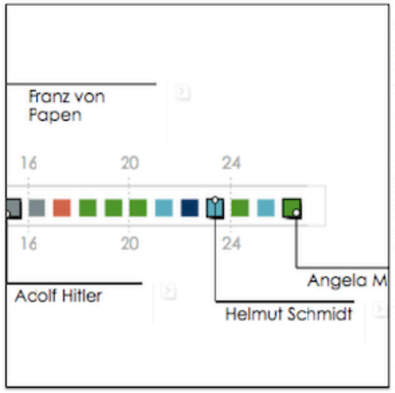
Narrative point: compare relative chronology, duration of events between facets; present relative synchronicities.
Perceptual task: bar length and position comparisons.



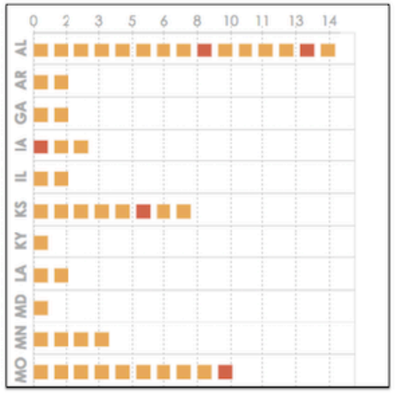
Narrative point: present chronology of a timeline with emphasis on recent events.
Perceptual task: bar position judgment.
Comment: do not start story with log scale.



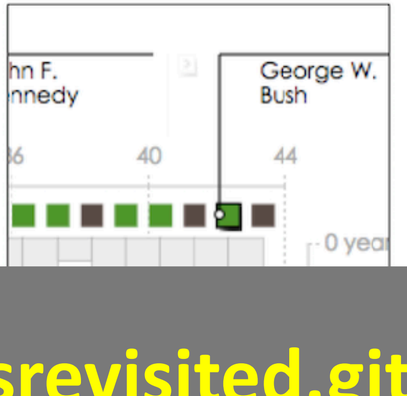
Narrative point: compare chronologies with emphasis on recent events between facets; show synchronicity.
Perceptual task: bar position comparisons.
Comment: do not start story with log scale.



Narrative point: present a sequence of events.
Perceptual task: bar position judgments.
Comment: wide aspect ratio.



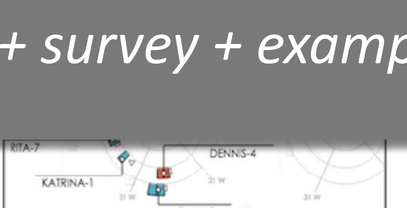
Narrative point: (accurately) compare lengths of sequences between facets.
Perc
p
C
c



Narrative point: present a sequence of events with distribution of time elapsed between events.
ath

Narrative point: present chronology, duration of

Narrative point: compare chronology, duration of events between facets



Narrative point: compare chronology, duration,

timelinesrevisited.github.io

journal paper + survey + example galleries

WHAT STORY DOES YOUR TIMELINE TELL?

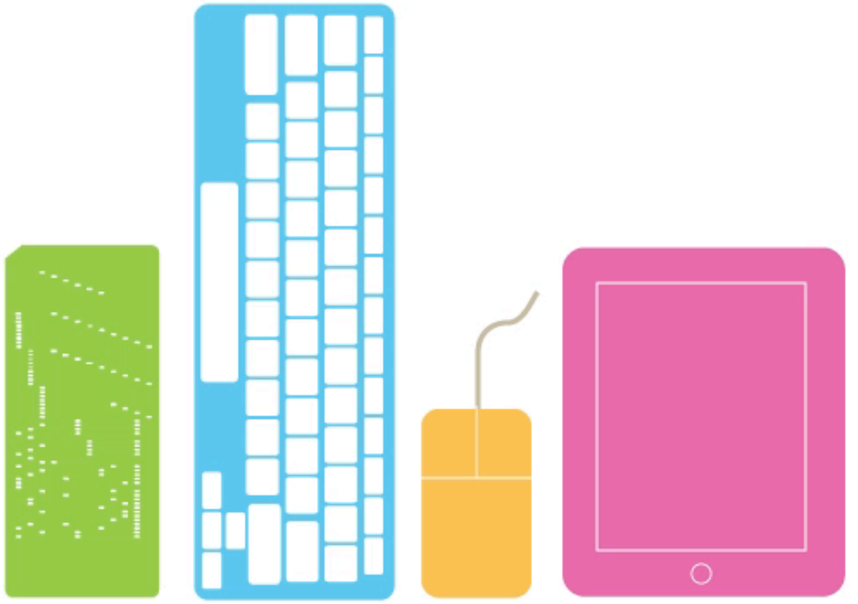
CIA Leak Case info legend start

White House
Novak
Lewis Libby
Matt Cooper & Time Mag.
Judith Miller & NYT
The War
Courts & Judges
Justice Department
Joe Wilson
all | none

