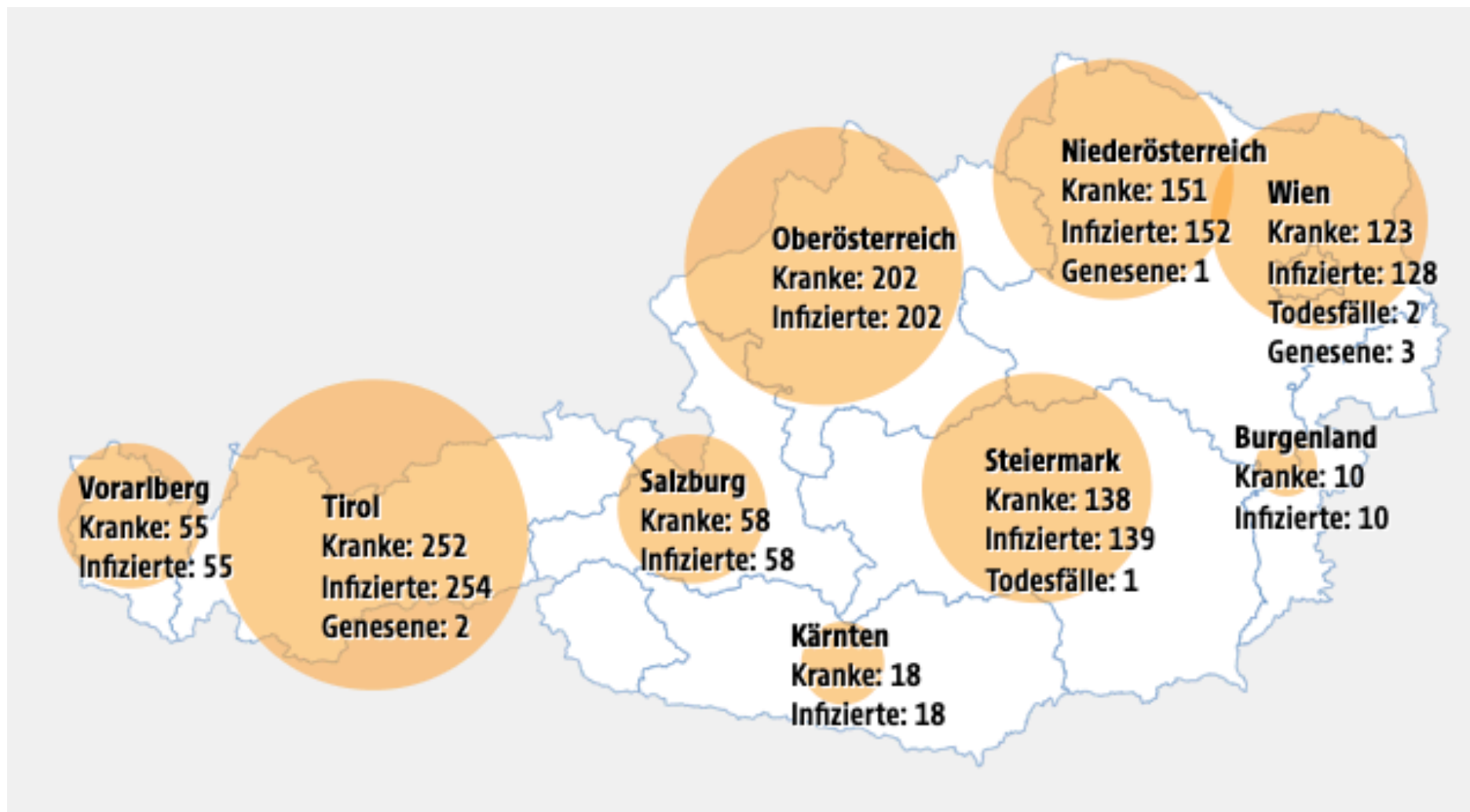




ORF 2 HD

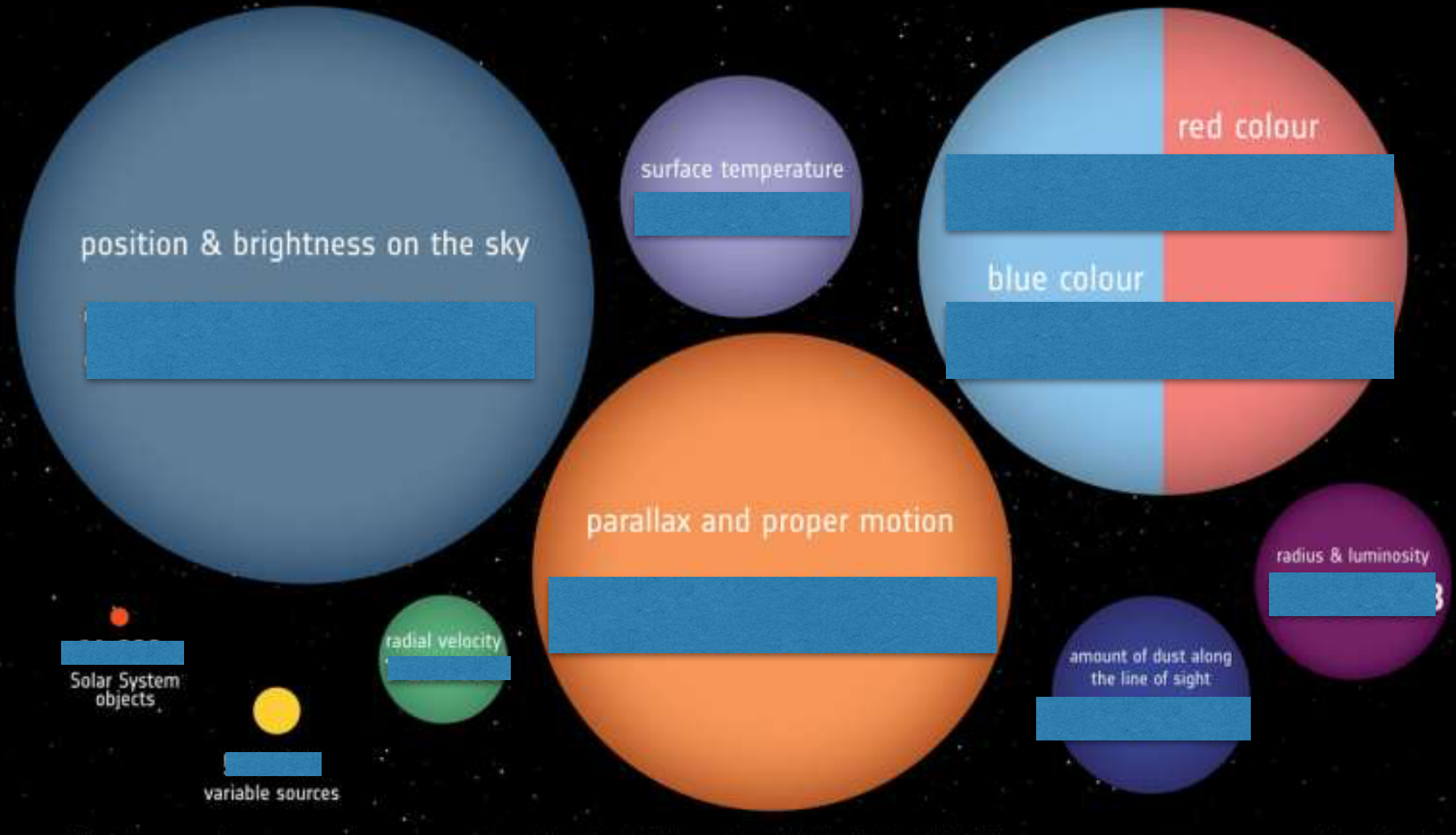
ORFIAT

WAHL19



