

Introduction to Data Visualization

Dario Rodighiero

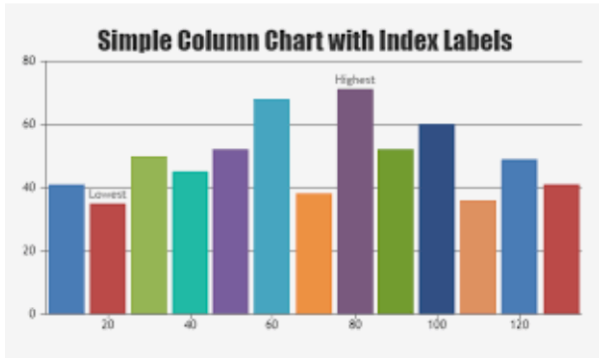
École polytechnique fédérale de Lausanne (EPFL)

Institut National d'Histoire de l'Art, 3 October 2018

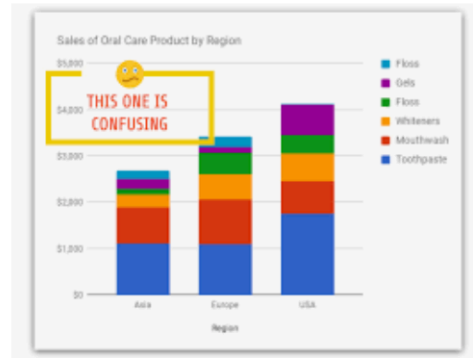
<https://darioodighiero.com>

1.

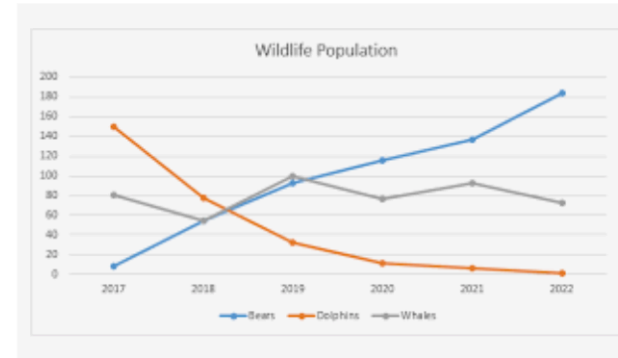
Charts, Diagrams, Infographics, Maps,
Visualizations, and Data Visualizations



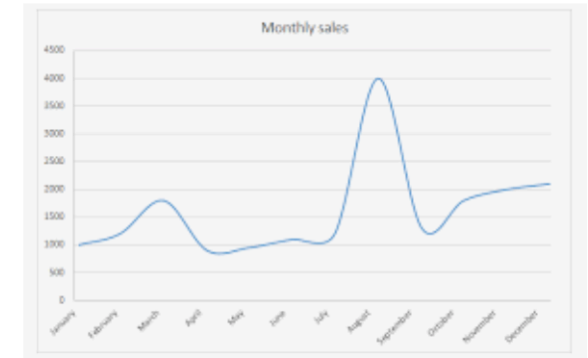
Beautiful PHP Charts & Graphs | CanvasJS
canvasjs.com



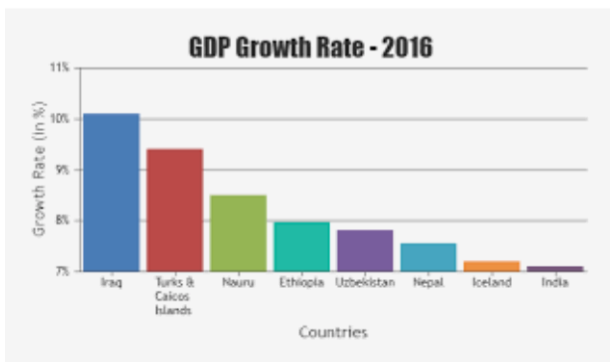
Eye-Catching Sales Charts - Venngage
venngage.com



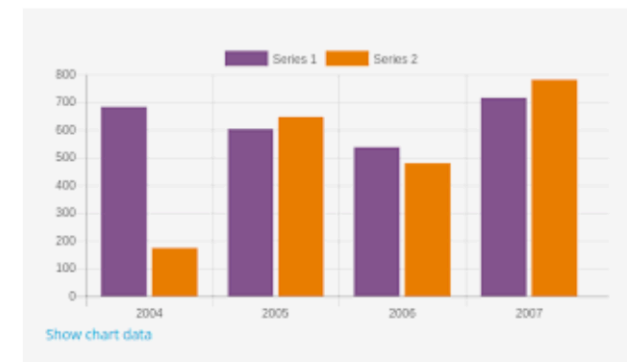
Line Chart in Excel - Easy Excel Tutorial
excel-easy.com



stop those lying line charts – Signal ...
m.signalnoise.com



jQuery Charts & Graphs | CanvasJS
canvasjs.com



Charts API - MoodleDocs
docs.moodle.org

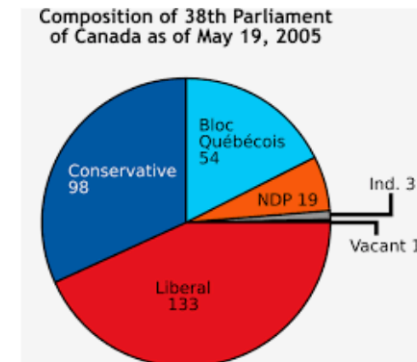
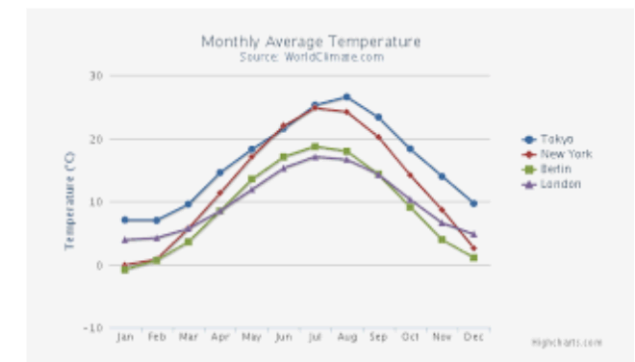
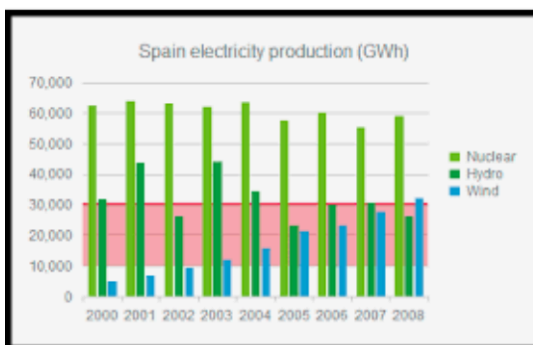


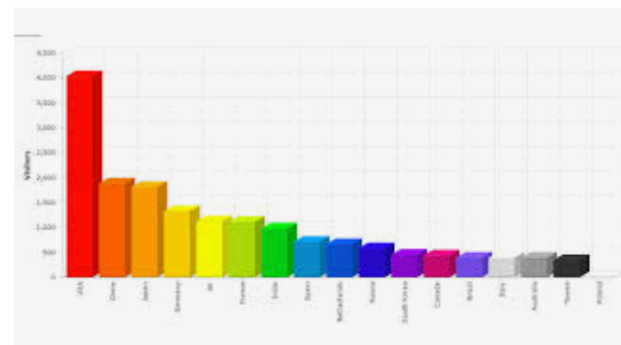
Chart - Wikipedia
en.wikipedia.org



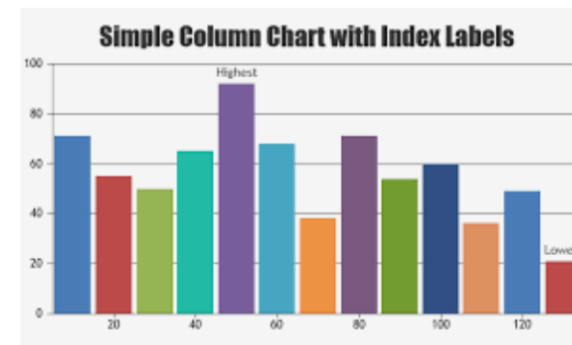
Line chart | Highcharts
highcharts.com



Charts Control - Kendo UI with support ...
telerik.com



3D Column Chart - amCharts
amcharts.com



Beautiful JavaScript Charts & Graphs ...
canvasjs.com



Create Interactive Charts with ui-grid ...
algotech.solutions

Google Search for "Charts"



SmartDraw - Create Flowcharts, Floor ...
smartdraw.com

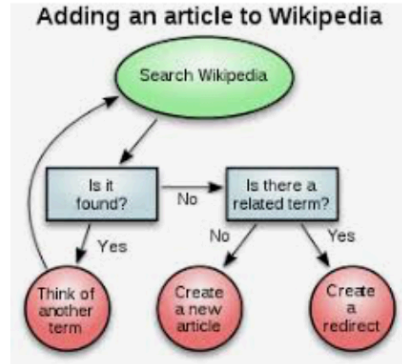
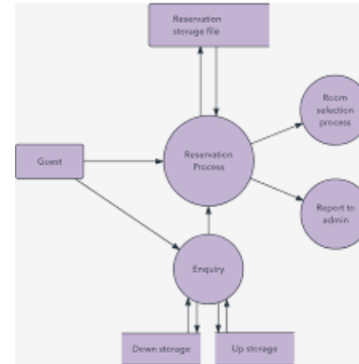


Diagram - Wikipedia
en.wikipedia.org



What is a Data Flow Diagram ...
lucidchart.com



Circle Diagrams
conceptdraw.com



What Is a Cluster Diagram...
lucidchart.com

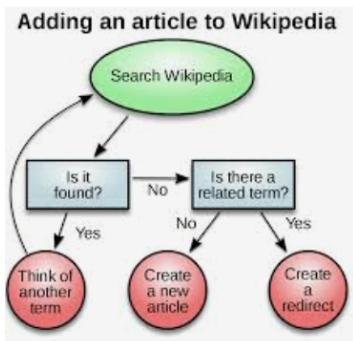
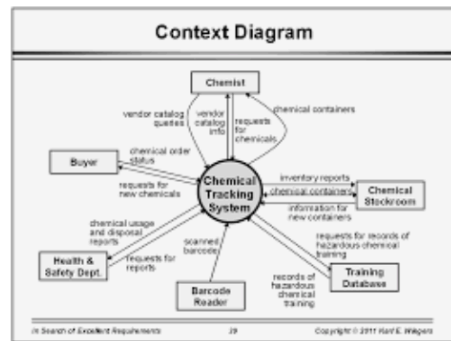
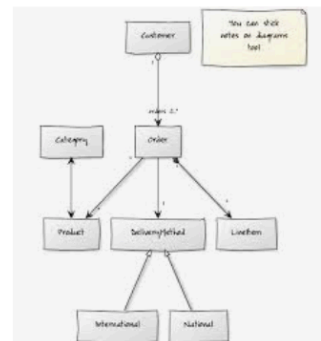


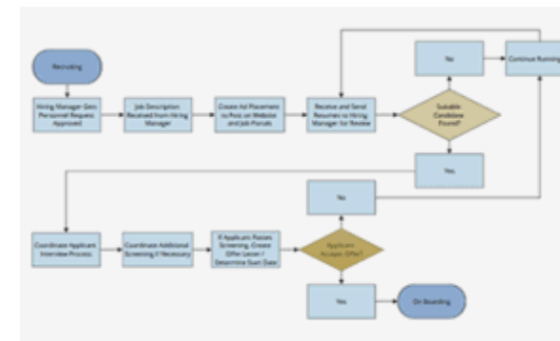
Diagram - Wikipedia
en.wikipedia.org



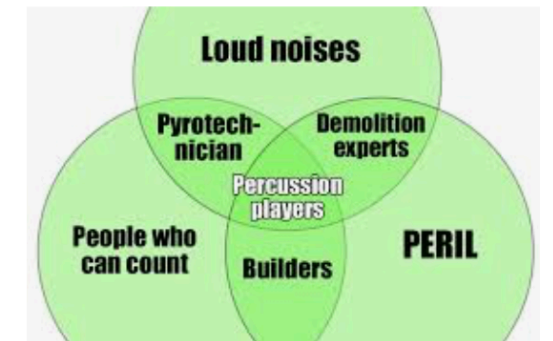
Analysis Diagrams | University IT
uit.stanford.edu



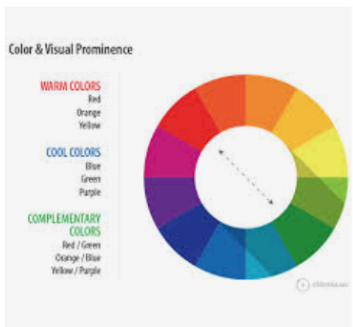
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yuml.me



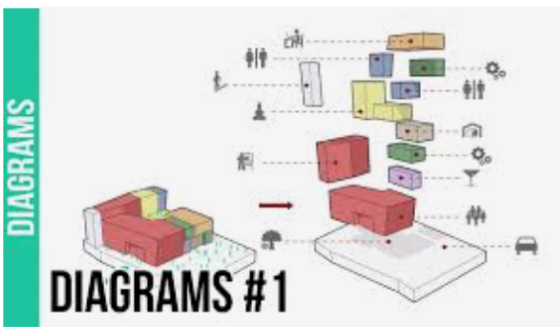
SmartDraw Diagrams
smartdraw.com



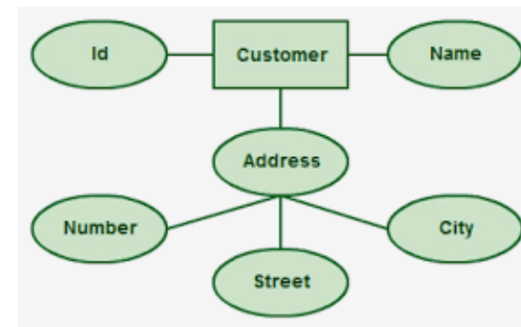
Venn diagrams for musicians - Classic FM
classicfm.com



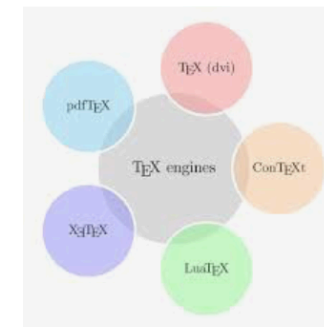
Diagrams That Explain Conte...
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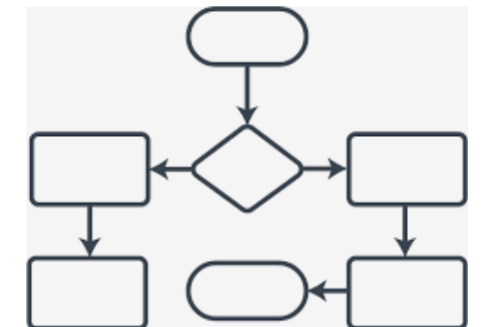
How to create Architecture Diagrams #1 ...
youtube.com



ER Diagram Tutorial | Complete Guide to ...
creately.com

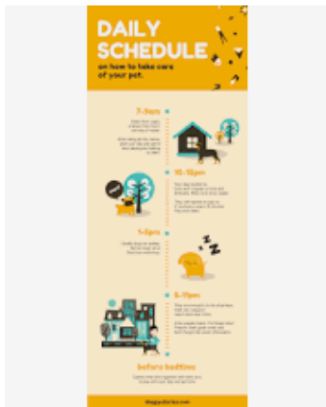


TikZ examples tag: Diagrams
texample.net



All About Business Process Mapping ...
lucidchart.com

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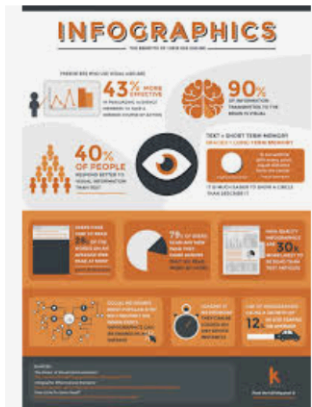
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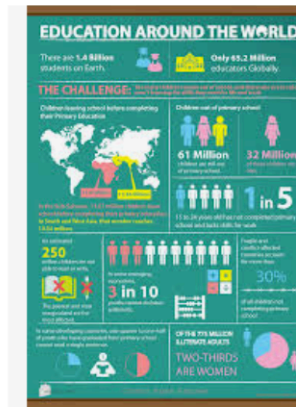
Milestone Infographics - 6 Steps by ...
graphicriver.net



Brochures, Flyers & More - ...
venngage.com



Visual.ly
visual.ly



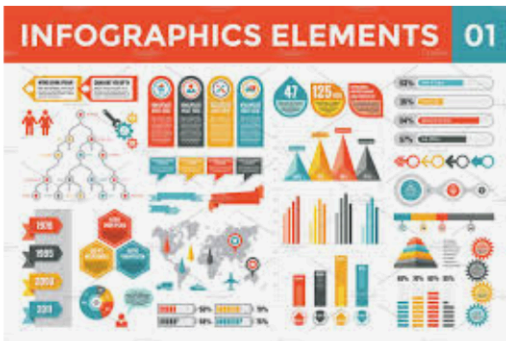
10 Great Infographics for E...
piktochart.com



Infographics Vectors, Photos and P...
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Creative Brain Infographic...
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Infographics Elements 01 ~ Presentation ...
creativemarket.com



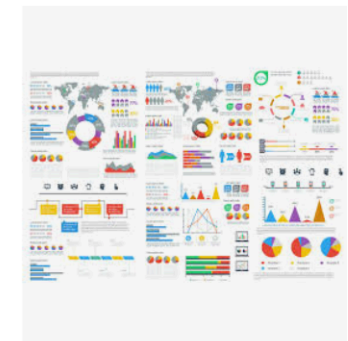
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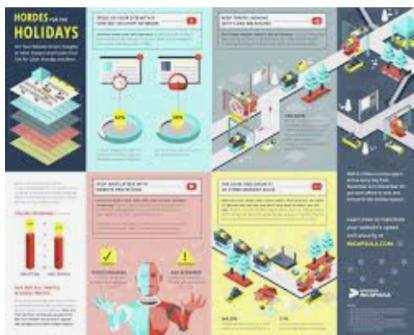
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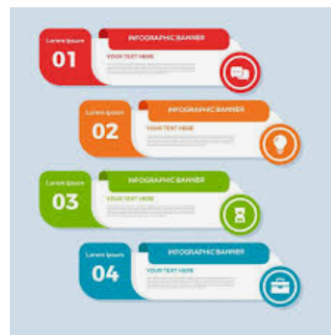
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creativemarket.com