Novak walks off "Inside Politics" set
Bob Woodward testifies before grand jury
Libby Indicted for obstruction of justice, false statements, p
Ashcroft recuses himself, Fitzgerald Takes over
NYT: Libby learned about Plame from Cheney
Gonzales testifies before federal grand jury
Cooper: "What I Told the Grand Jury"
Bush questioned by prosecutors
McClellan refuses to discuss Rove involvement
FBI interviews White House officials
Cooper cooperates, avoids jail
McClellan: "...not the way this president or this White House operates."
Time agrees to turn over Cooper's notes and e-mails
Grand Jury questions administration officials
NYT: Miller's Source was Libby
Cheney: "No. I don't know Joe Wilson"
Rove testifies before grand jury
Libby pleads not guilty
Kristof's NYT Column disputes accuracy of 16 words
Judith Miller subpoenaed
Miller implicates Libby
Rove informed that he won't be charged
Air Force One, Briefing Book
Robert Novak
Cooper held in contempt again
Bush: If someone "committed a crime"...
Jury receives Libby case for deliberatio
U.S. INVASION/OCCUPATION OF IRAQ
Novak's Column "outs" Plame
Cooper ordered to jail
Rove's 4th grand jury appearance
Libby sentenced to 30 months, fine
Wilson's "What I didn't find in Africa" published in NYT
Washington Post: Rove = Cooper's source
Judge denies delay in Libby's sente
Bush's State of the Union with "16 words"
Lewis "Scooter" Libby
Libby's criminal trial
Bush commutes Libby
Wilson's factfinding mission to Niger
DOJ launches investigation
Miller held in contempt of court
Judith Miller jailed
Rove testifies for 5th time
Libby found guilty on 4/5 coun

2002 2003 2004 2005 2006 2007

timeglider (timeglider.com) prev Nov 7, 2004 next



Arjuna Soriano

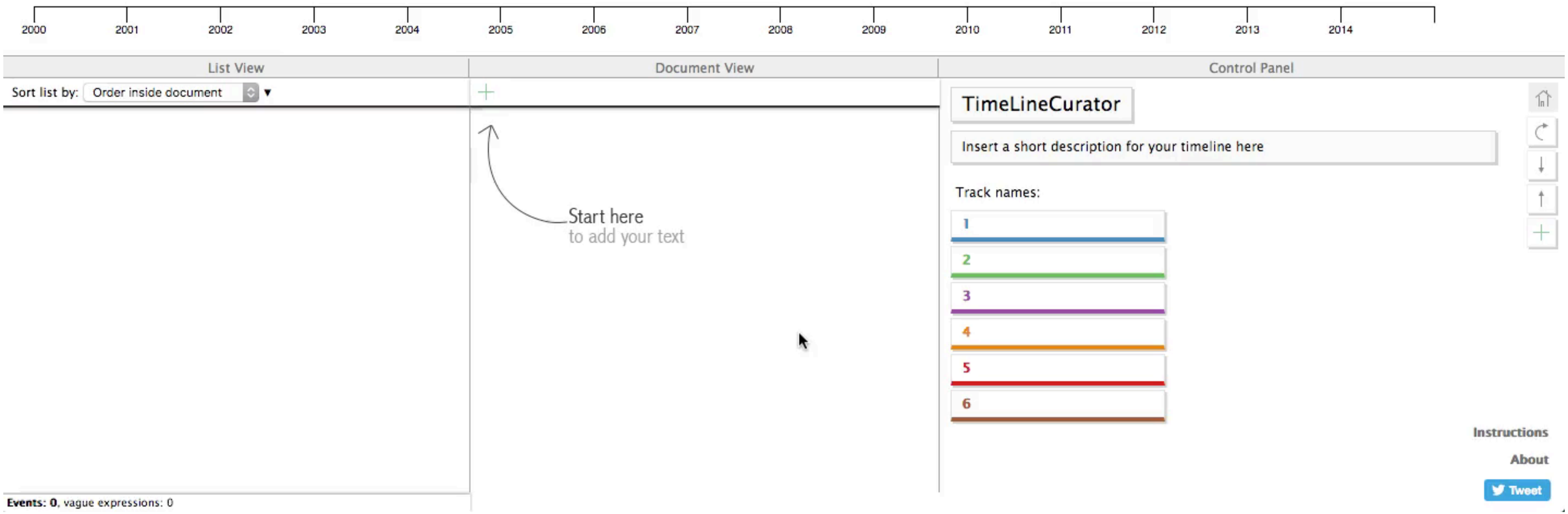
From punch cards to multi touch.