As of Mar 16, 2020, 3pm

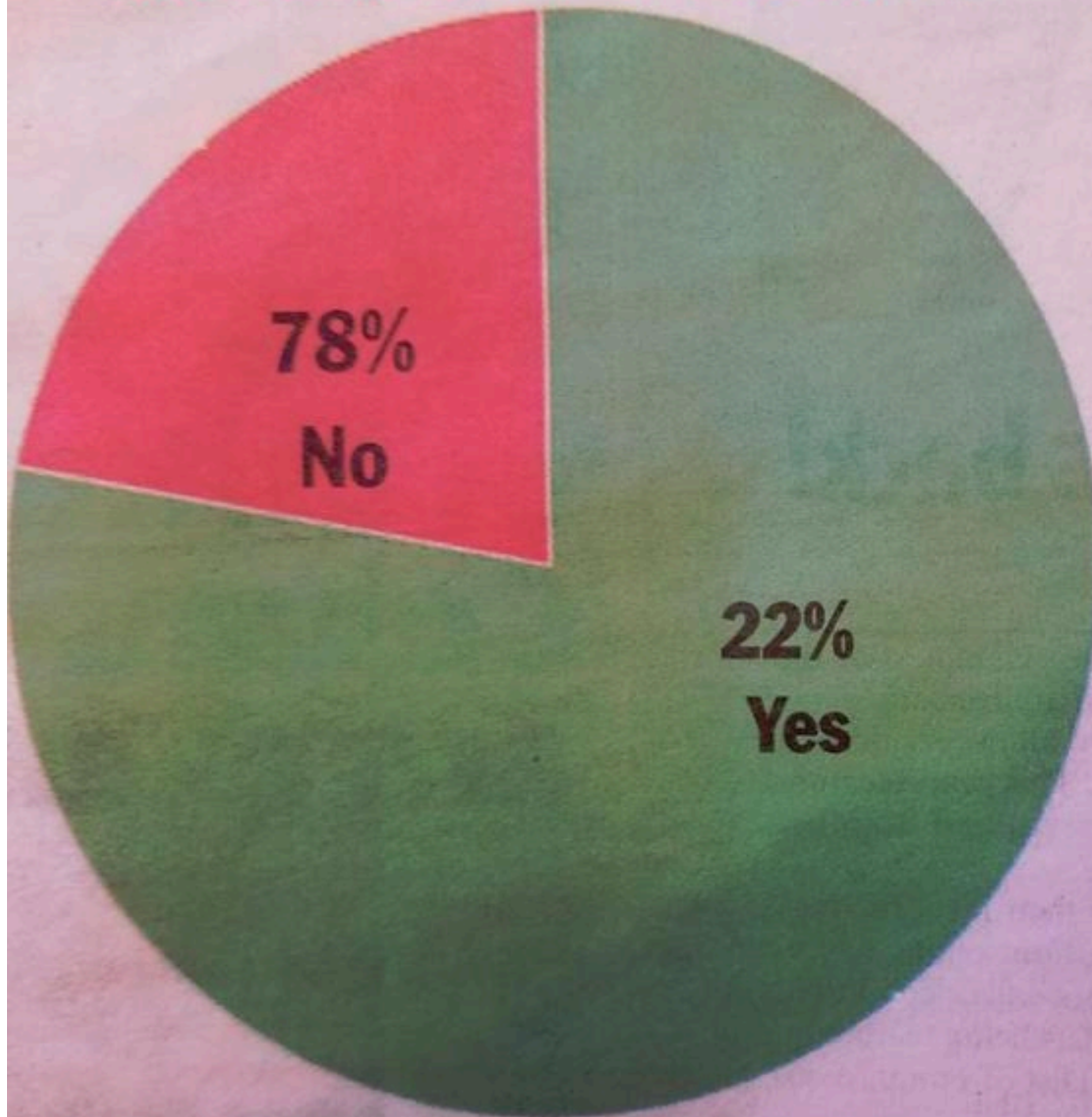
→ HOW MANY STARS WILL THERE BE IN THE SECOND GAIA DATA RELEASE?