The 45 Most Creative Infographics ...
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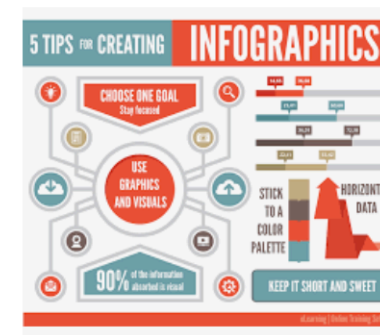
Cheap Infographics - fives...
fivesquid.com



manufacturing industry ...
matthews.com.au



Infographics Clip Art, Vector Image...
istockphoto.com

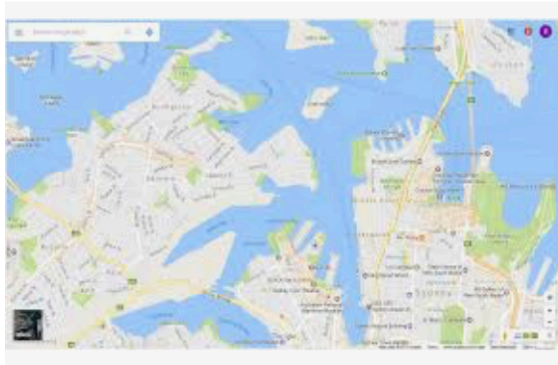


5 Tips for Creating Infographics ...
digitalchalk.com

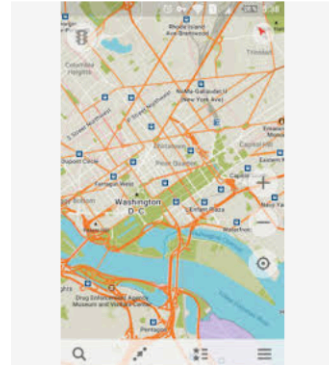


Our Infographic Design Se...
quintagroup.com

Google Search for "Infographics"



Developer Guide | Maps URLs | Google ...
developers.google.com



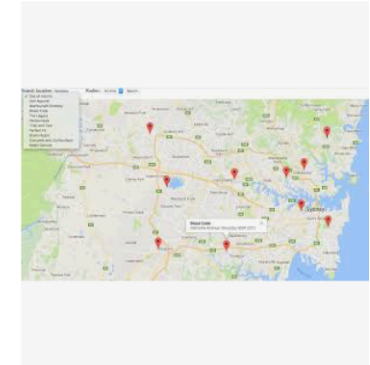
Maps.me - Wikipedia
en.wikipedia.org



Wall Map of the United States ...
geology.com



Asia Europe Centered World Wall Map ...
maps.com



Creating a Store Locator on ...
developers.google.com



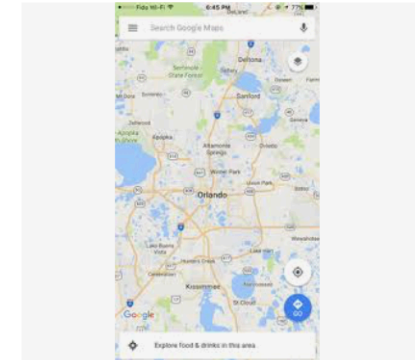
International 1:20 million Supermap ...
mapworld.com.au



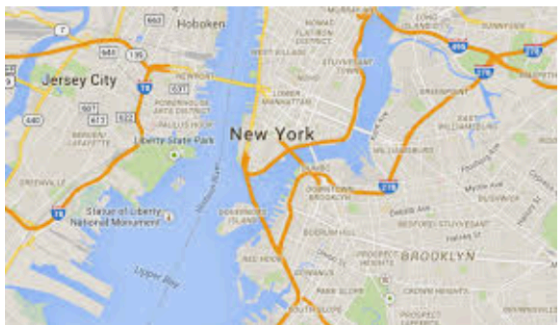
United States Map and Satellite Image
geology.com



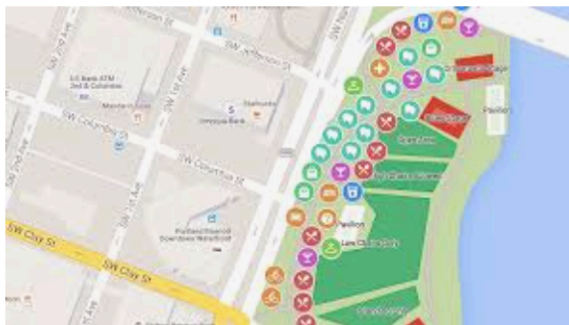
World Maps | Maps of all countries ...
ontheworldmap.com



Google Maps (app) - Wikipedia
en.wikipedia.org



Snazzy Maps - Free Styles for Google Maps
snazzymaps.com



My Maps – About – Google Maps
google.com



Explore feature makes Maps a social ...
thenextweb.com



World Wall Map Environmental
mapsinternational.co.uk

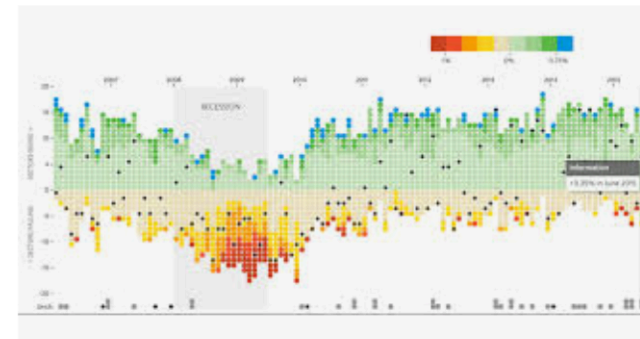
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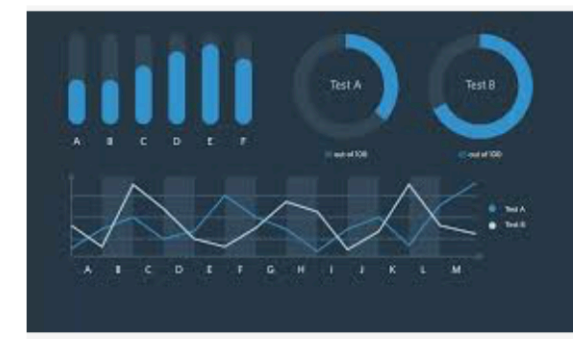
What makes a good visualization? | E ...
e-nor.com



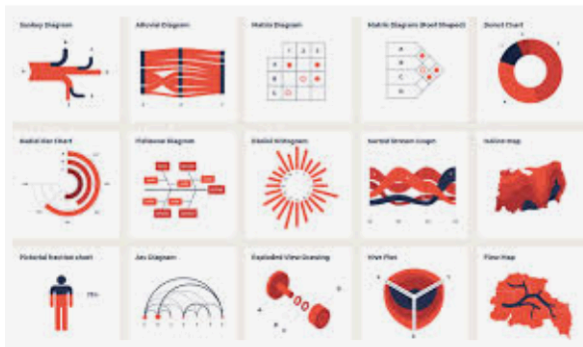
Latest Version of OBIEE 12C further ...
blogs.perficient.com



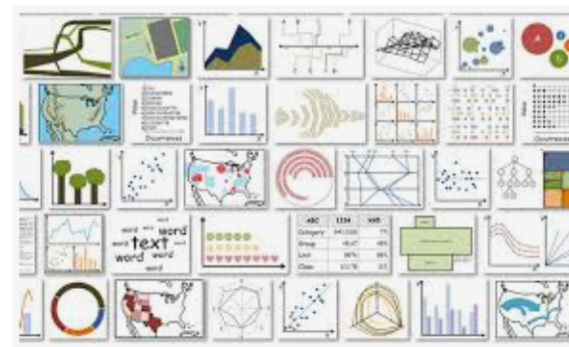
The Best Topical Data Visualizations of ...
generalassemb.ly



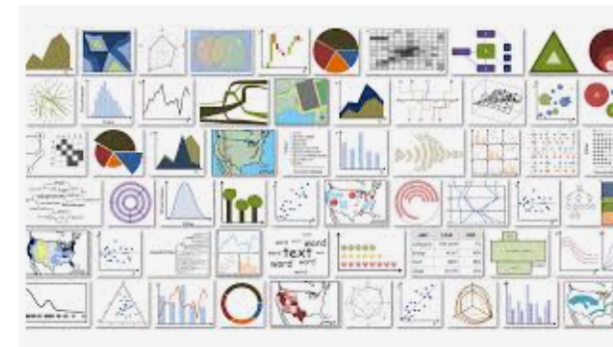
Getting it right: why infographics are ...
blog.prototypr.io



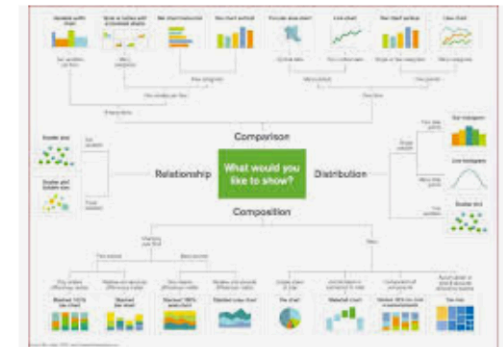
Data Visualizations ...
datainnovation.org



data visualization memorable ...
seas.harvard.edu



What makes a data visualization memorable?
phys.org



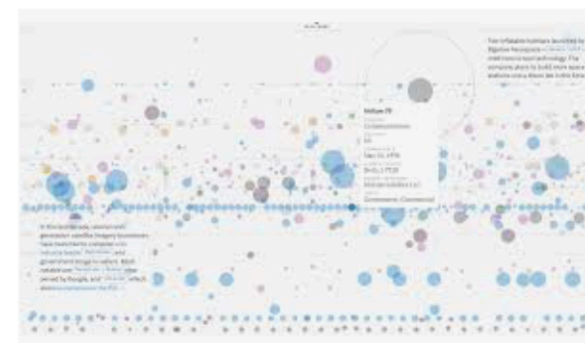
Data Visualizations in Python with Code
towardsdatascience.com



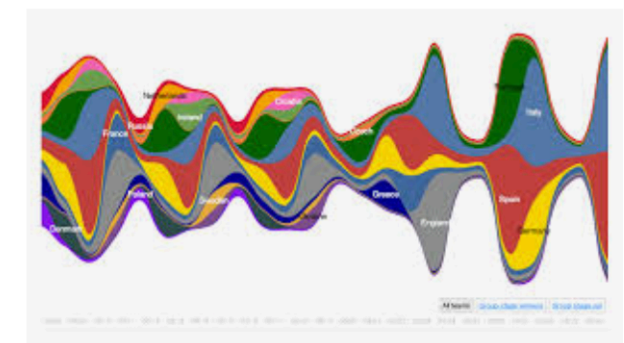
The Best Data Visualizations of All ...
datapine.com



15 Stunning Data Visualizations (And ...
blog.visme.co

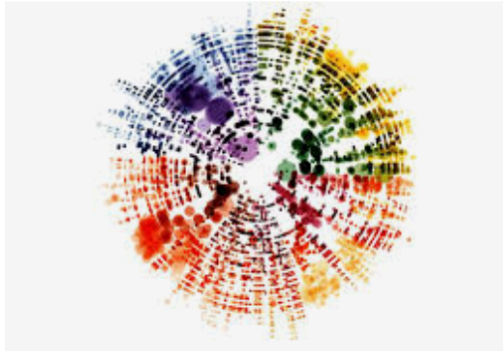


15 Data Visualizations That Will Blow ...
blog.udacity.com



data density visualizations ...
radar.oreilly.com

Google Search for "Visualizations"



Tips for Data Visualization – Towards ...
towardsdatascience.com



Choose the Right Data Visualization ...
pcmag.com



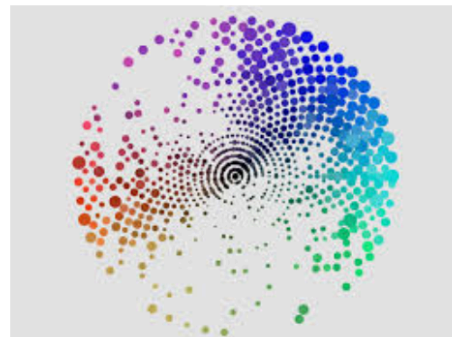
AnyChart | Data Visualization in 2017 ...
anychart.com



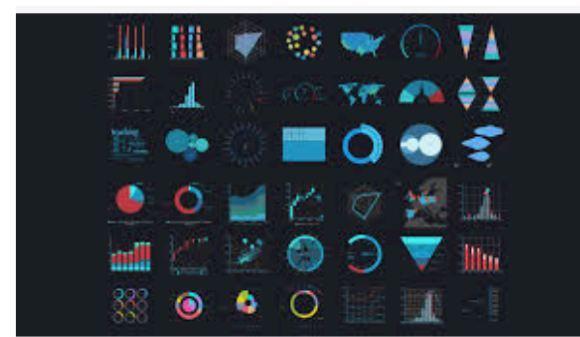
What is Data Visualization? | Geotab
geotab.com



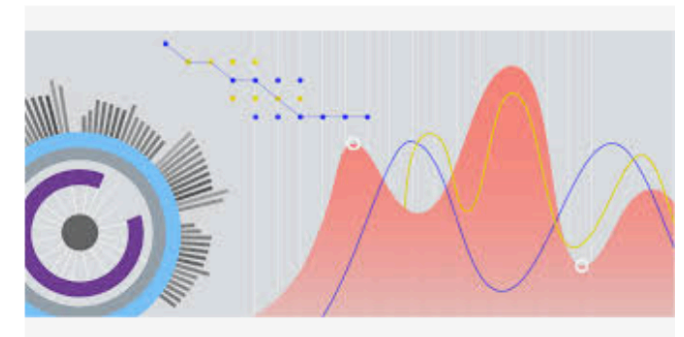
The importance of Data Visualisation ...
nice.one



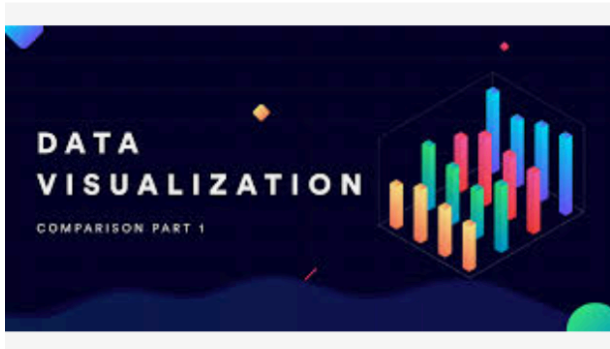
10 Big Data Visualization Tools ...
promptcloud.com



Coding for Data Visualization – Coding ...
codinginthewild.com



Data Visualization – Design at IBM ...
medium.com



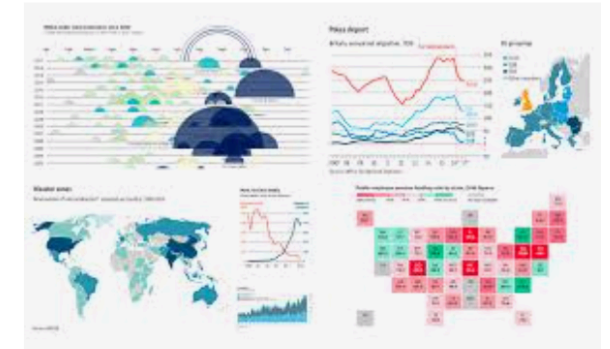
Your guide to Data Visualization for ...
uxdesign.cc



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vecteezy.com



7 data visualization techniques for ...
blog.mapbox.com



AnyChart | Visualizing Data in Charts ...
anychart.com

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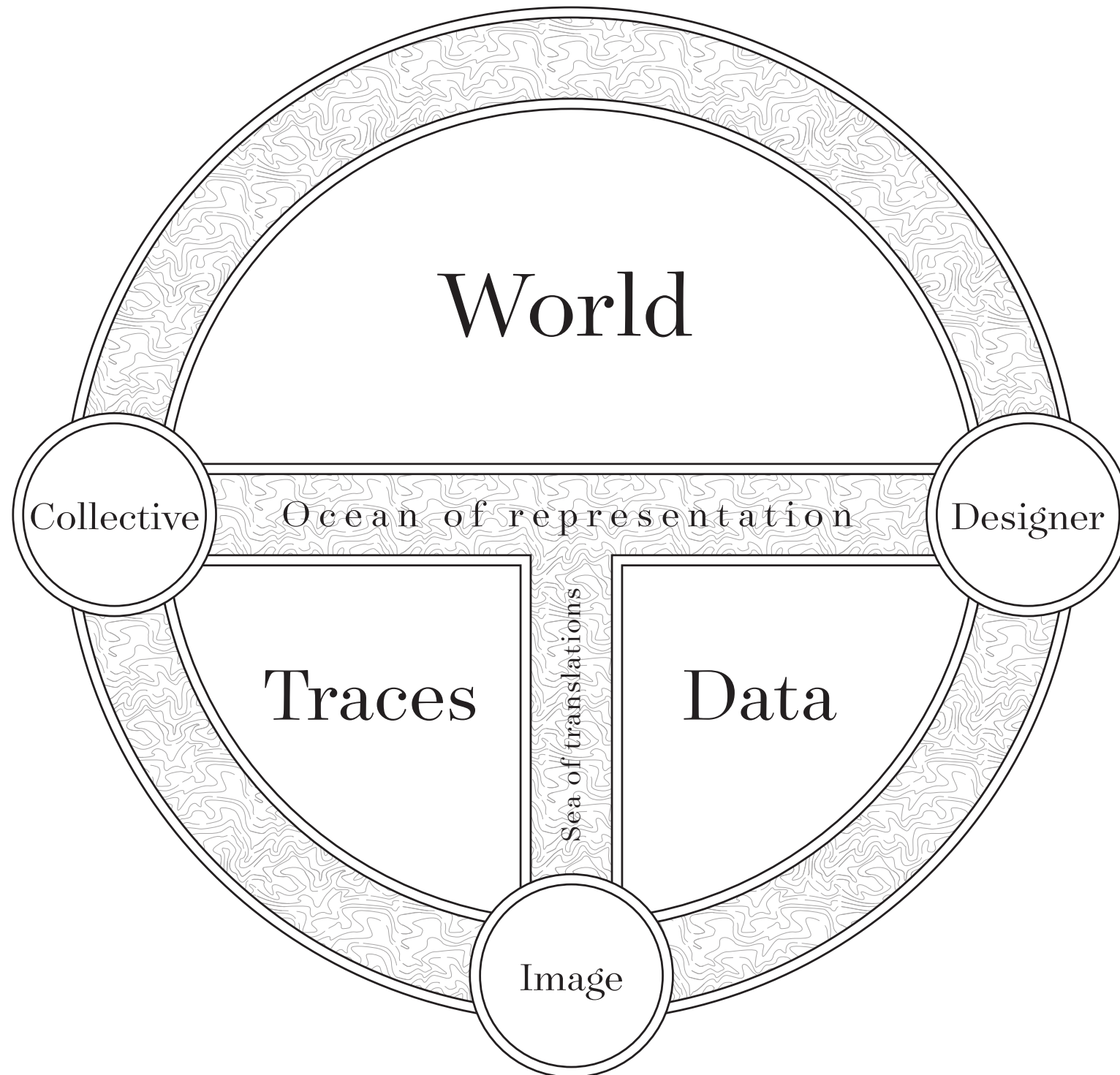
2.