Revolutionary User Interfaces

The human computer interface helps to define computing at any one time. As computers have become more mainstream the interfaces have become more intimate. This is the journey of computer technology and how it has come to touch all of our lives.

The Antikythera
1600

CHRONOLOGICAL	*Dali was born, **THEN** he started painting, **THEN** moved to Paris, …*
NON-CHRONOLOGICAL	*Dali lived in Paris during his Surrealist period, … **MEANWHILE**, Matisse was in Italy, … , **YEARS EARLIER**, he too lived in Paris, …*



Fulda, Brehmer, & Munzner (2015): timelinecurator.org

EXPRESSIVE STORYTELLING WITH TIMELINES

Chronological OR non-chronological

Choice of representations for time

Choice of time scales

TIMELINE STORYTELLER

timelinestoryteller.com

Chronological OR non-chronological

Choice of representations for time

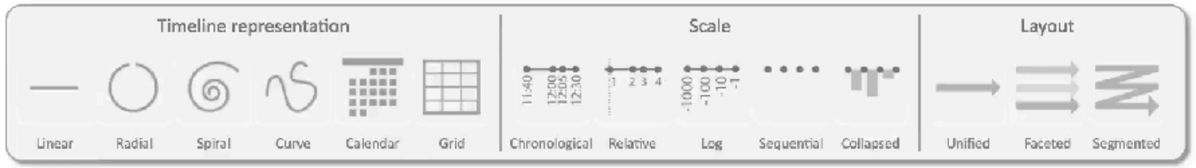
Choice of time scales

Annotate, emphasize, reveal,

Timeline Storyteller

Secure https://timelinestoryteller.com/app/

Microsoft



TOUR ? ✉

Timeline Storyteller (Alpha)