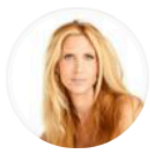


→ HOW MANY STARS WILL THERE BE IN THE SECOND GAIA DATA RELEASE?



ARE YOU SATISFIED WITH YOUR LIFE?



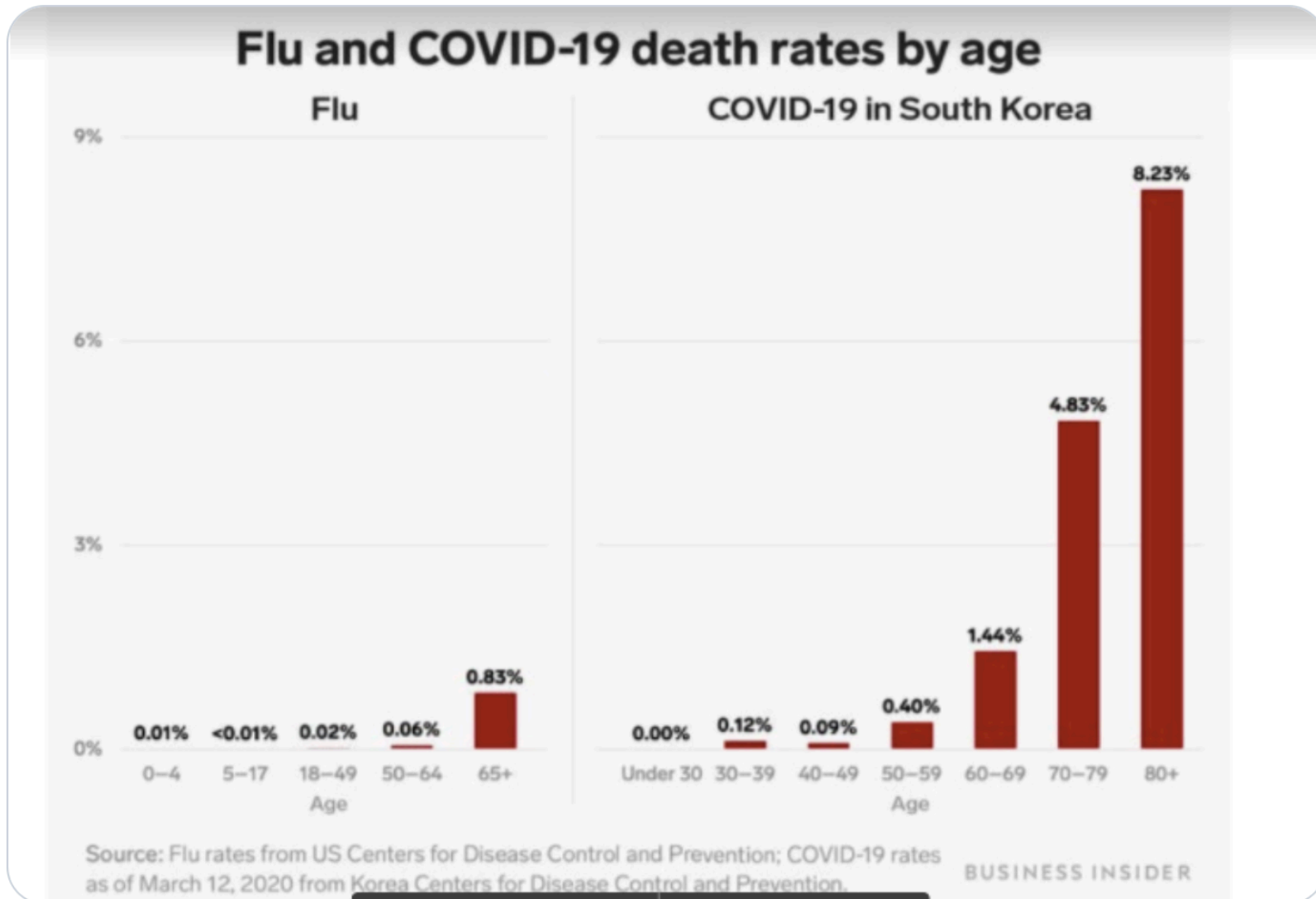


Ann Coulter ✓

@AnnCoulter



For people under 60, coronavirus is LESS dangerous than the seasonal flu:



1:11 PM · Mar 24, 2020



053622 Visual and Exploratory
Data Analysis (VU) &
136013 Visualization of humanities
data (UE)

Acil Cetin + Christian Knoll + Laura
Koesten + Torsten Möller + Timothée
Schmude + Florian Windhager

What is Visualization?

- What?
- Why?
- Who?
- How?

Sources

- Selective contributions from
 - Raghu Machiraju
 - Tamara Munzner
 - Hanspeter Pfister
 - Melanie Tory
 - Daniel Weiskopf

What is Visualization?

- What?
- Why?
- Who?
- How?



vi·su·al·ize

1. To form a mental image of
2. To make visible

Definitions

- B. McCormick, T. DeFanti, and M. Brown:

Visualization is a method of computing. It transforms [the symbolic into the geometric](#), enabling researchers to observe their simulations and computations. Visualization offers a method for [seeing the unseen](#). It enriches the process of scientific discovery and fosters profound and unexpected insights. In many fields it is already revolutionizing the way scientists do science.