The Three Translations of Data Visualization

From World to Interpretation

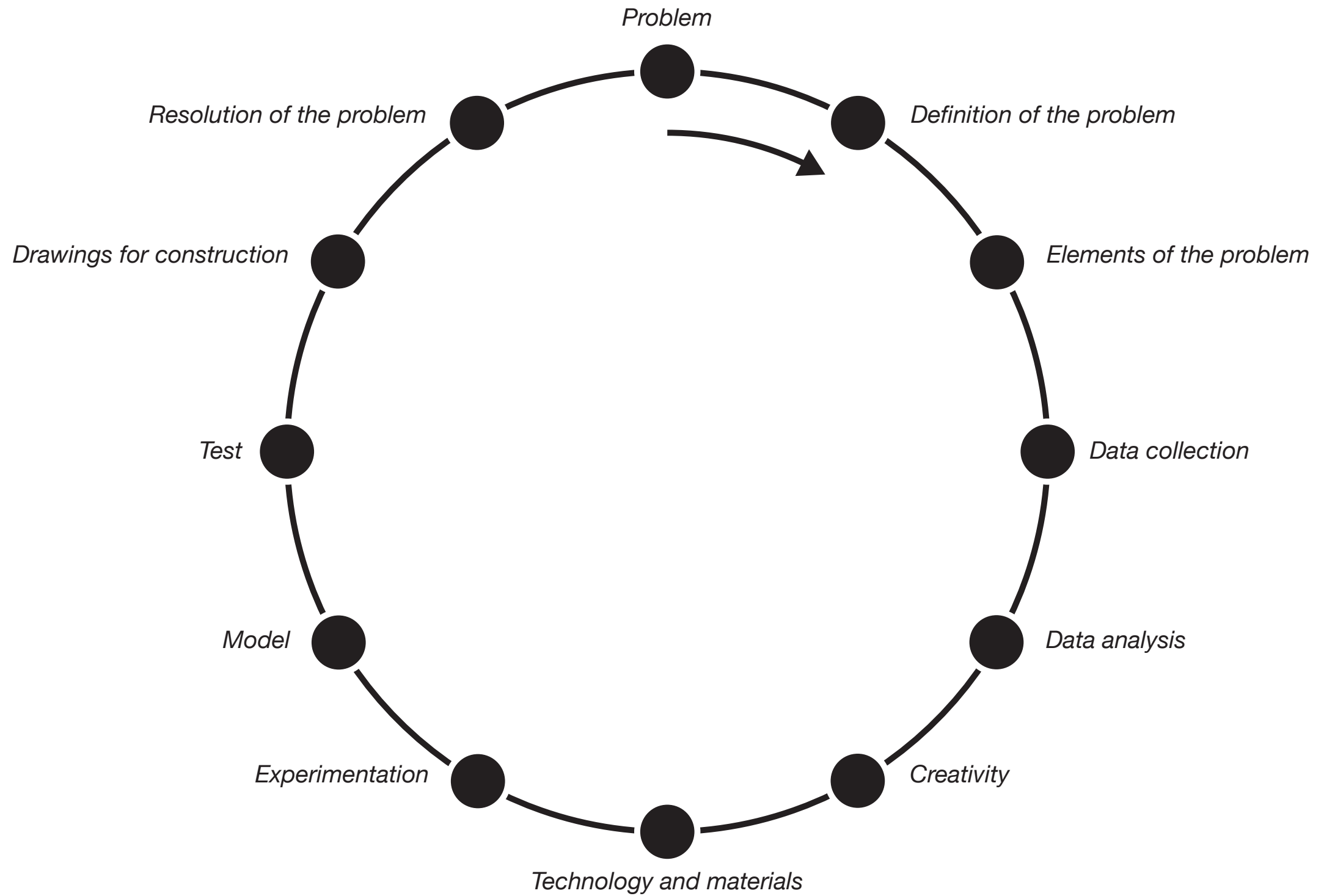
a) Datafication

From World to Data



b) Visualization

From Data to Visualization



Design Process

Elements

Points

Lines

Shapes

Volumes

Texts

Element Characteristics

Size

Position

Color

Transparency

Font

Structures

Hierarchical (trees)

Relational (networks)

Temporal (timelines)

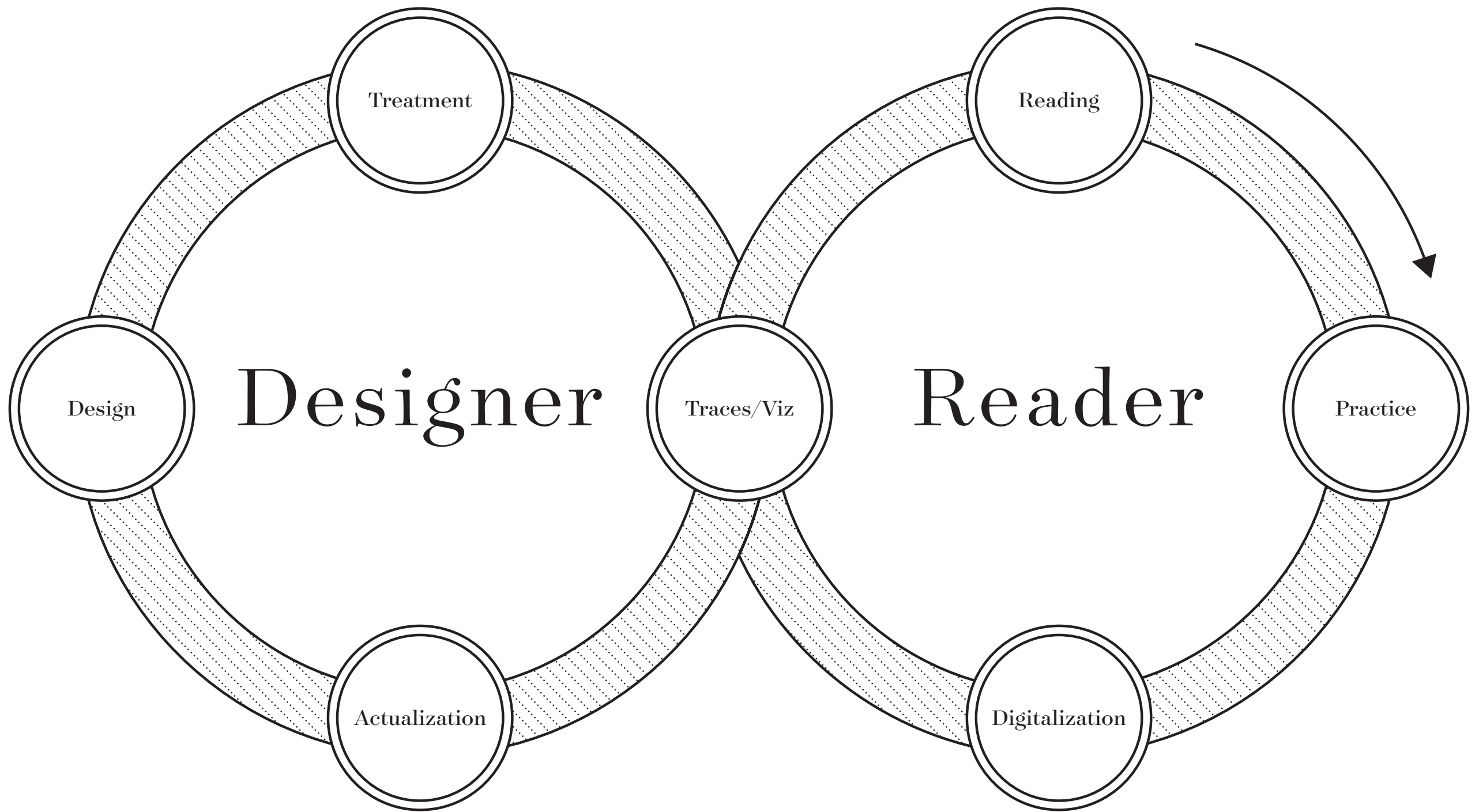
Spatial (maps)

Textual (books)

c) Interpretation

From Visualization to Interpretation





Rodighiero & Romele (2018)

Interpretation

Association

Differentiation

3.

Examples

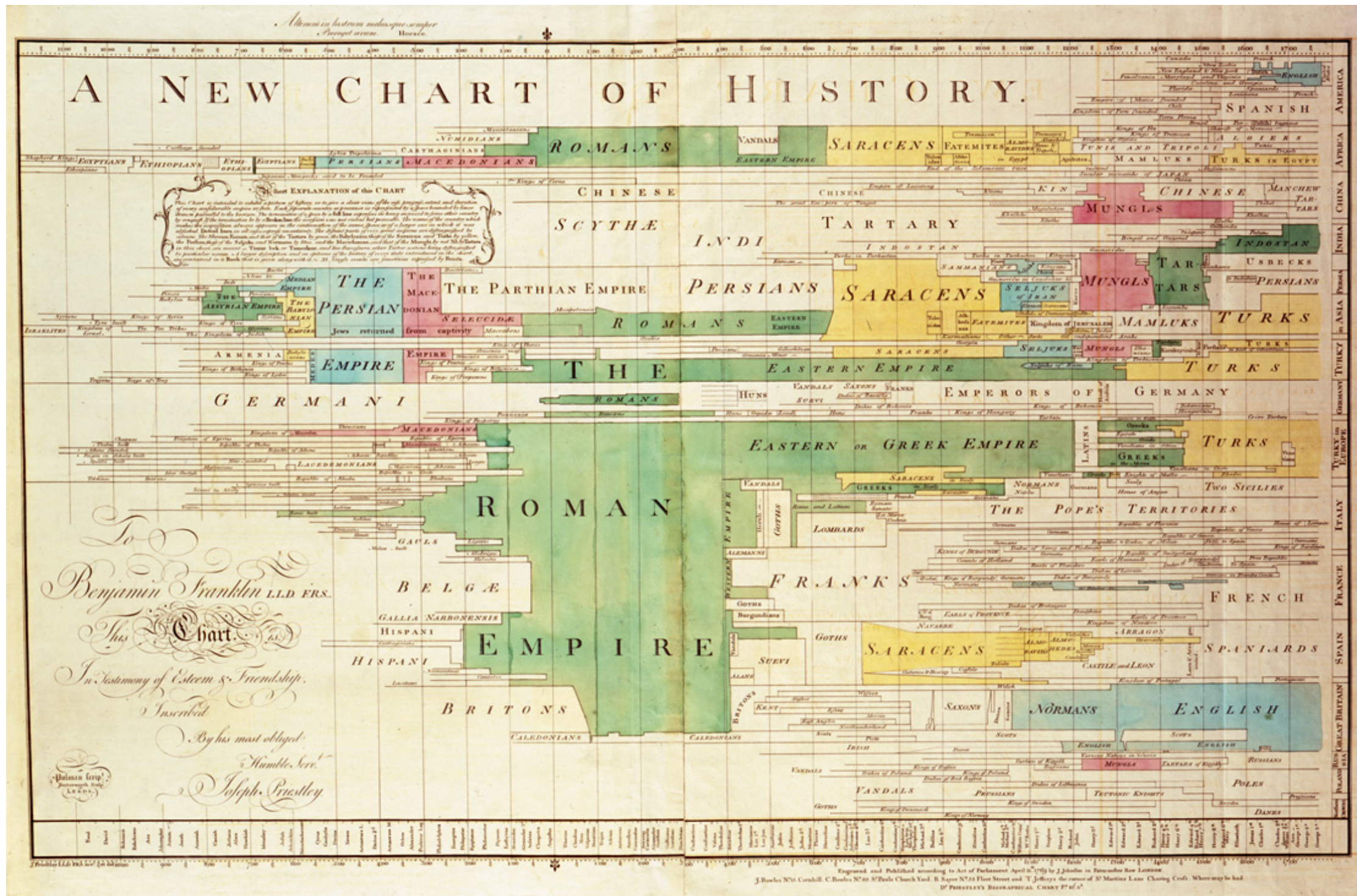
Classical Visualizations (*18th–19th centuries*)

Modern Visualizations (*20th century*)

Contemporary Visualizations (*21st century*)

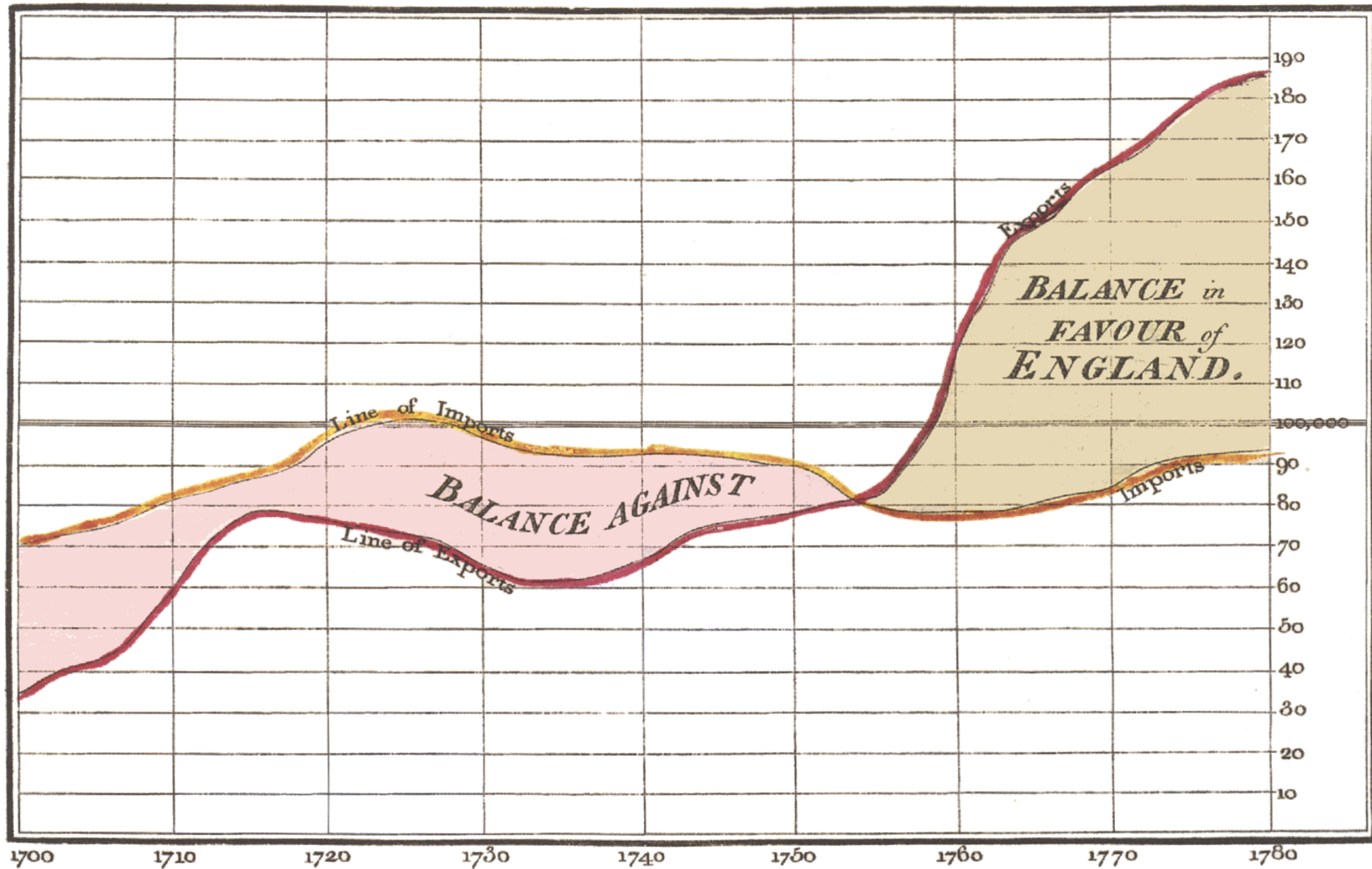
a.

Classical Visualizations



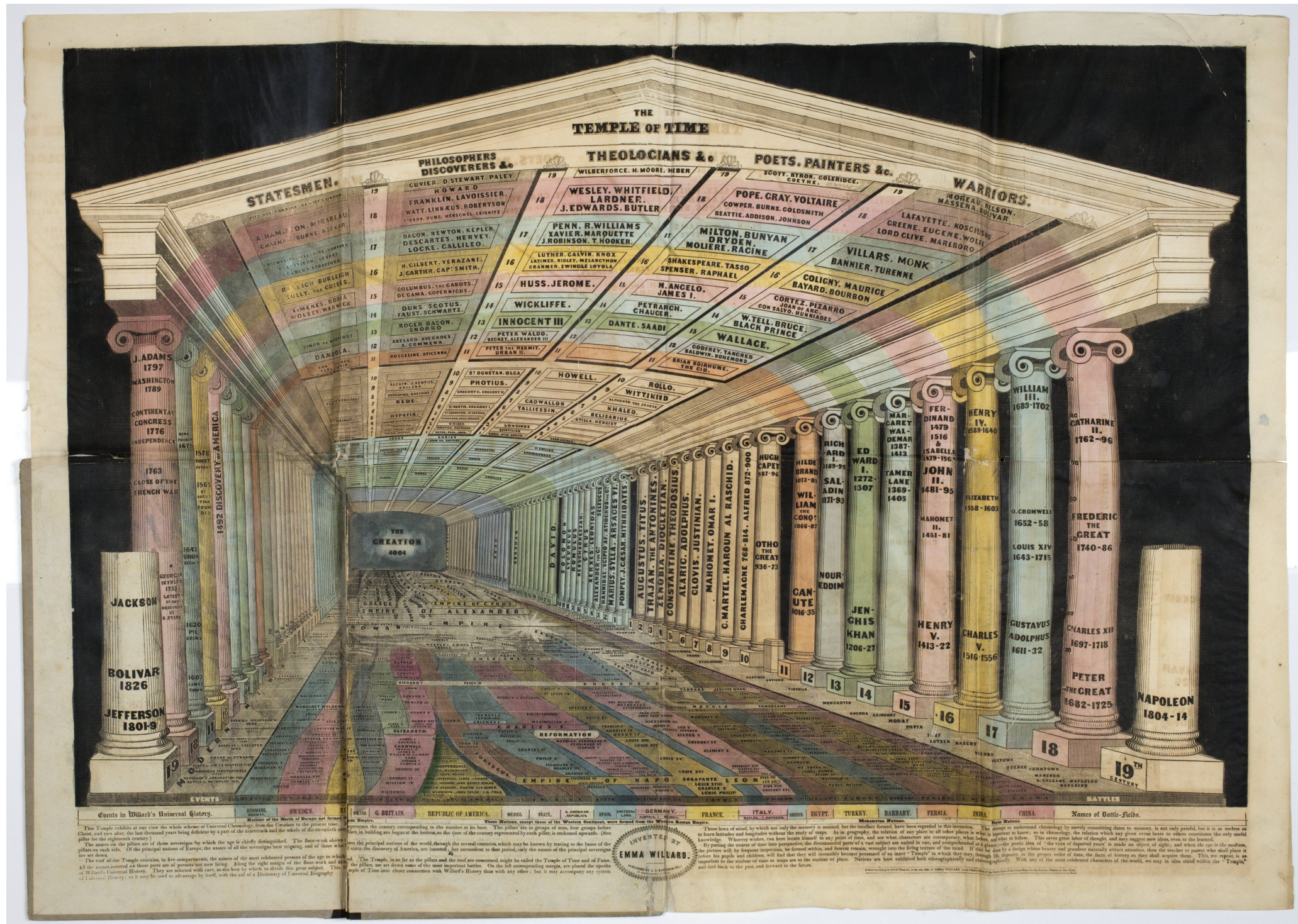
A New Chart of History, Joseph Priestley (1769)
https://en.wikipedia.org/wiki/Joseph_Priestley

Exports and Imports to and from DENMARK & NORWAY from 1700 to 1780.