Load timeline data

DEMO JSON CSV

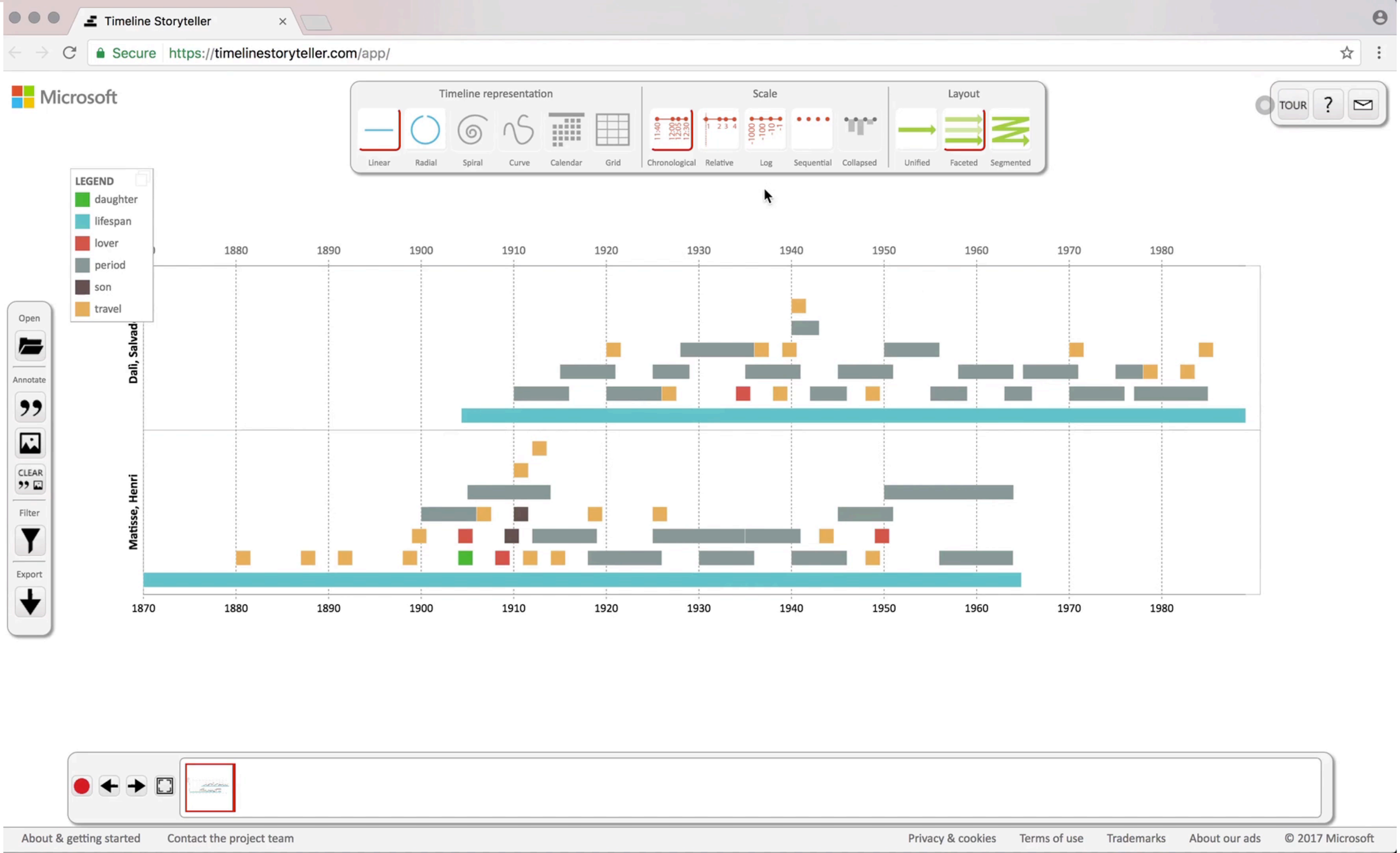
Load timeline story

DEMO

An expressive visual storytelling environment for presenting timelines.

A note about privacy: Your data remains on your machine and is not shared with Microsoft unless you export the content you create and provide your email address. If you share your content with Microsoft, we will use it for research and to improve our products and services. We may also include it in a future research publication. By using this service, you agree to Microsoft's Privacy Statement and Terms of Use.

1.5 x speed


Timeline Storyteller
Secure https://timelinestoryteller.com/app/
Microsoft
Timeline representation
Linear
Radial
Spiral
Curve
Calendar
Grid
Scale
Chronological
Relative
Log
Sequential
Collapsed
Layout
Unified
Faceted
Segmented
TOUR
LEGEND
daughter
lifespan
lover
period
son
travel
Open
Annotate
CLEAR
Filter
Export
Dali, Salvad
Matisse, Henri
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
About & getting started
Contact the project team
Privacy & cookies
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Trademarks
About our ads
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3 x speed