McCormick, B.H., T.A. DeFanti, M.D. Brown, **Visualization in Scientific Computing**, Computer Graphics 21(6), November 1987

Definitions

- Tamara Munzner, 2012:

Computer-based visualization systems provide visual representations of datasets intended to help people carry out some task more effectively.

T. Munzner: **Visualization Design and Analysis: Abstractions, Principles, and Methods**, AK Peters, 2014

Definitions

- Tamara Munzner, 2012:
Computer-based visualization systems provide visual representations of datasets intended to **help people** carry out some task more effectively.

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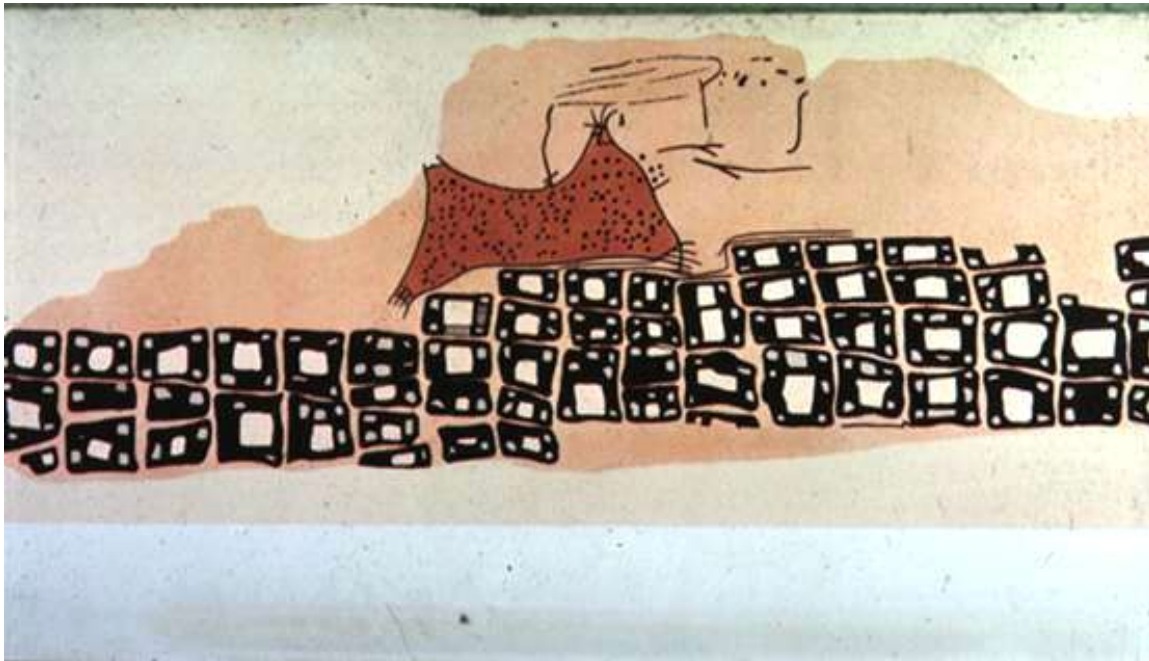
- Tamara Munzner, 2012:

Computer-based visualization systems provide visual representations of datasets intended to help people carry out some task **more effectively**.