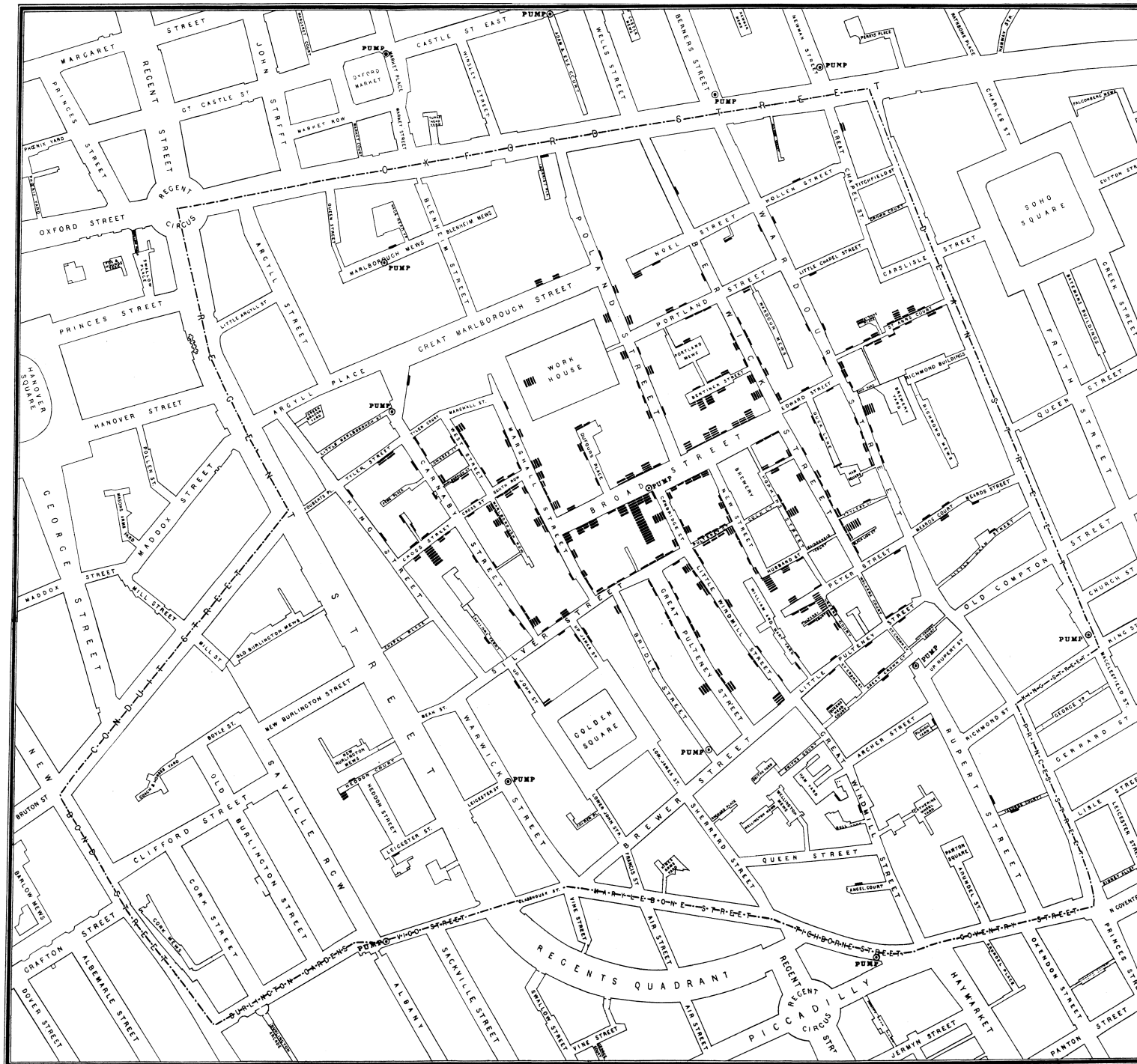


Commercial and Political Atlas, William Playfair (1786)

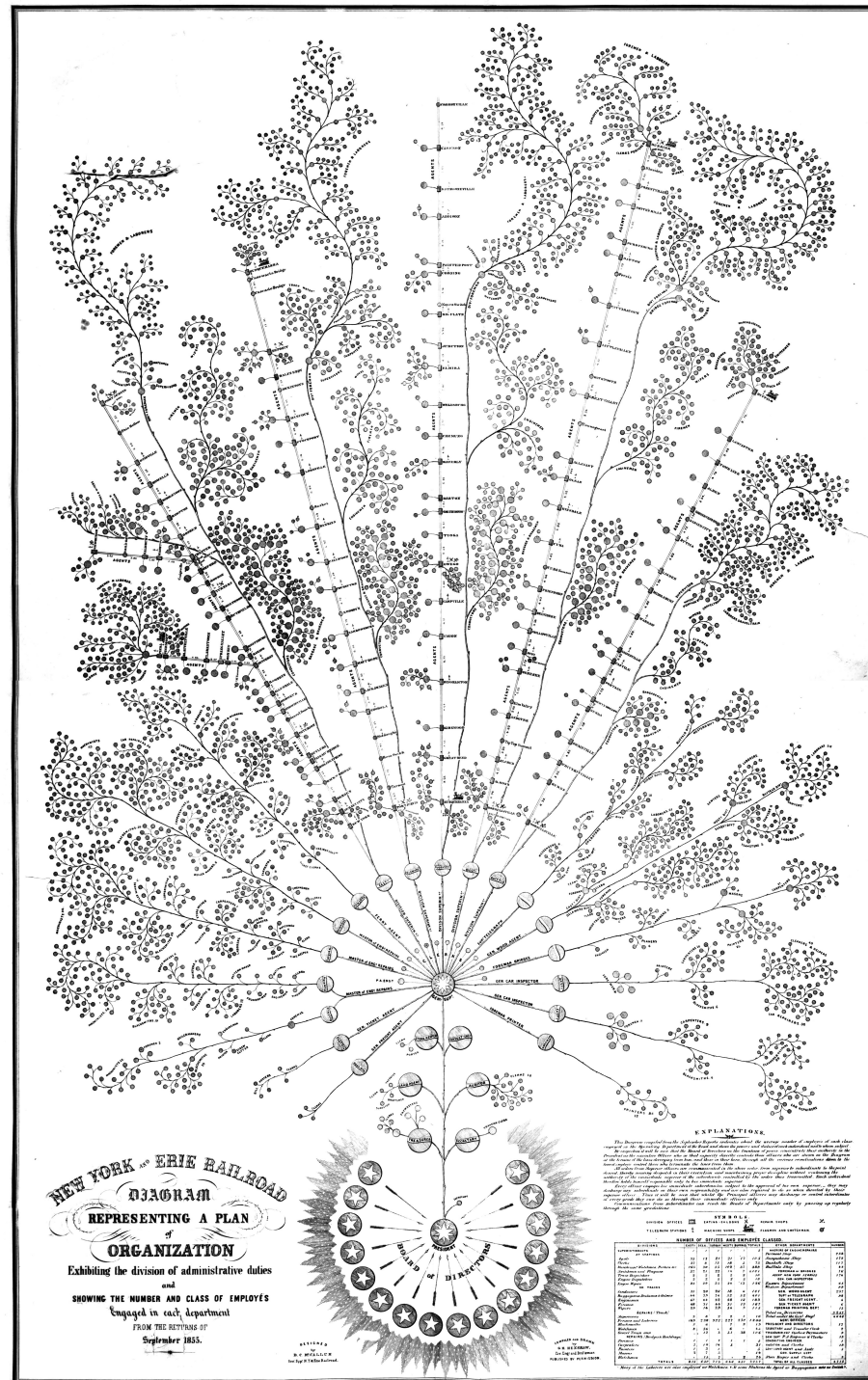
https://en.wikipedia.org/wiki/William_Playfair



Temple of Time, Emma Willard (1846)
https://en.wikipedia.org/wiki/Emma_Willard

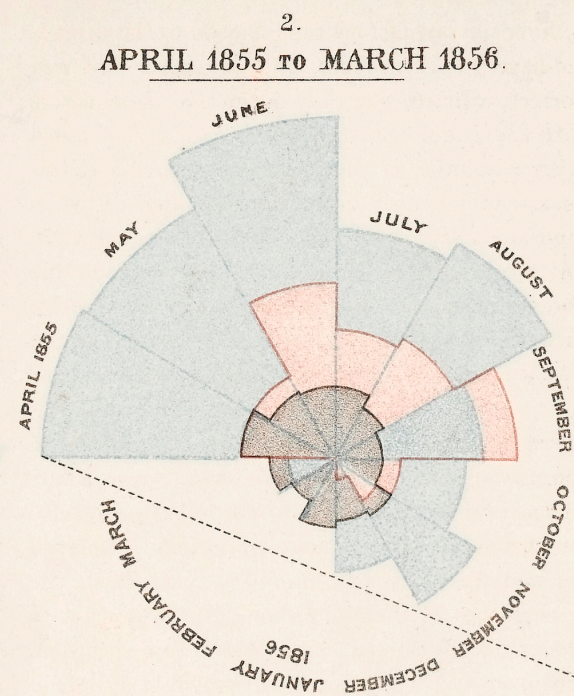


Clusters of cholera cases in the London, John Snow (1854)
https://en.wikipedia.org/wiki/John_Snow

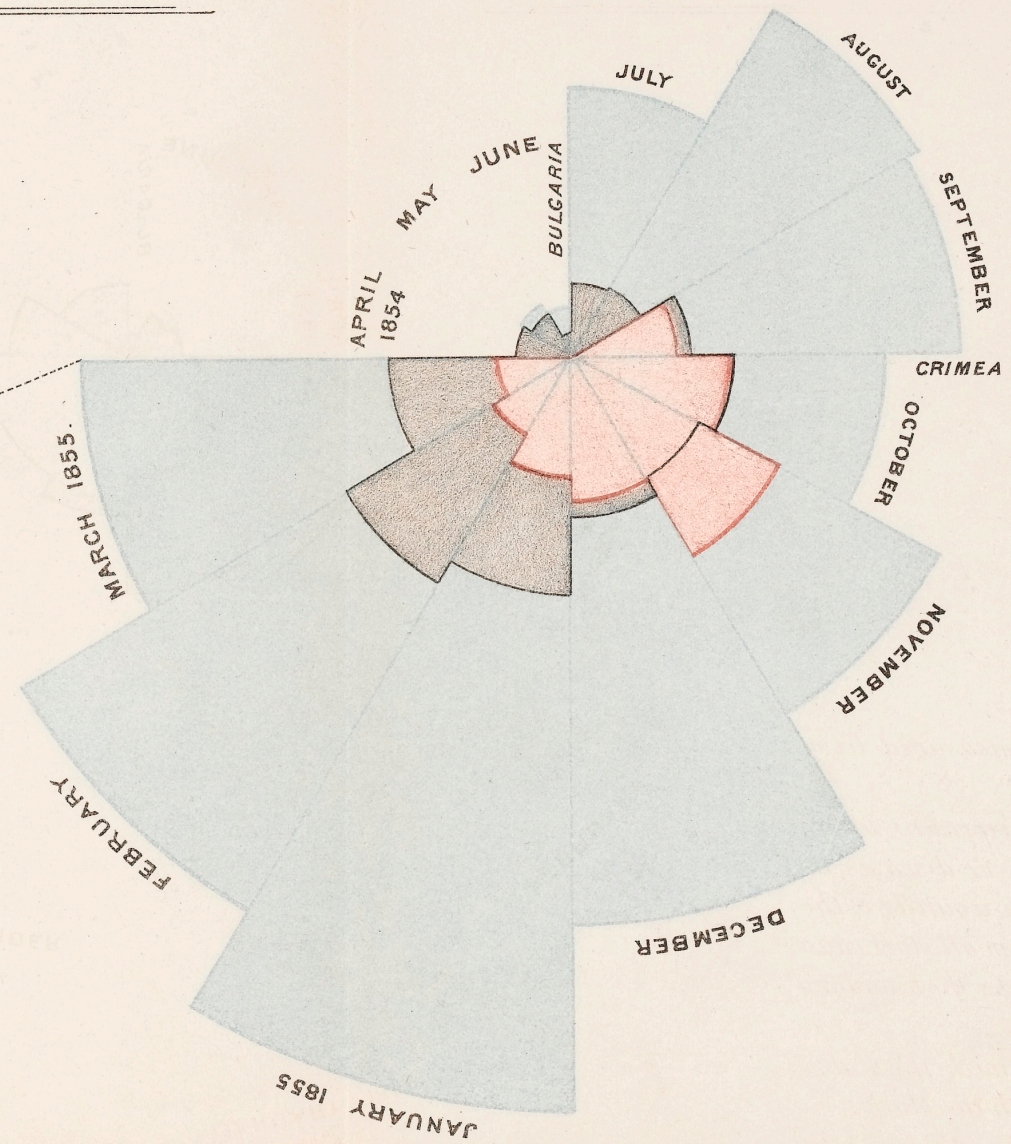


Organizational diagram of the New York and Erie Railroad, Daniel McCallum (1855)
https://en.wikipedia.org/wiki/Daniel_McCallum

DIAGRAM OF THE CAUSES OF MORTALITY
IN THE ARMY IN THE EAST.



1.
APRIL 1854 TO MARCH 1855.



The Areas of the blue, red, & black wedges are each measured from the centre as the common vertex.
The blue wedges measured from the centre of the circle represent area for area the deaths from Preventible or Mitigable Zymotic diseases, the red wedges measured from the centre the deaths from wounds, & the black wedges measured from the centre the deaths from all other causes.
The black line across the red triangle in Nov^r 1854 marks the boundary of the deaths from all other causes during the month.
In October 1854, & April 1855, the black area coincides with the red; in January & February 1855, the blue coincides with the black.
The entire areas may be compared, by following the blue, the red & the black lines enclosing them.

Harrison & Sons, St. Martin's Lane.

Mortalité de l'armée britannique - Illustration, Florence Nightingale (1858)
https://en.wikipedia.org/wiki/Florence_Nightingale

Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813.

Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite. Paris, le 20 Novembre 1869.

Les nombres d'hommes présents sont représentés par les largeurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en travers des zones. Le rouge désigne les hommes qui entrent en Russie, le noir ceux qui en sortent. — Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M.M. Chiers, de Ségur, de Fezensac, de Chambray et le journal inédit de Jacob, pharmacien de l'Armée depuis le 28 Octobre.

Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Jérôme et du Maréchal Davout qui avaient été détachés sur Minsk et Mohilow et ont rejoint vers Orscha et Witebsk, avaient toujours marché avec l'armée.

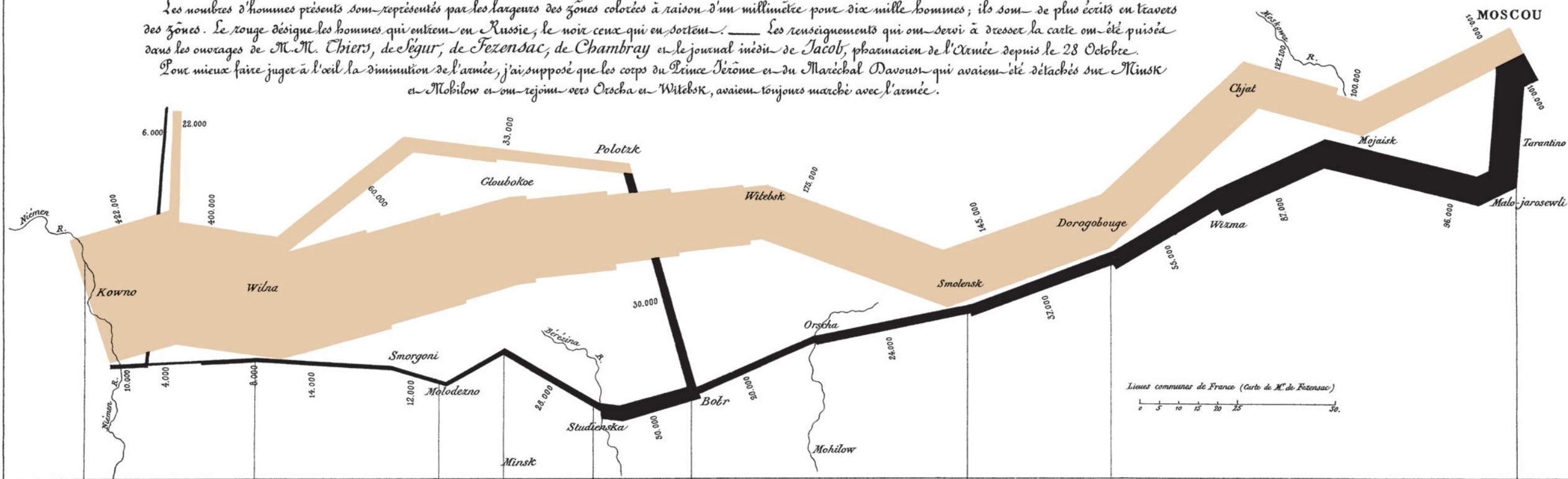
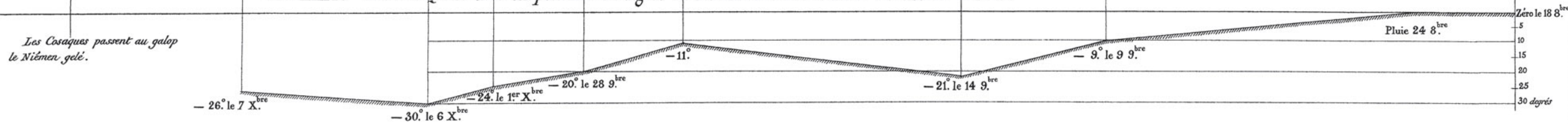


TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.