Timeline Storyteller

Secure https://timelinestoryteller.com/app/

Microsoft

Timeline representation: Linear, Radial, Spiral, Curve, Calendar, Grid

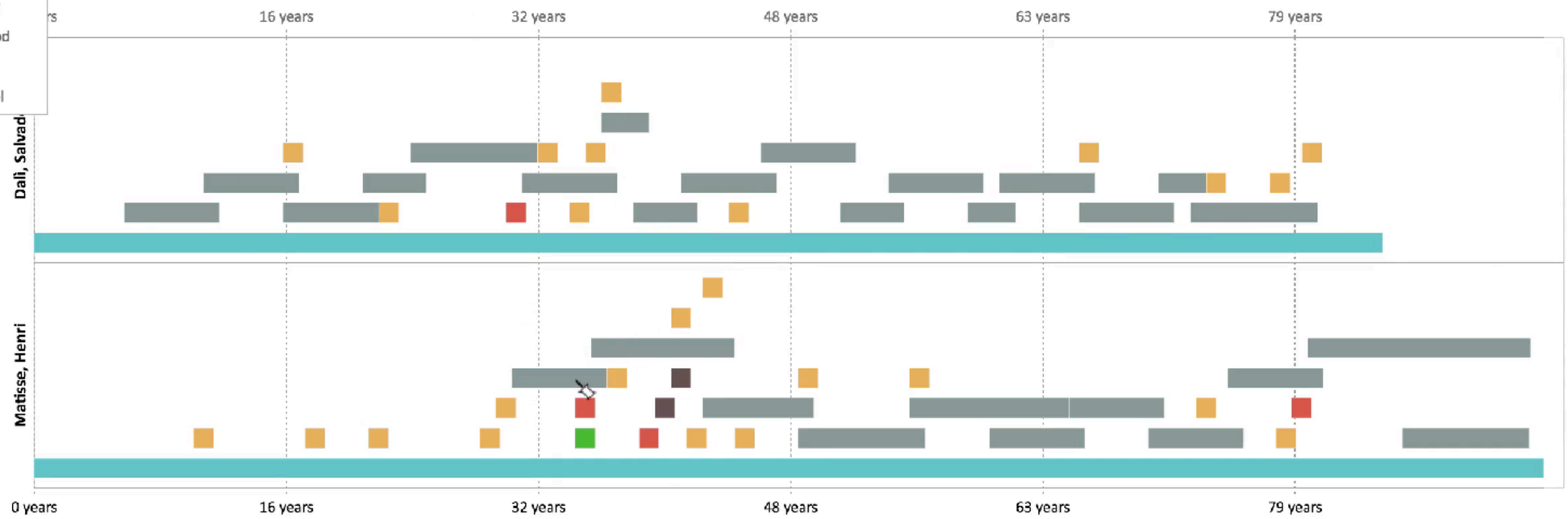
Scale: Chronological, Relative, Log, Sequential, Collapsed