T. Munzner: **Visualization Design and Analysis: Abstractions, Principles, and Methods**, AK Peters, 2014

Visualization Goals

Map



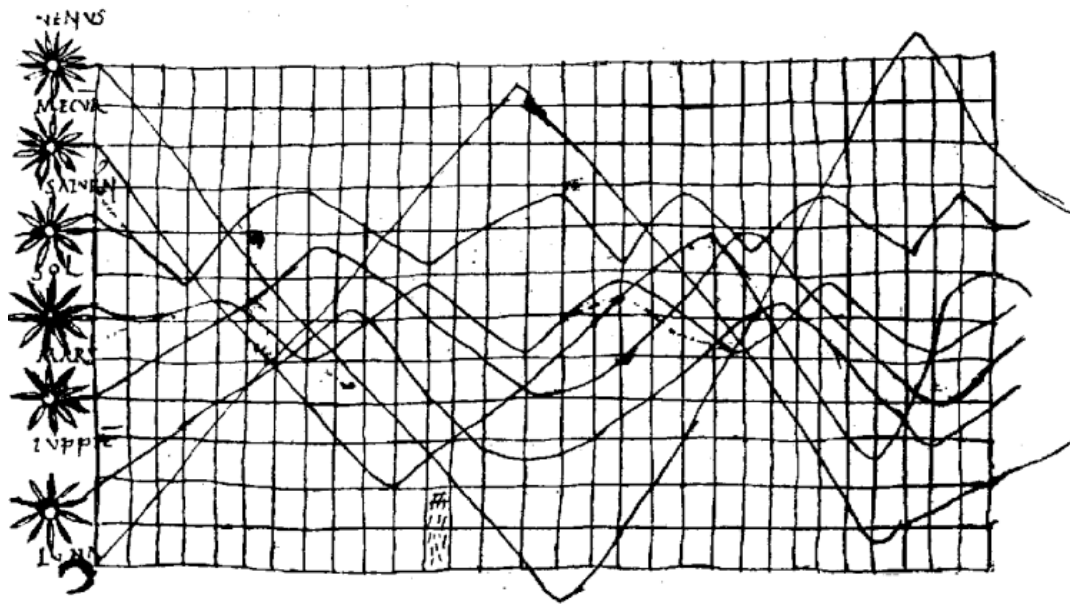
Konya town map, Turkey, c. 6200 BC



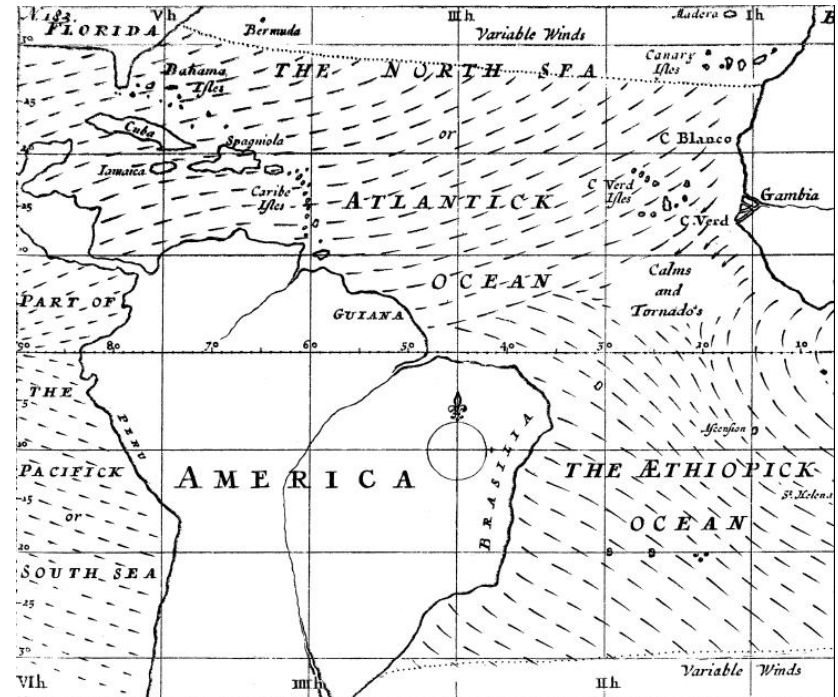
Anaximander's Map of the World

Anaximander of Miletus, c. 550 BC

Map

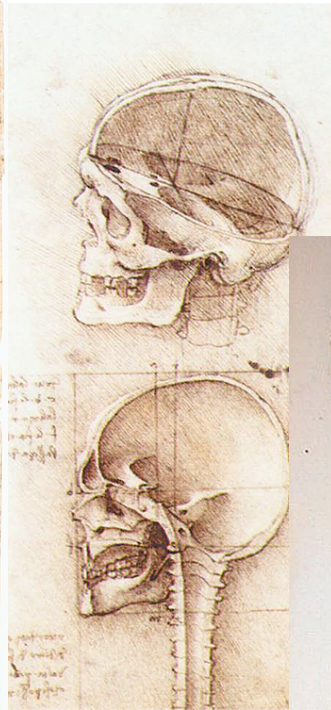


Planetary Movement Diagram, c. 950



Halley's Wind Map, 1686