Autog. par Regnier, 8. Par. S^{te} Marie S^{te} O^{ne} à Paris.

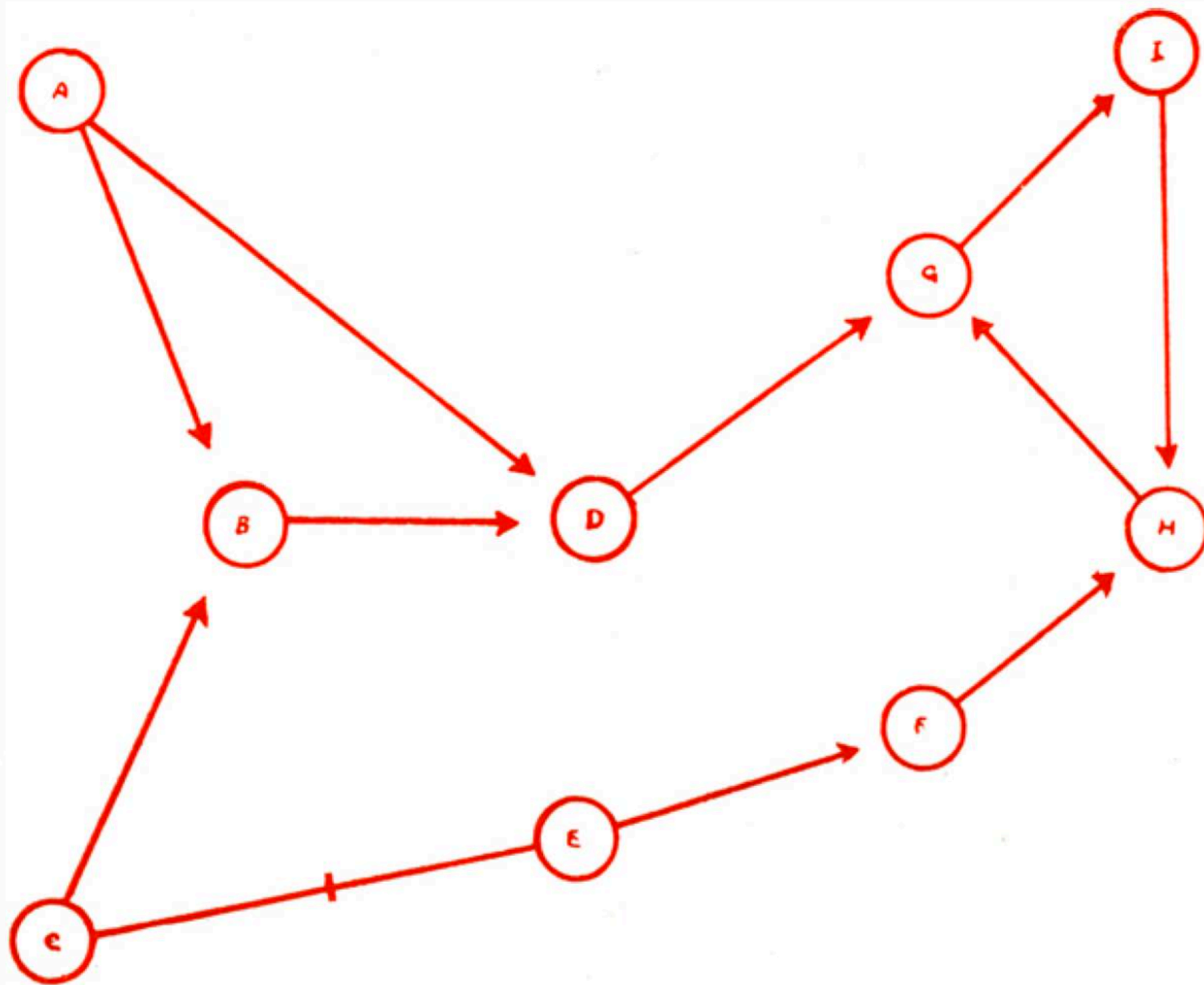
Imp. Lith. Regnier et Dourdot.

b.

Modern Visualizations

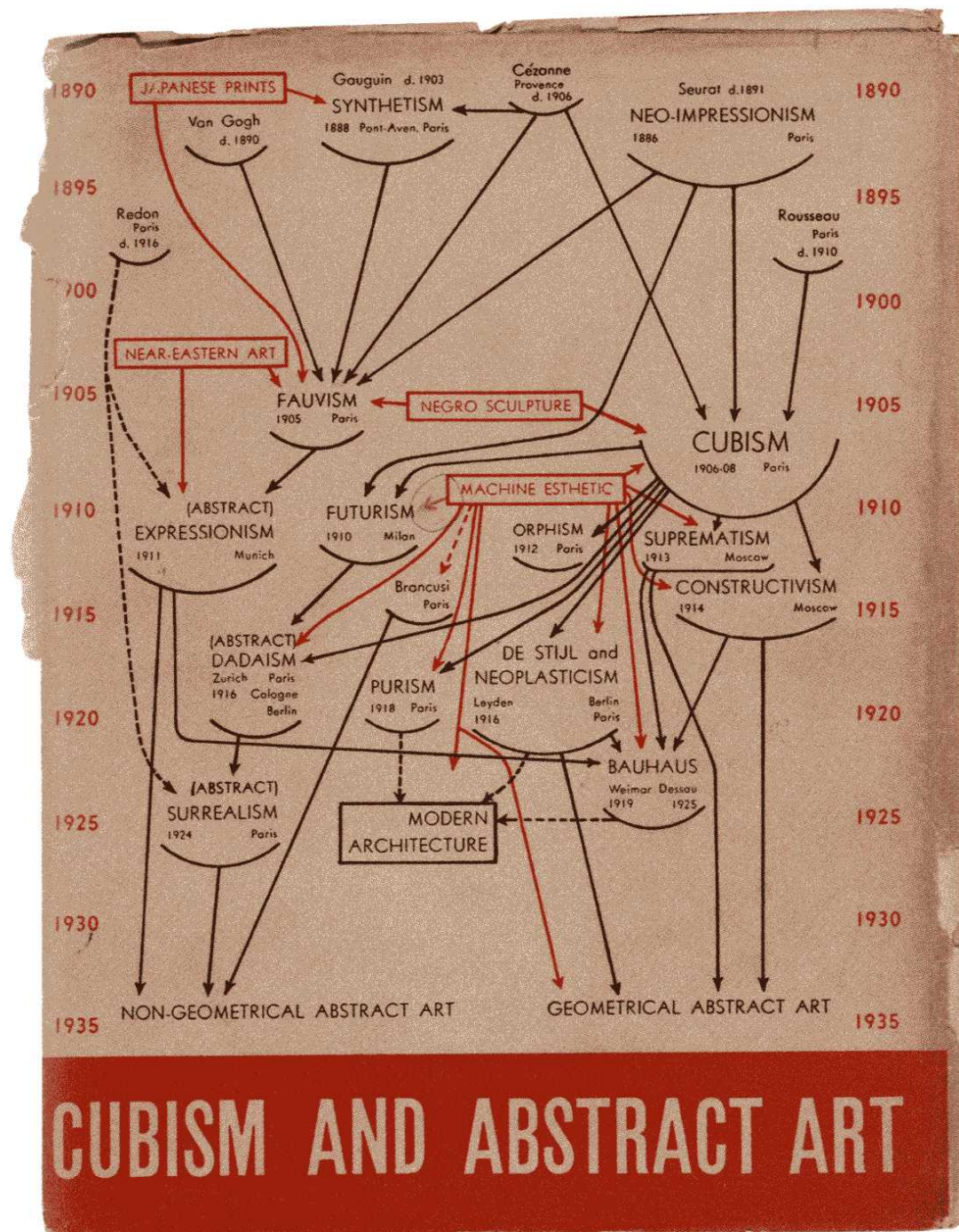


London Underground Map, Harry Beck (1933)
https://en.wikipedia.org/wiki/Harry_Beck

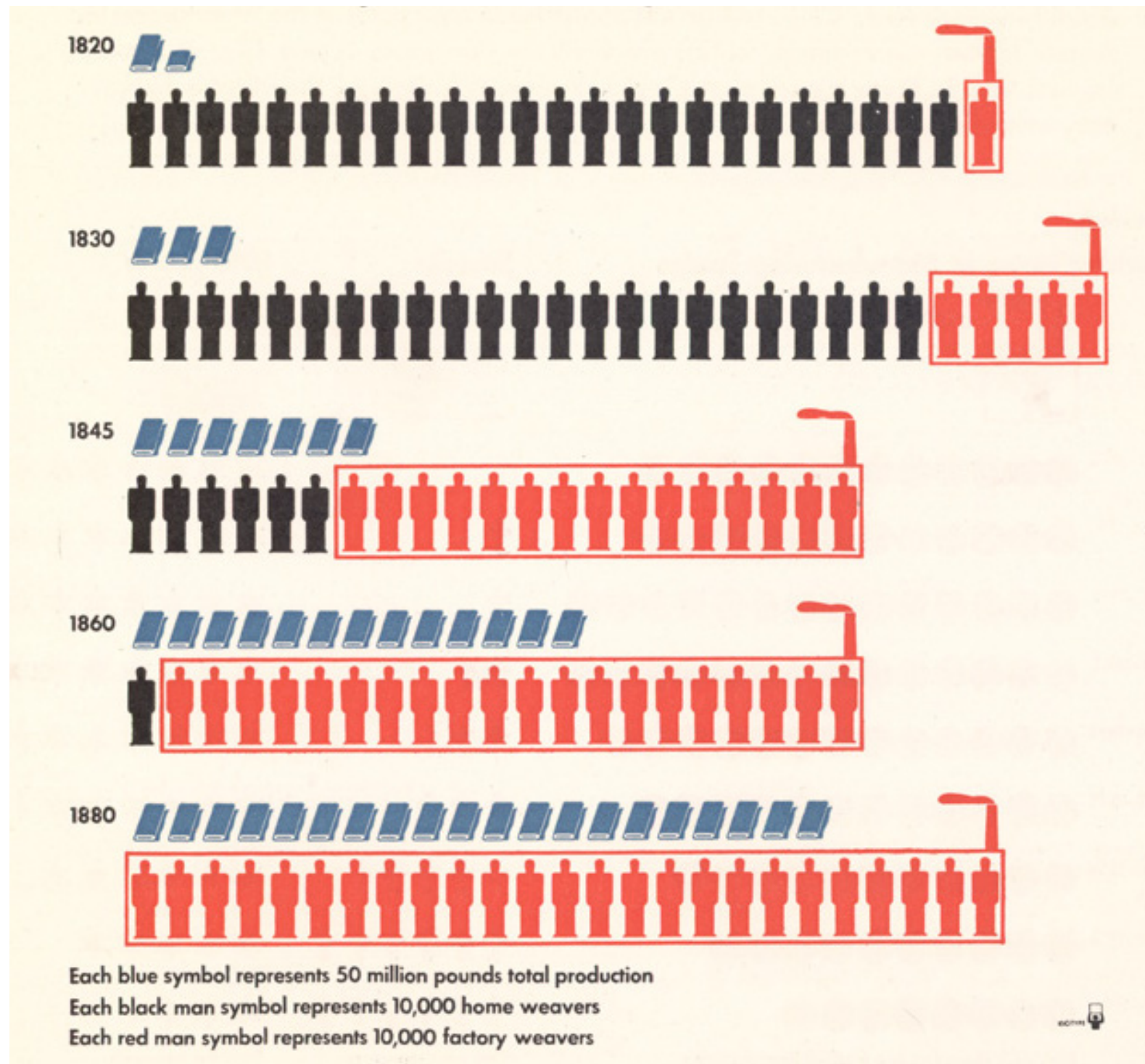


Sociograms, Jacob L. Moreno (1934)

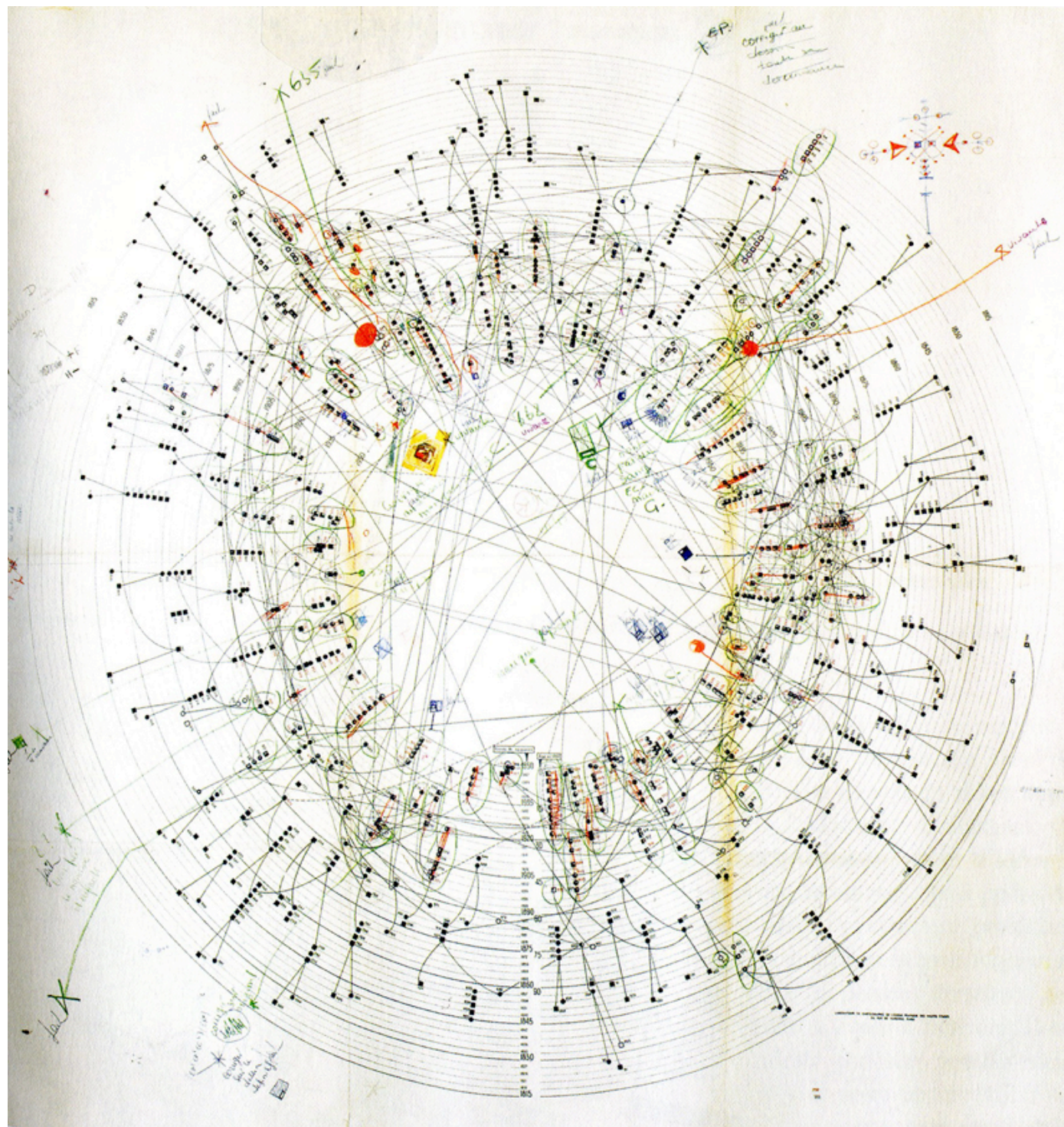
https://en.wikipedia.org/wiki/Jacob_L._Moreno



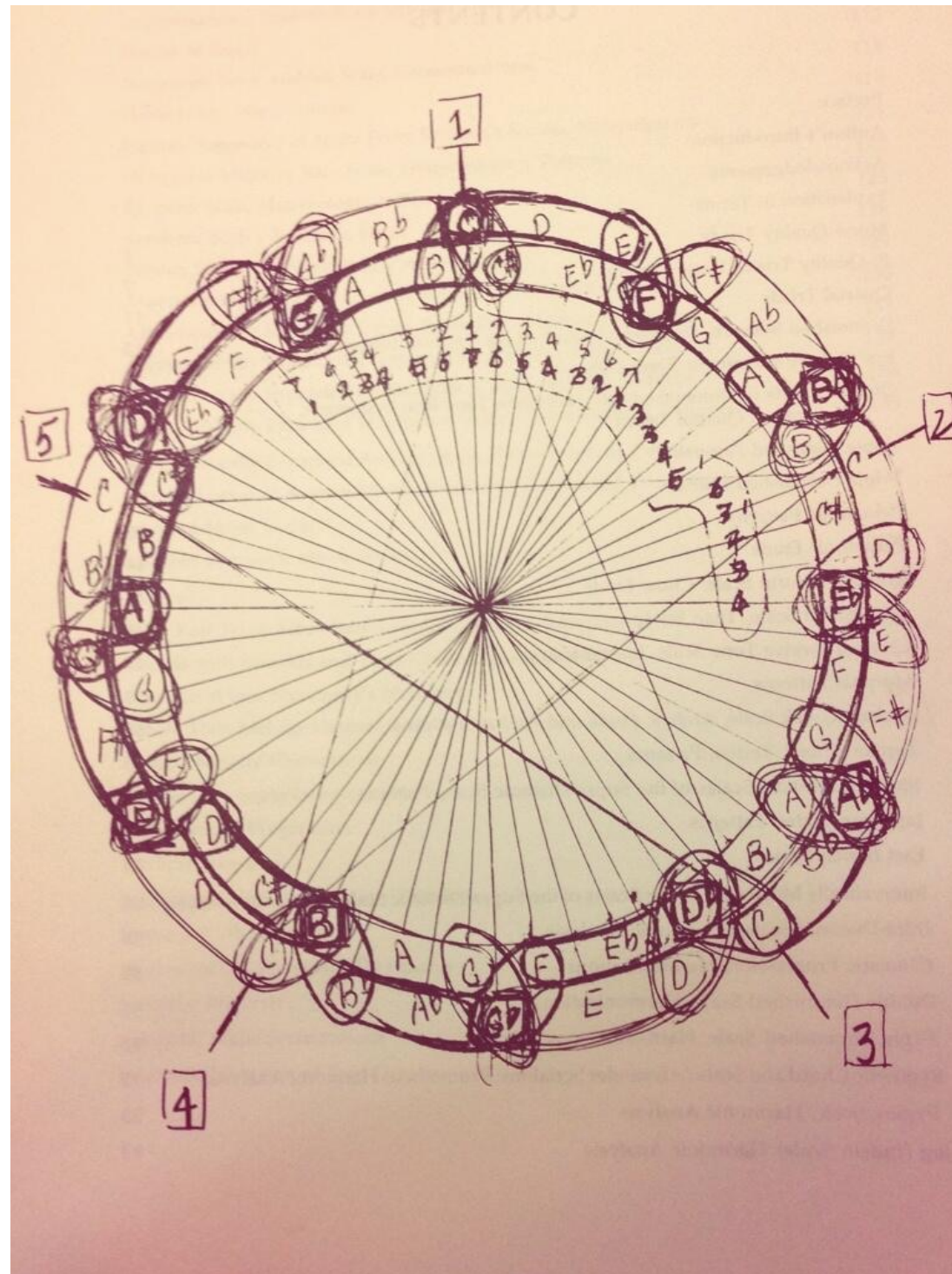
Cubism and Abstract Art, Alfred Barr (1936)
<https://www.moma.org/calendar/exhibitions/2748>