Layout: Unified, Faceted, Segmented

TOUR ? ✉

LEGEND
- daughter
- lifespan
- lover
- period
- son
- travel

Open
Annotate
CLEAR
Filter
Export



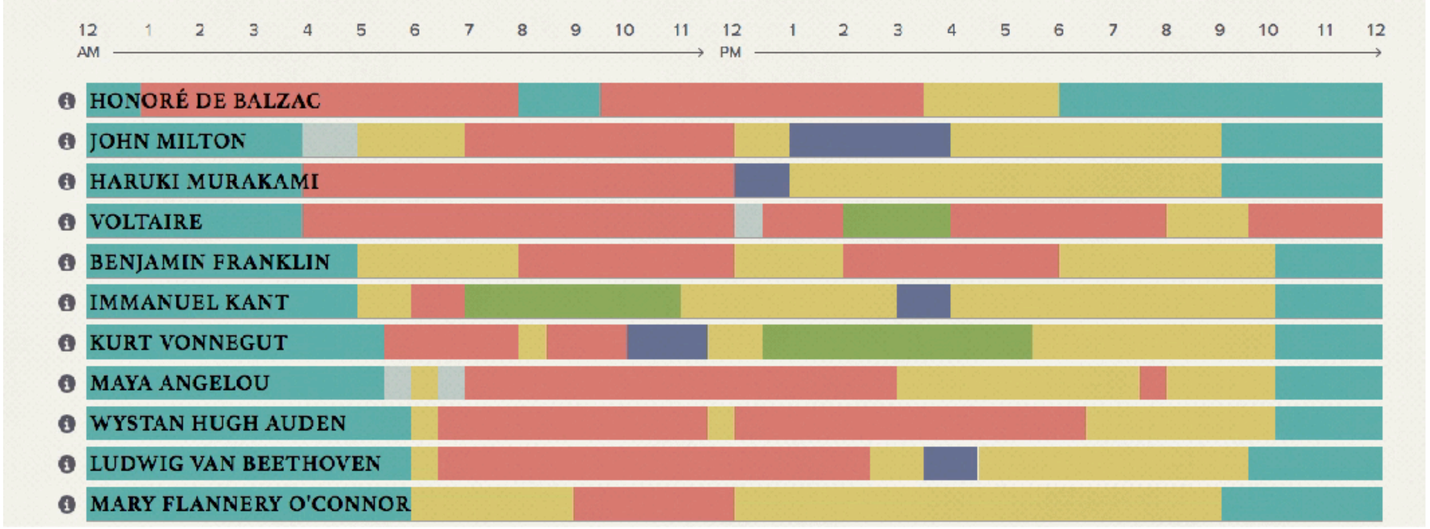
3 x speed

THE DAILY ROUTINES OF

FAMOUS CREATIVE PEOPLE

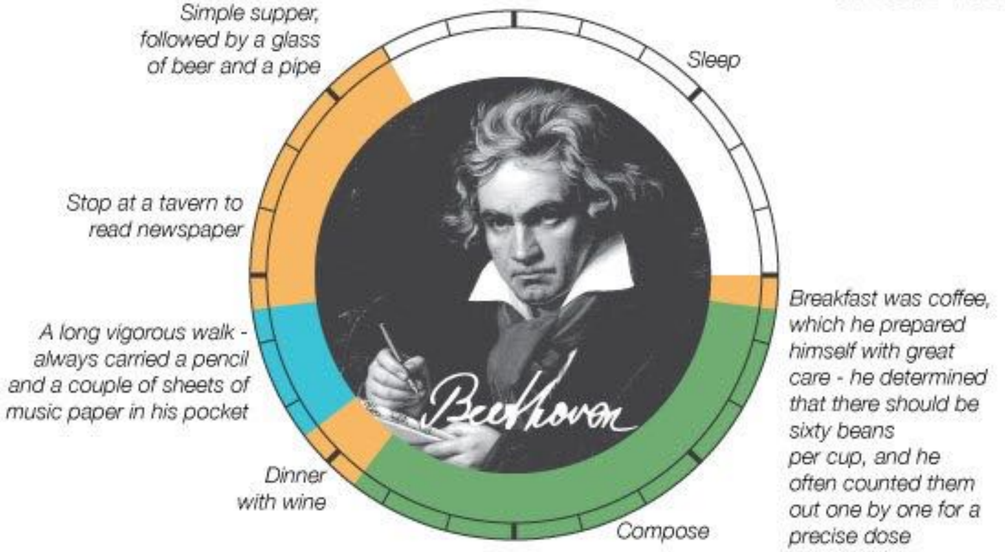
Turns out great minds don't think alike. Discover how some of the world's most original artists, writers and musicians structured their day, based on 'Daily Rituels' by Mason Currey. Filter the different categories by toggling on or off, and hover over the colored bars to learn more about the daily routines.