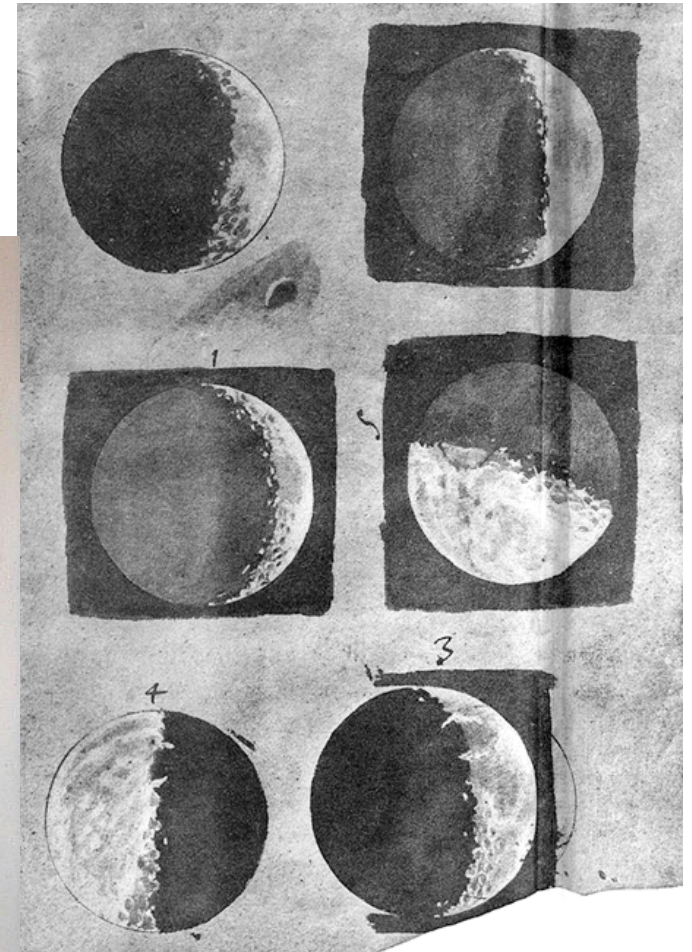
Record



Leonardo Da Vinci, ca. 1500

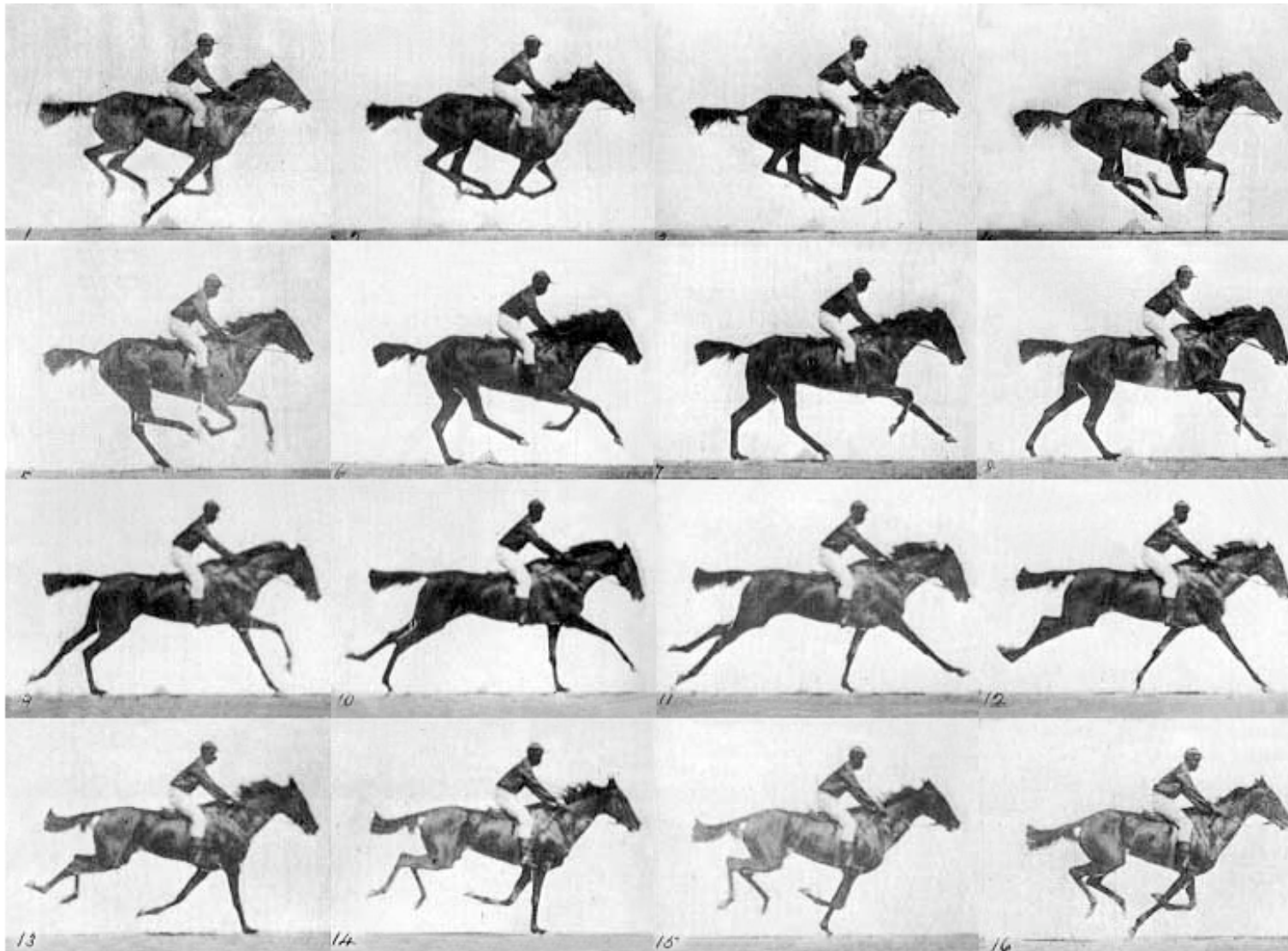


William Curtis (1746-1799)



Galileo Galilei, 1616

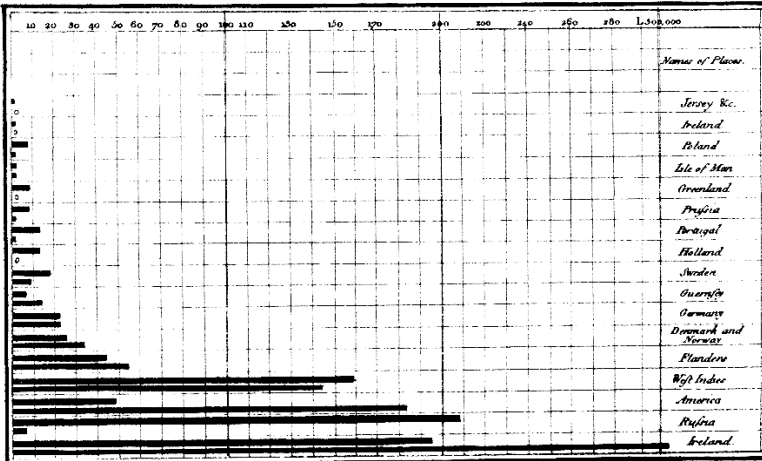
Record



E. J. Muybridge, 1878

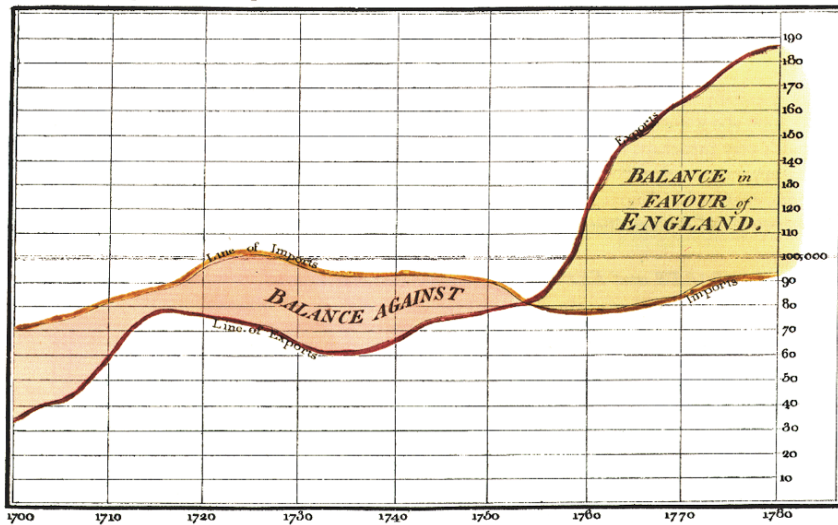
Abstract

Exports and Imports of SCOTLAND to and from different parts for one Year from Christmas 1780 to Christmas 1781.