Modern Man in the Making – Isotype, Otto Neurath (1939)
https://en.wikipedia.org/wiki/Otto_Neurath

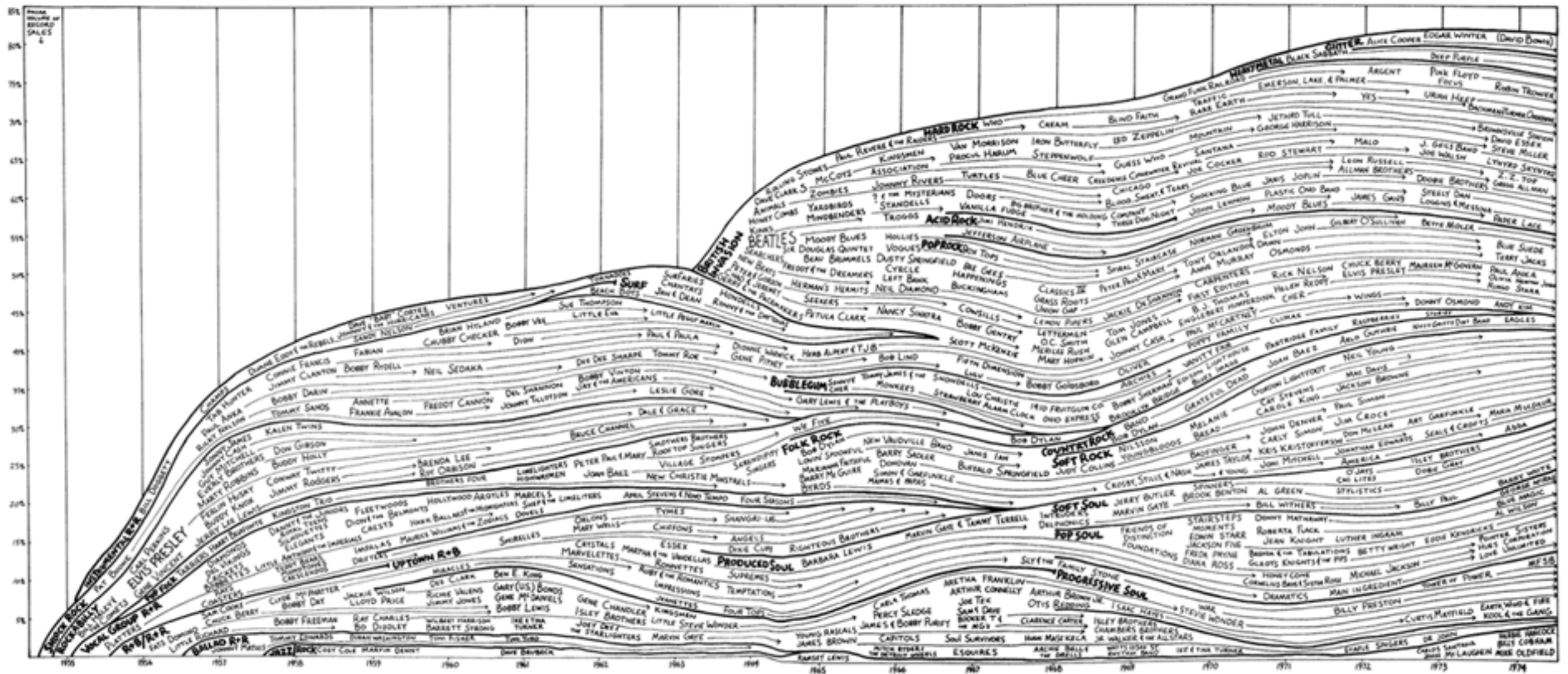


Genealogical diagram, Jean Malaurie (1950s)
https://en.wikipedia.org/wiki/Jean_Malaurie



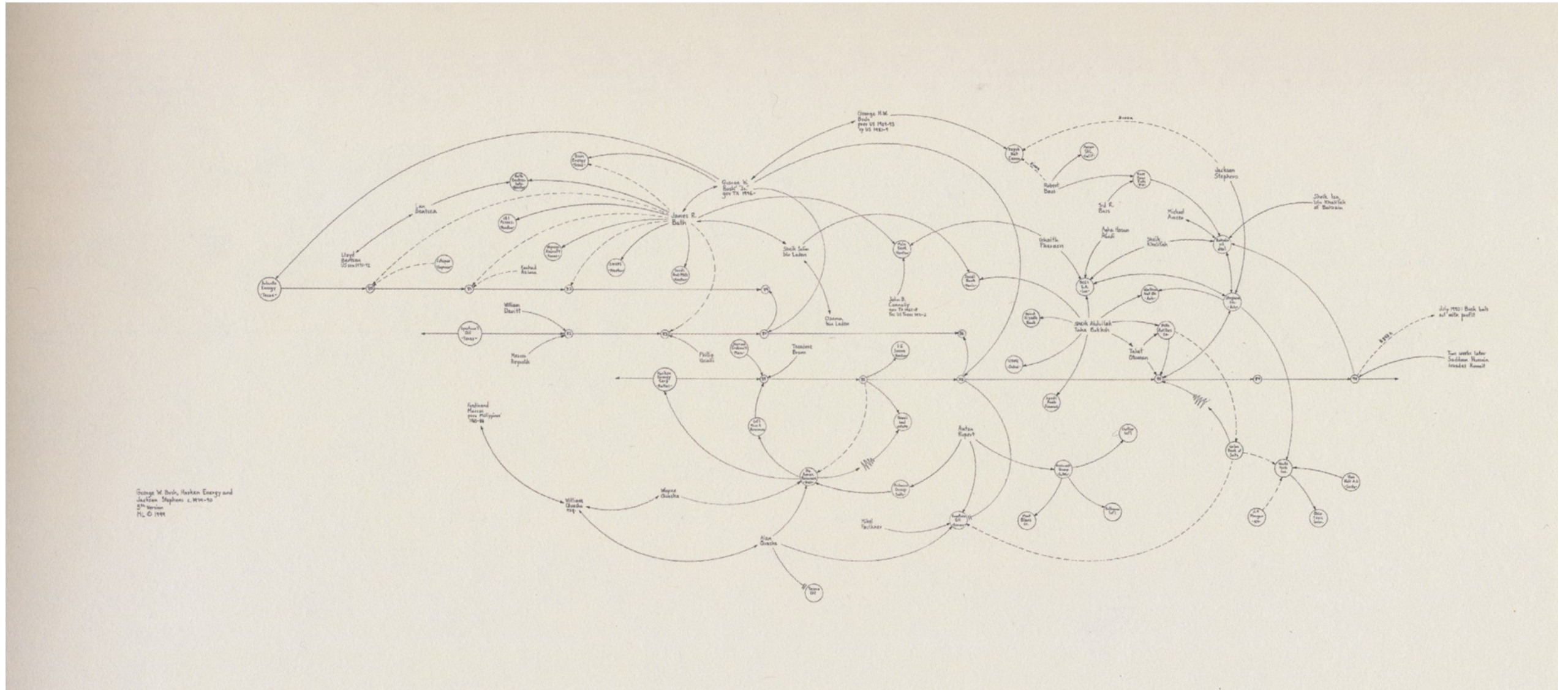
Circle of Fifths, John Coltrane (1967)

<http://www.openculture.com/2017/04/the-tone-circle-john-coltrane-drew-to-illustrate-the-theory-behind-his-most-famous-compositions-1967.html>

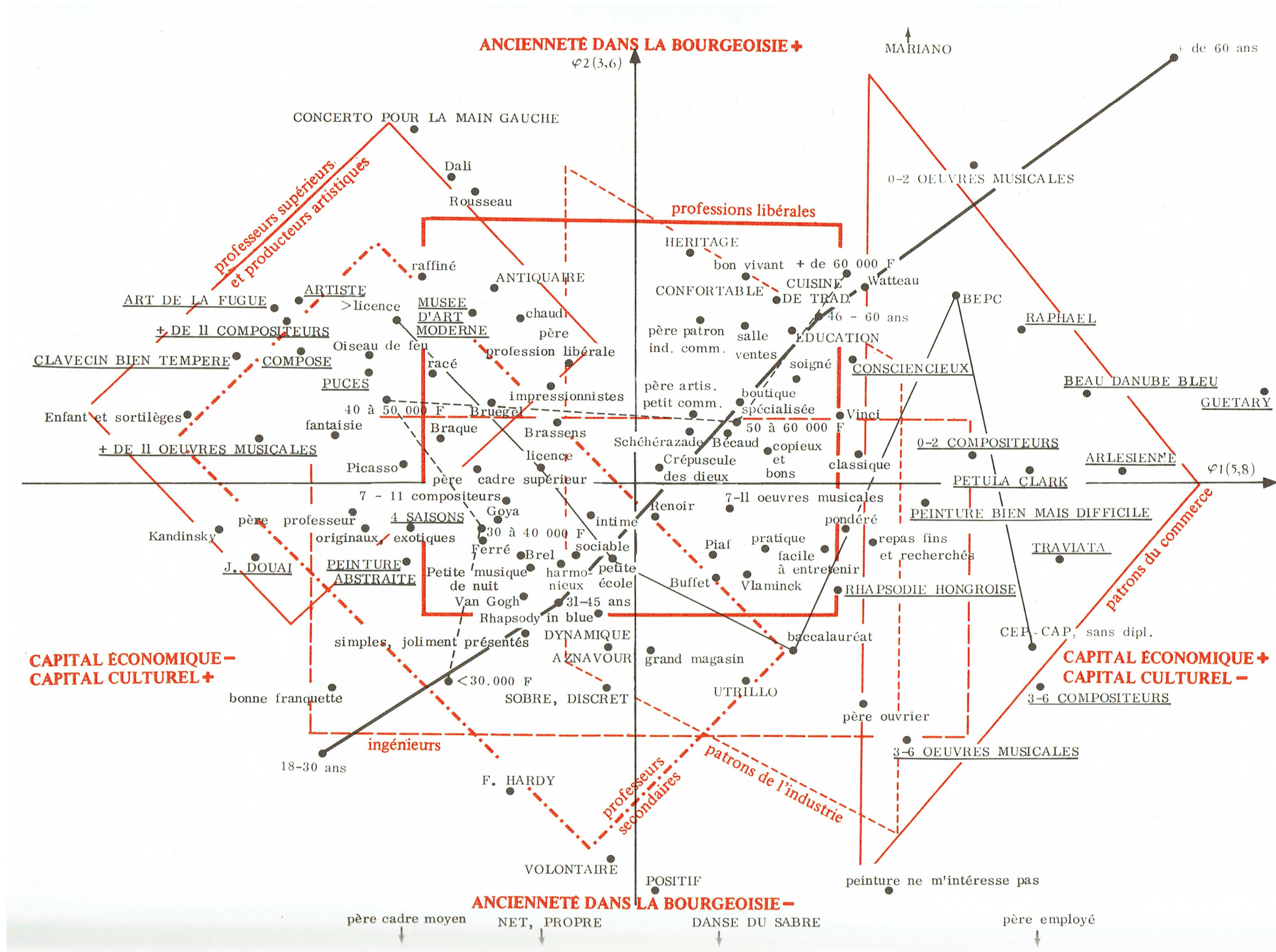


The History of Rock, Reebee Garofalo (1975)

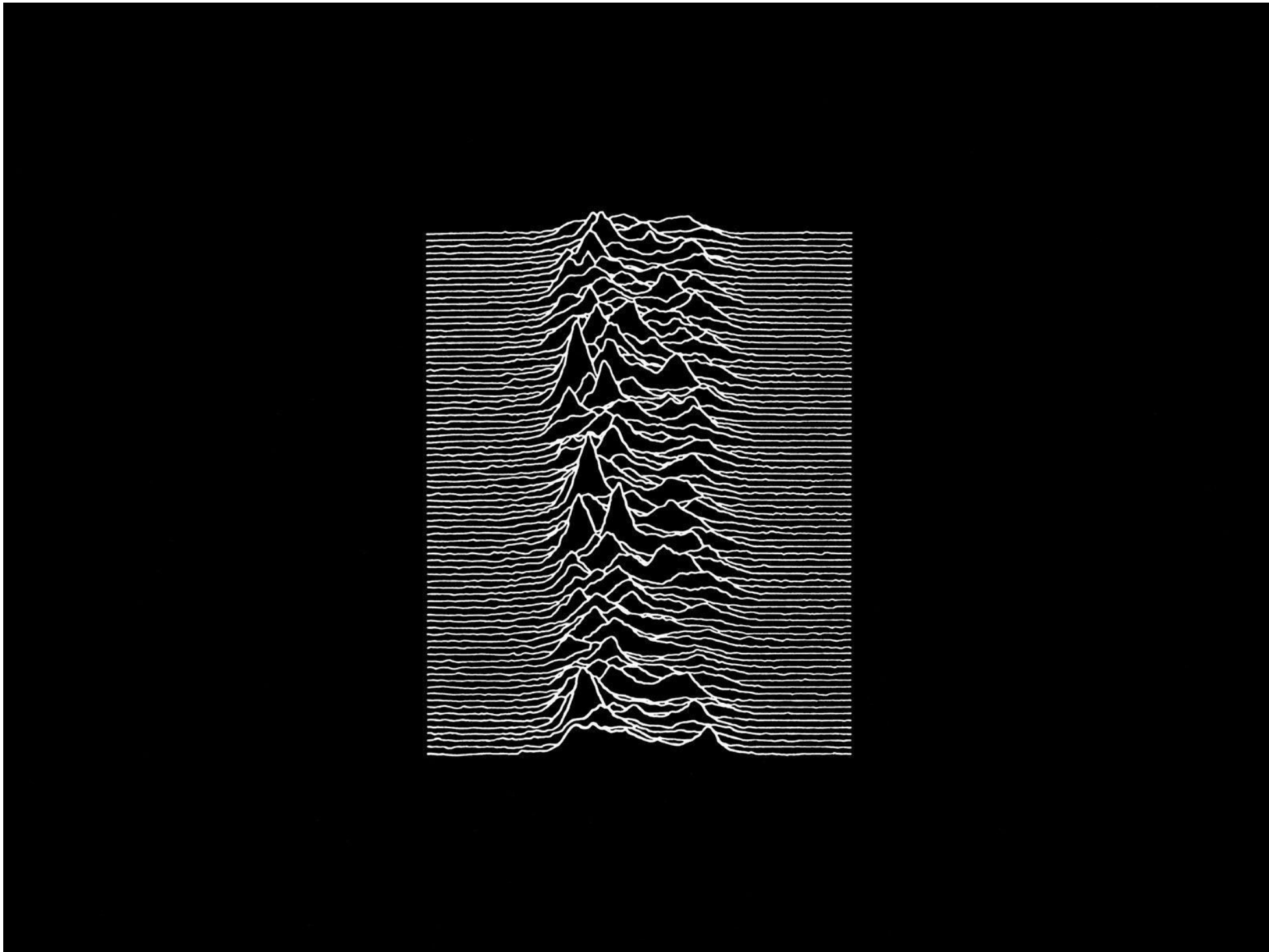
https://www.edwardtufte.com/bboard/q-and-a-fetch-msg?msg_id=0002N4



George W. Bush, Harken Energy, and Jackson Stephens, Mark Lombardi (1979-90)
https://medium.com/@ben_fry/learning-from-lombardi-a28032a7eb5



Multiple Correspondence Analysis (MCA) in *La distinction*, Pierre Bourdieu (1979)
https://en.wikipedia.org/wiki/Multiple_correspondence_analysis

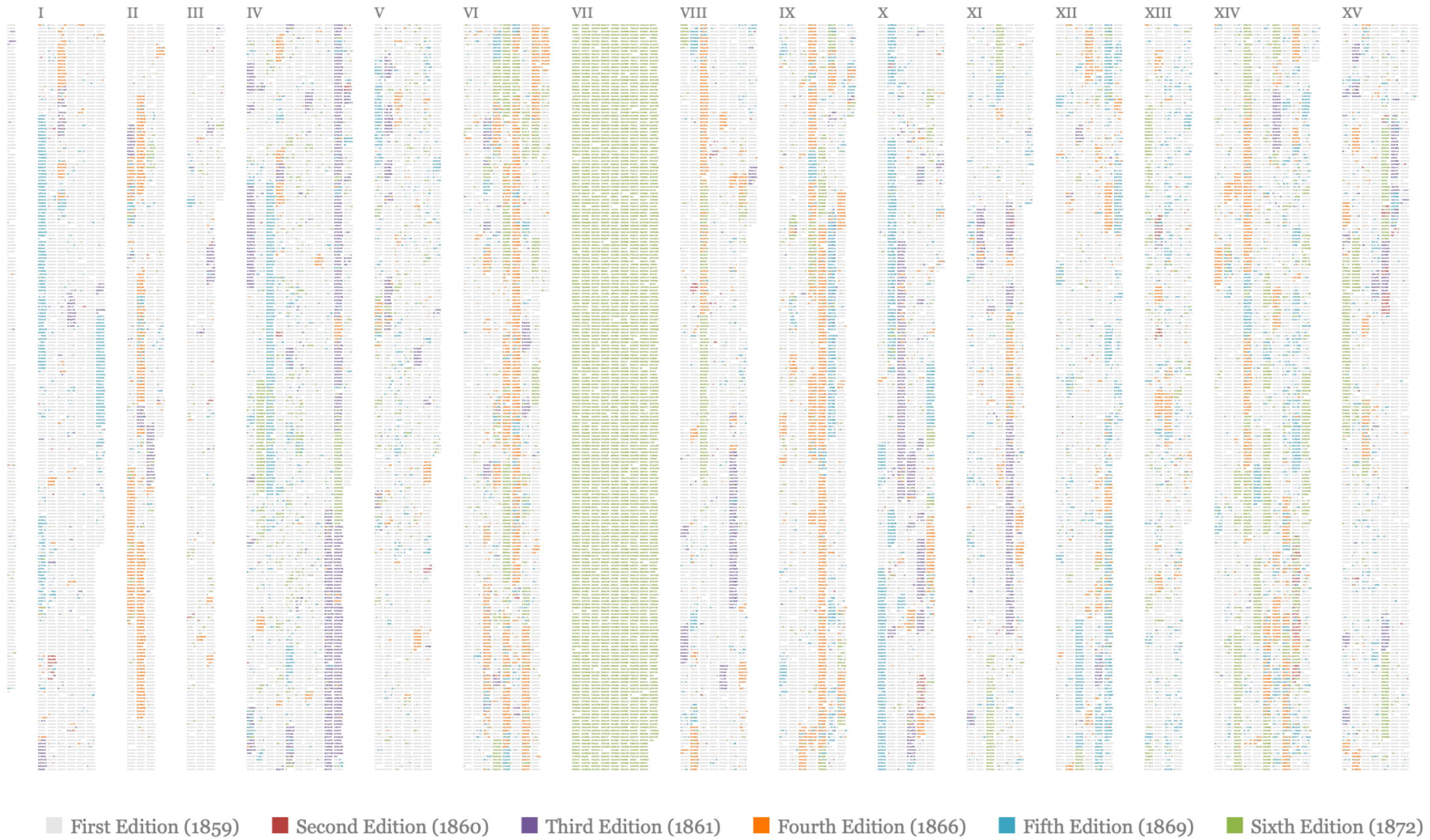


Stacked Plot of Radio Signals from a Pulsar, Harold Craft (1977)