SLEEP CREATIVE WORK DAY JOB/ADMIN FOOD/LEISURE EXERCISE OTHER



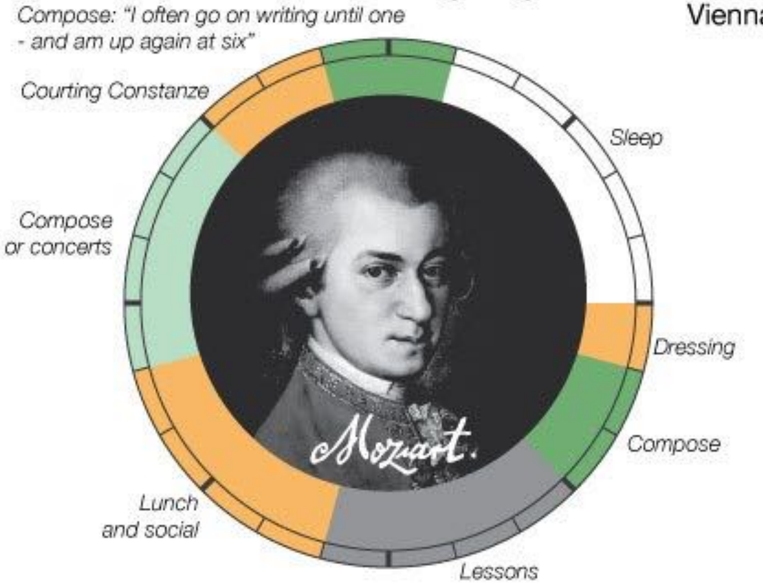
Ludwig van Beethoven

c. 1822-1827



Wolfgang Amadeus Mozart

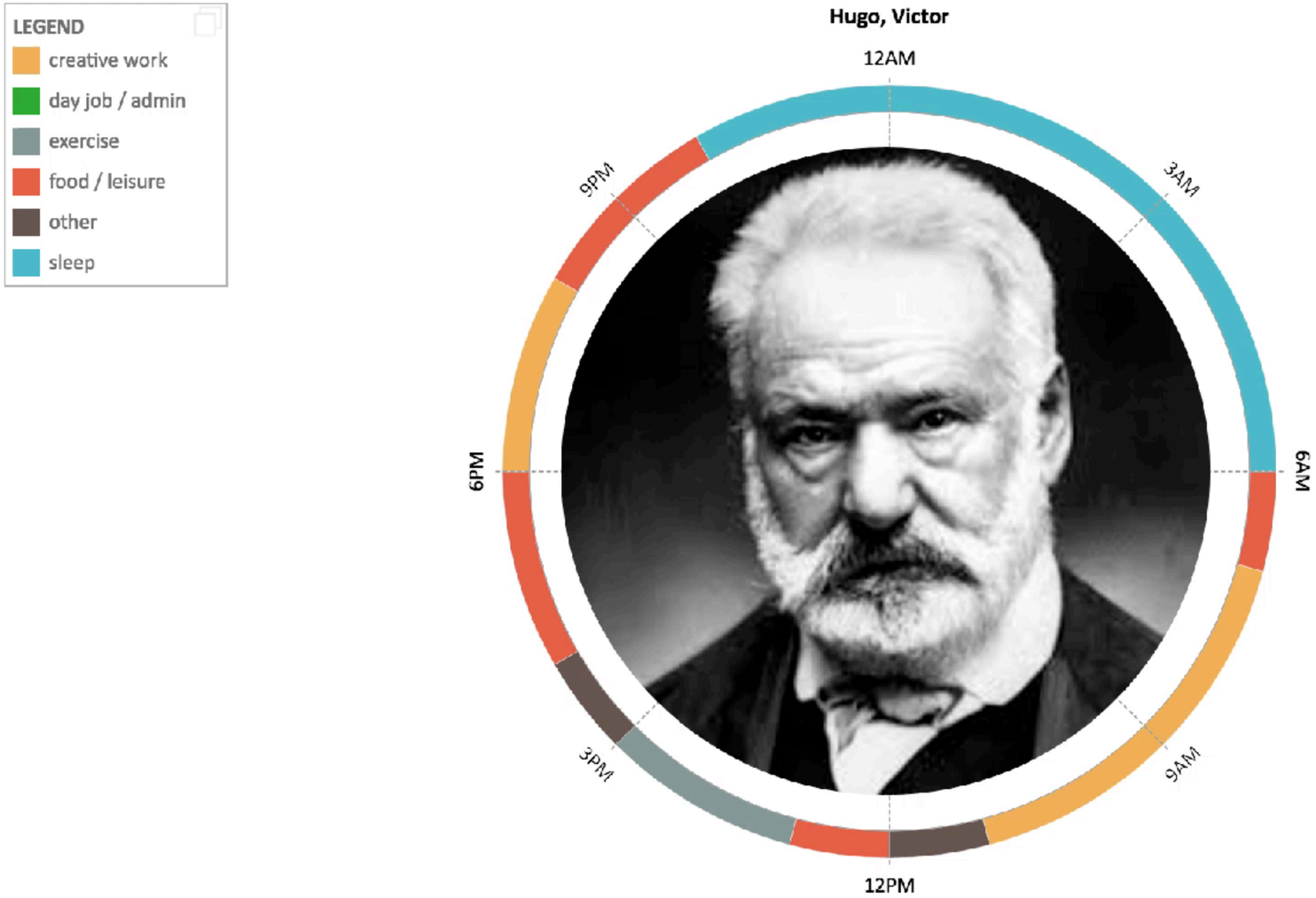
Vienna, c. 1781



Left: © 2014 Podio, podio.com/site/creative-routines
Right: © 2014 RJ Andrews, infowetrust.com/ creative-routines

Secure https://timelinestoryteller.com/app/

Consider the 24 hours daily routine of French writer Victor Hugo.



THE TIMELINE DESIGN SPACE

Different combinations of timeline representation and scale tell different stories about your data.

STORYTELLING CONSIDERATIONS

Don’t limit yourself to a single combination!

Use animated transitions and annotation for incremental reveal, and to connect consecutive narrative points.

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formerly UBC & LMU, now with Cumul8

TIMELINE PROJECTS:

- **timelinesrevisited.github.io** *(survey w/ 250+ entries, journal paper)*
- **timelinecurator.org** *(text → timeline tool, open-source)*
- **timelinestoryteller.com** *(presentation tool, open-source)*
- **Timeline Consortium** *(toward a standard for timeline data)*

CONTACT:

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