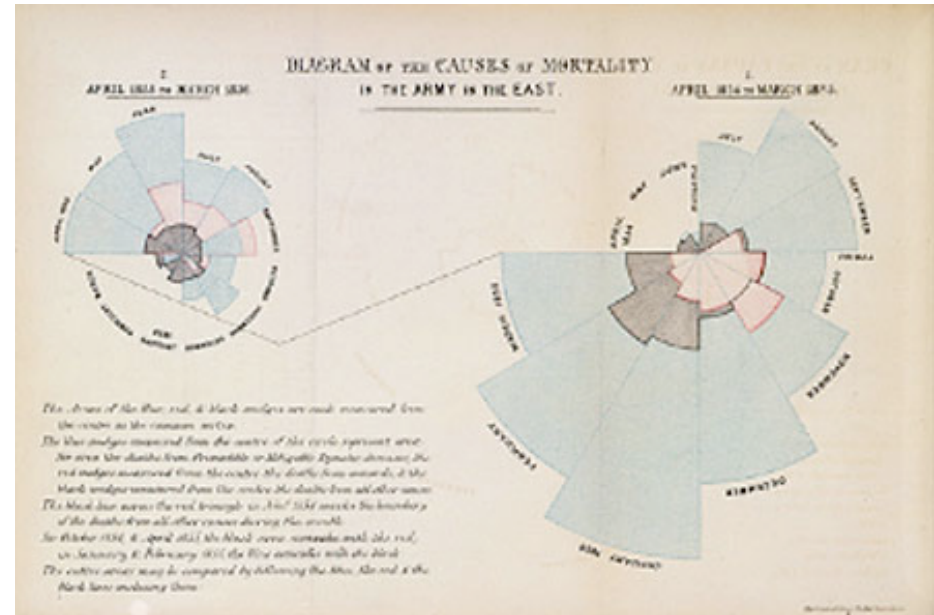


The Upright divisions are Ten Thousand Pounds each. The Black Lines are Exports the Red Lines Imports.
 Published in the Edinburgh Journal of 1781 by W. Playfair. New Imp. 1781. Strand, London.