<https://blogs.scientificamerican.com/sa-visual/pop-culture-pulsar-origin-story-of-joy-division-s-unknown-pleasures-album-cover-video/>

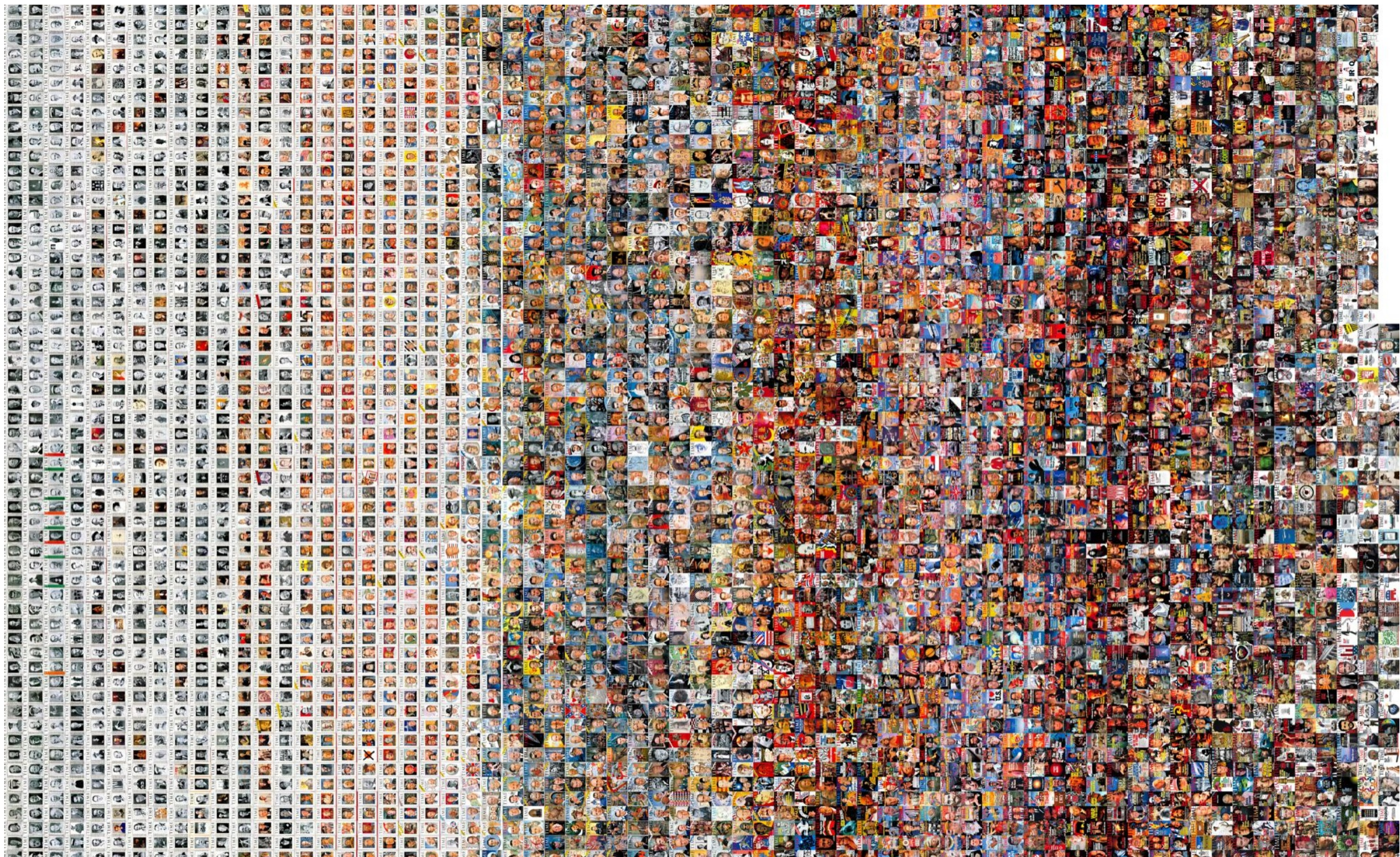
c.

Contemporary Visualizations



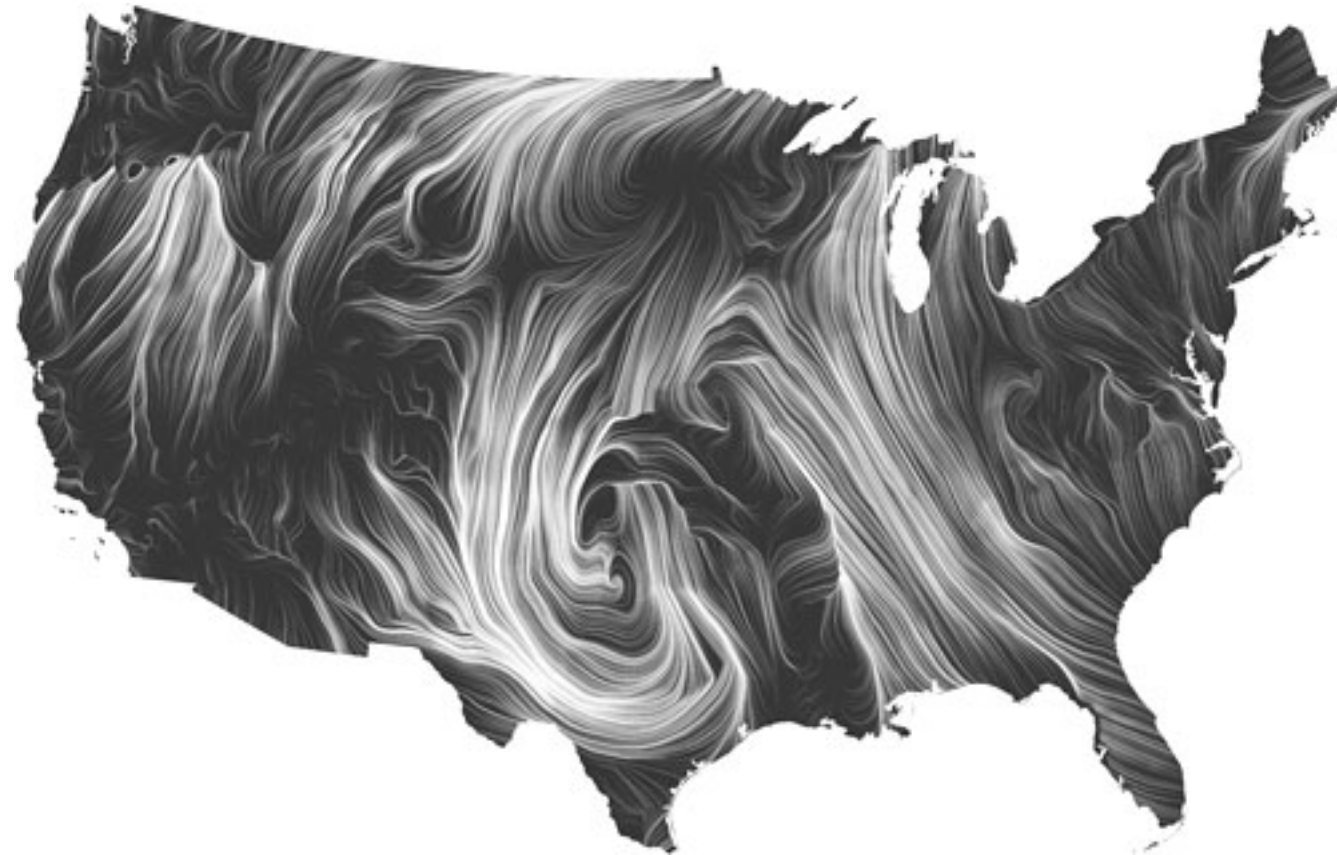
The preservation of Favoured Traces, Ben Fry (2009)

<https://fathom.info/traces/>



Timeline, Lev Manovich (2010)

<http://manovich.net/index.php/exhibitions/timeline>



Wind Map, Fernanda Viégas (2012)
<http://www.fernandaviegas.com>



Picasso

“ My mother said to me,
If you are a soldier,
you will become a general.
If you are a monk,
you will become the Pope.
Instead, I was a painter, and
became Picasso. ”

full name

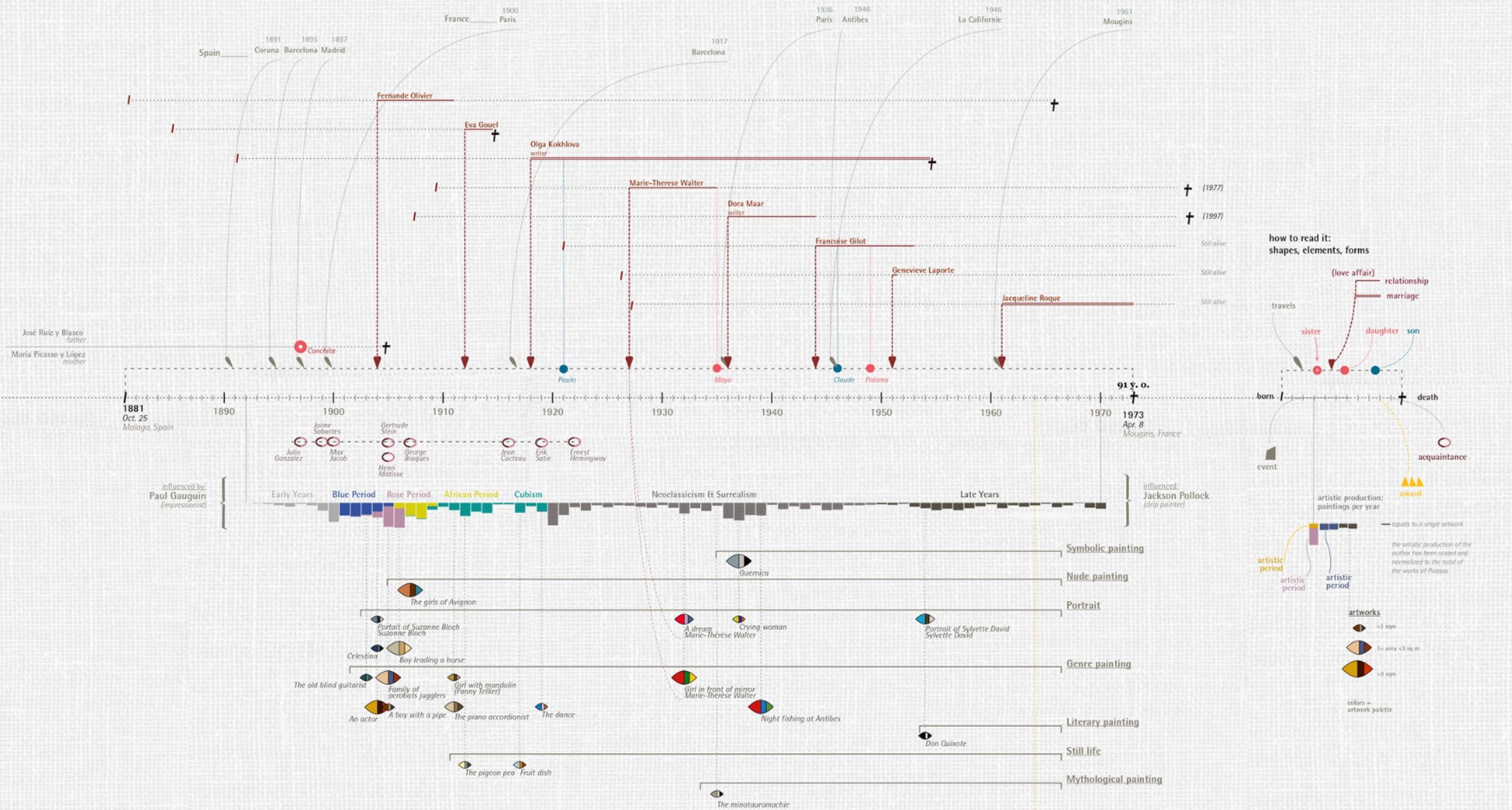
Pablo Diego José
María de los Remedios Crispiniano
de la Santísima Trinidad

distinctive features



Righty Scorpio

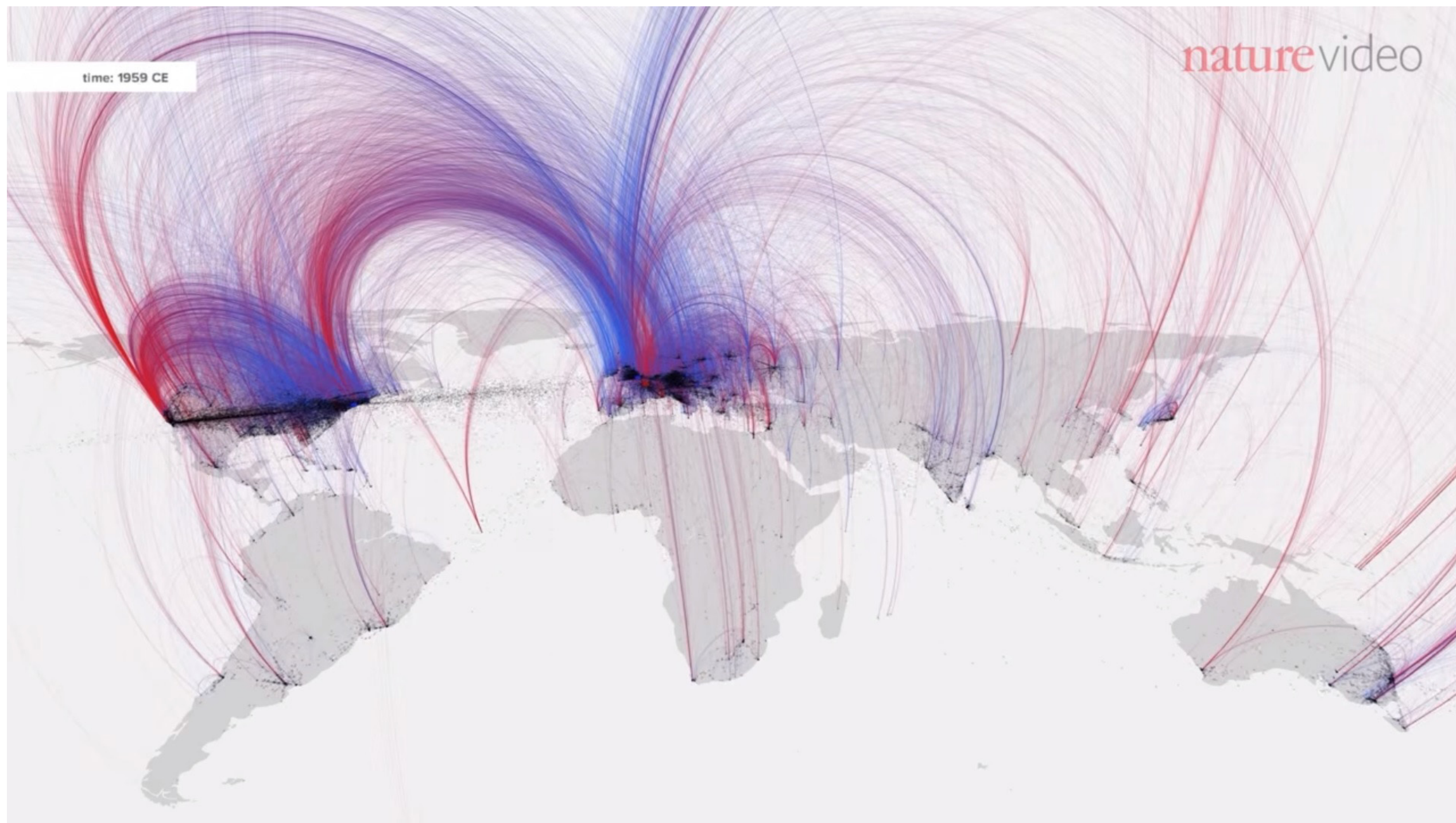
a project by Accurat
directed by Giorgia Lupi and Michela Buttignol
www.accurat.it



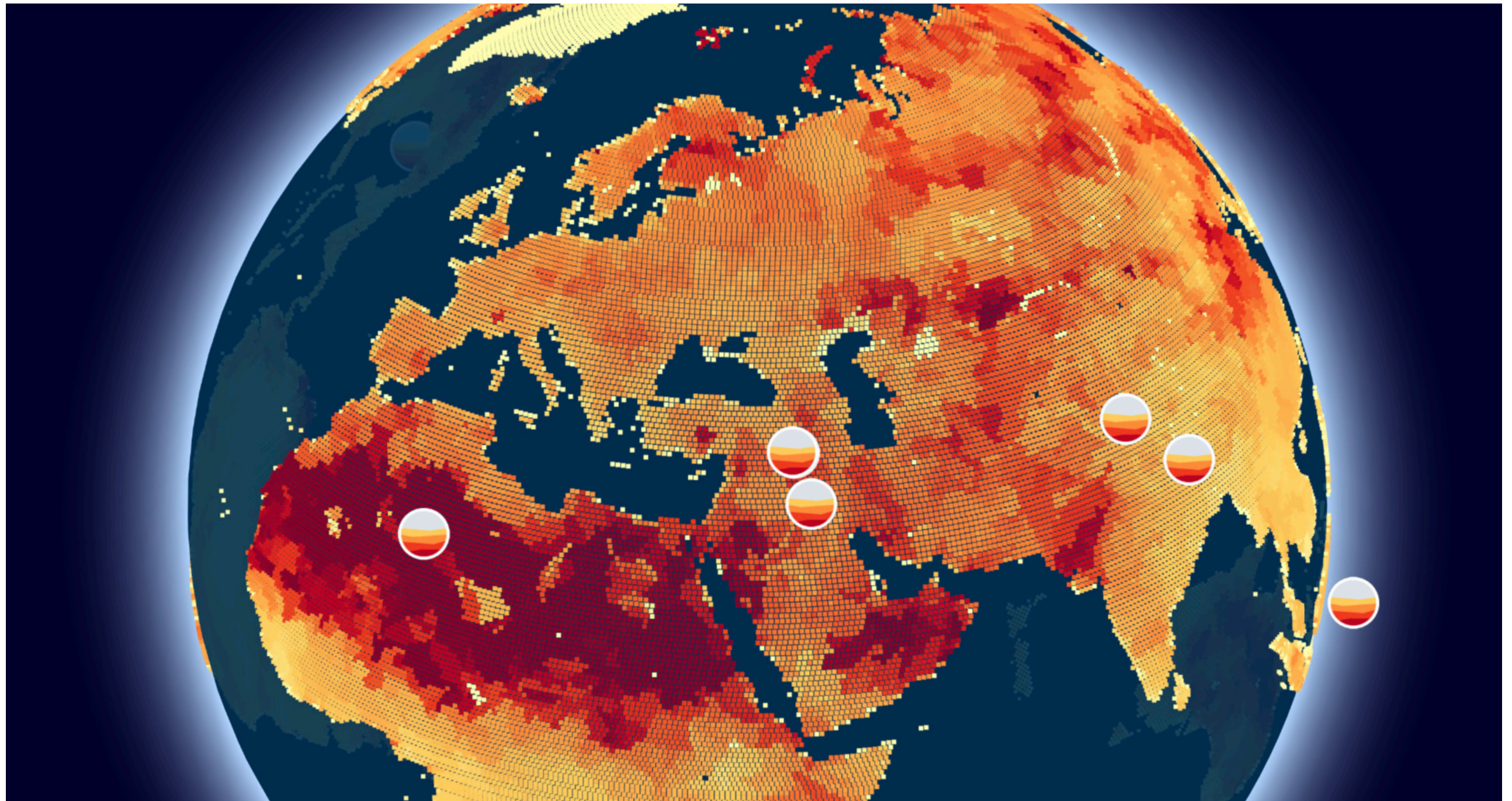
how to read it:
shapes, elements, forms

- travels
- (love affair) relationship
- marriage
- sister
- daughter
- son
- born
- death
- acquaintance
- award
- artistic production: paintings per year
- equals to a single artwork
- the artistic production of the author has been sorted and equalized to the total of the works of Picasso
- artistic period
- artistic period
- artworks
- <1 sqm
- ◐ 1-10 sqm
- ◑ 10-100 sqm
- ◒ >100 sqm
- colors = artwork palette

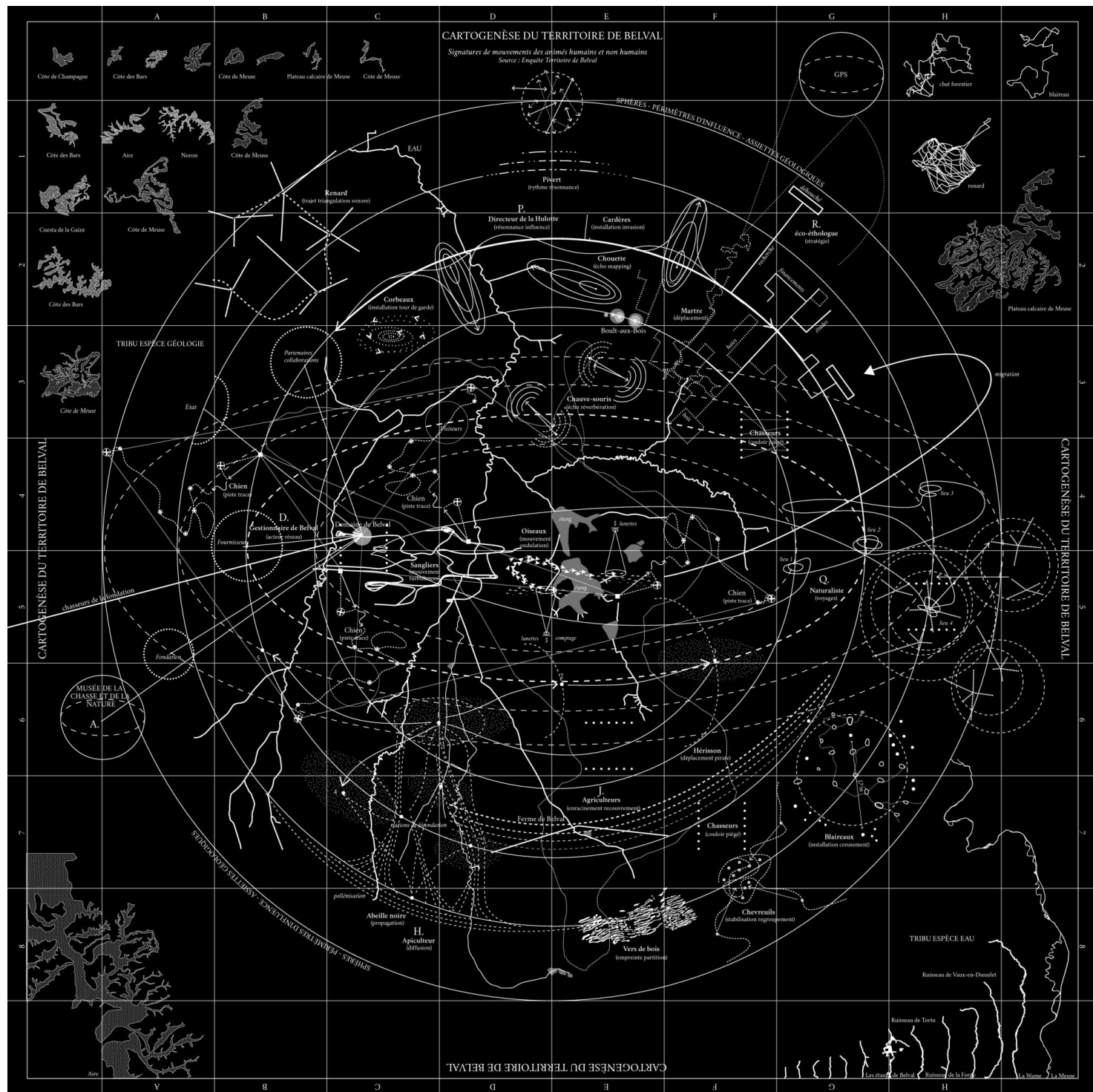
Visualizing Painters' Lives Series, Giorgia Lupi (2013)
<https://www.accurat.it>



Charting Culture, Mauro Martino (2014)
<http://www.mamartino.com/projects/cultsci/>

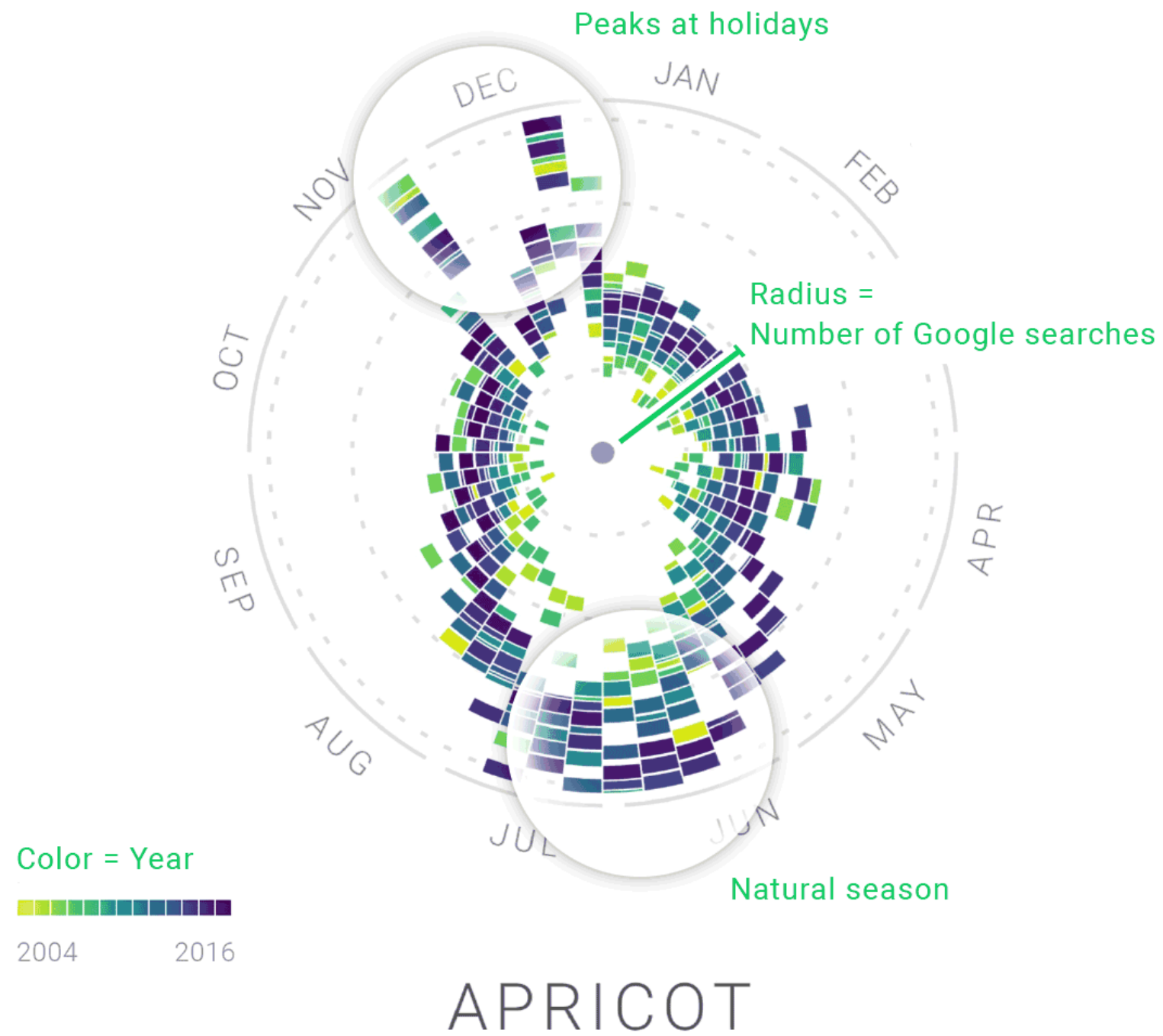


World Water Atlas, Jan Willem Tulp (2016)
<http://tulpinteractive.com>

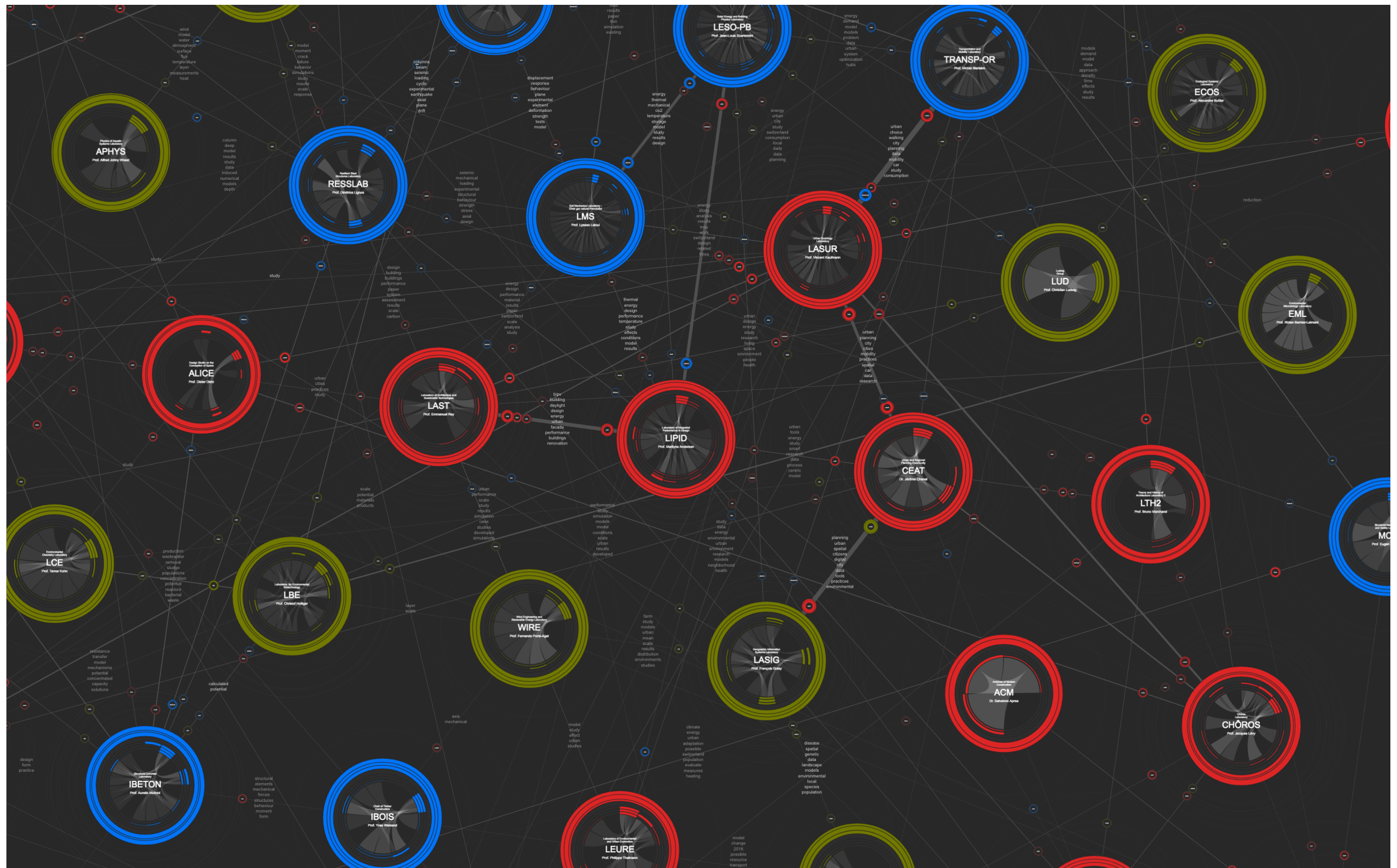


Cartogenese, Alexandra Arenes (2017)

<https://vimeo.com/232655044>



The Rhythm of Food, Moritz Stefaner (2017)
<https://truth-and-beauty.net>



Affinity Map, Dario Rodighiero & Ogier Maitre (2018)
<https://affinitymap.epfl.ch>

4.

To keep in mind

Structures

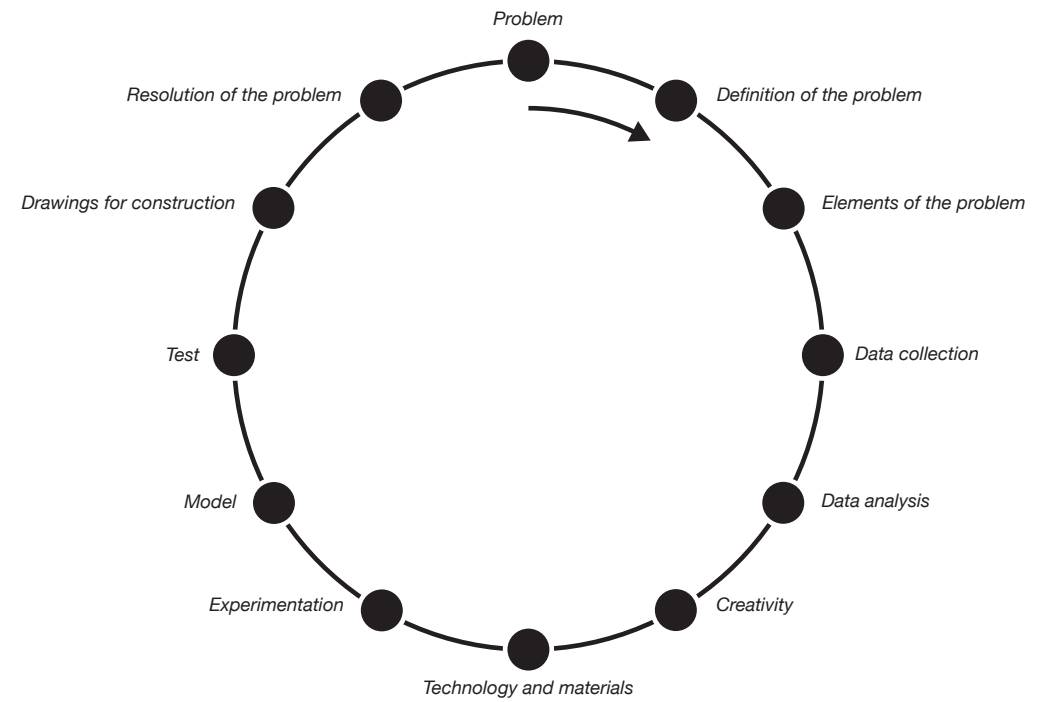
Hierarchical (trees)

Relational (networks)

Temporal (timelines)

Spatial (maps)

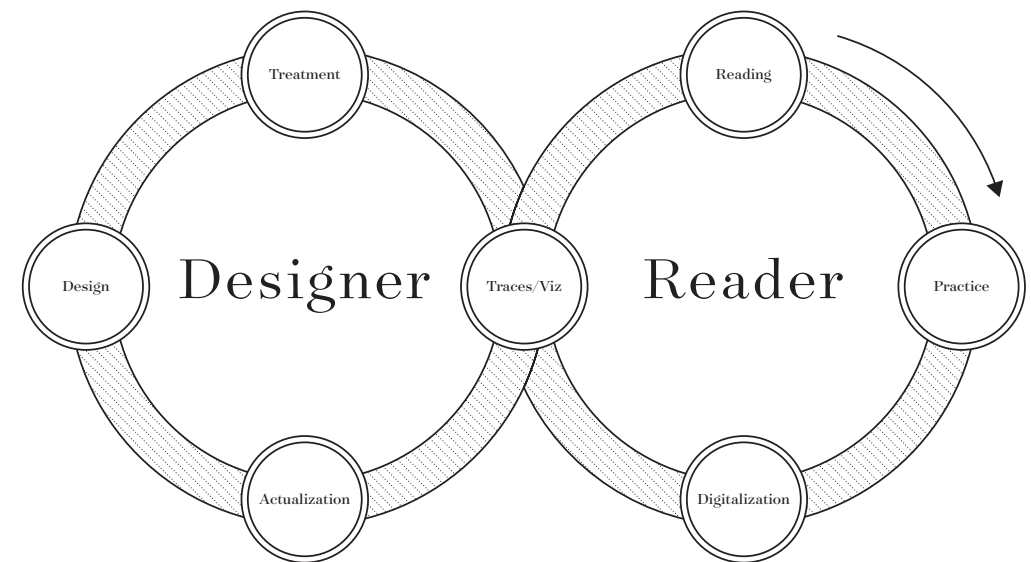
Textual (books)



Interpretation

Association

Differentiation



Thanks

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dario.rodighiero@epfl.ch

<https://dariorodighiero.com>