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

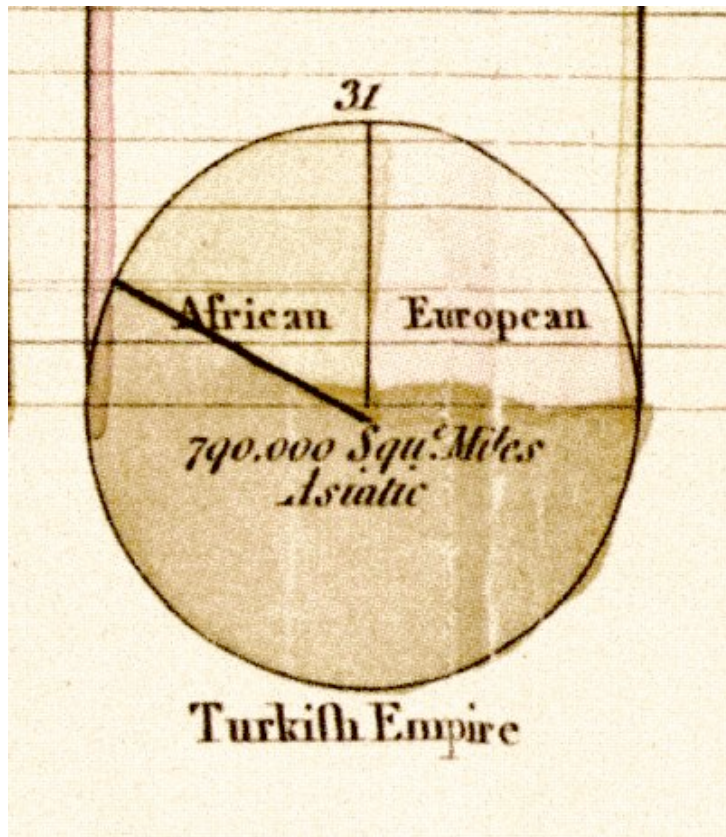


W. Playfair, 1786

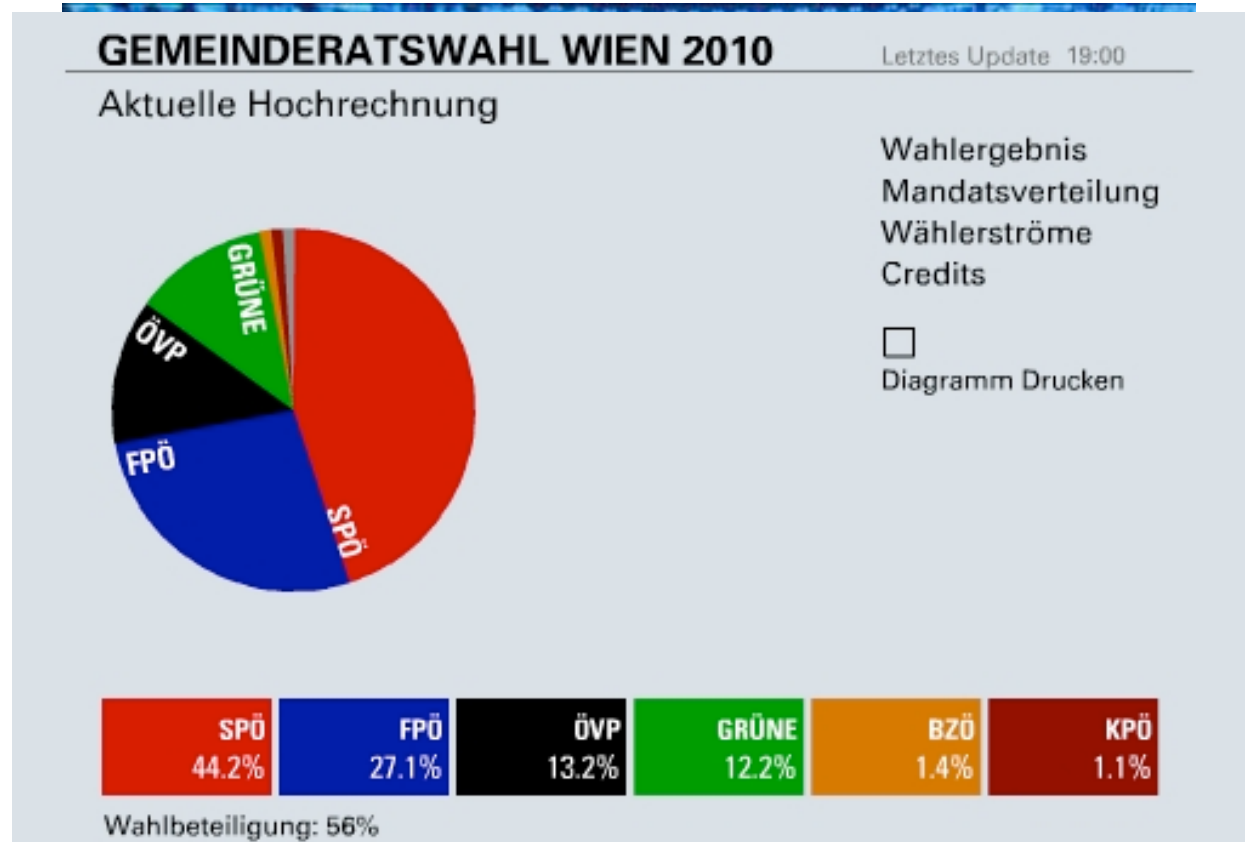


F. Nightingale, 1856

Abstract



W. Playfair, 1801



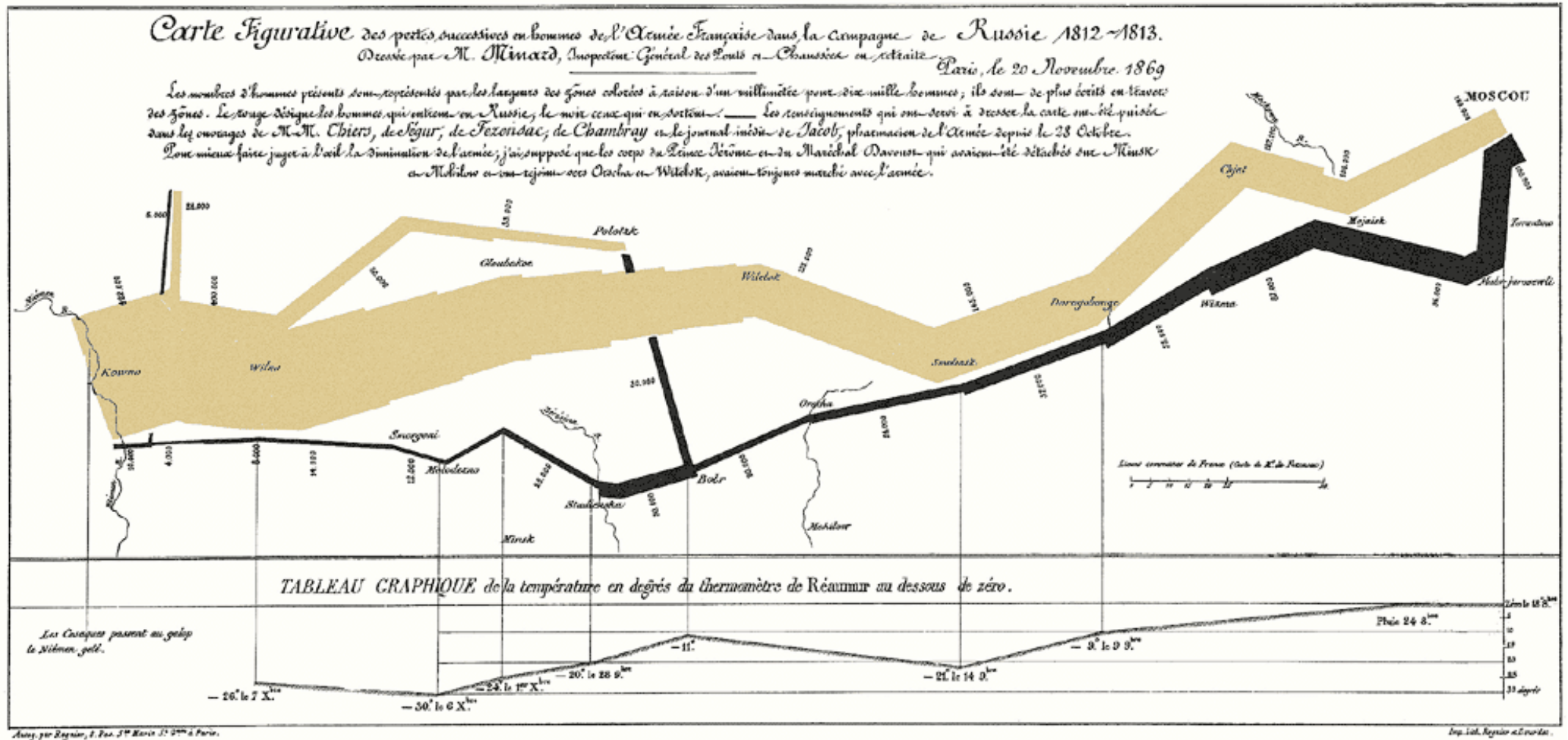
derStandard.at, 2010

Discover



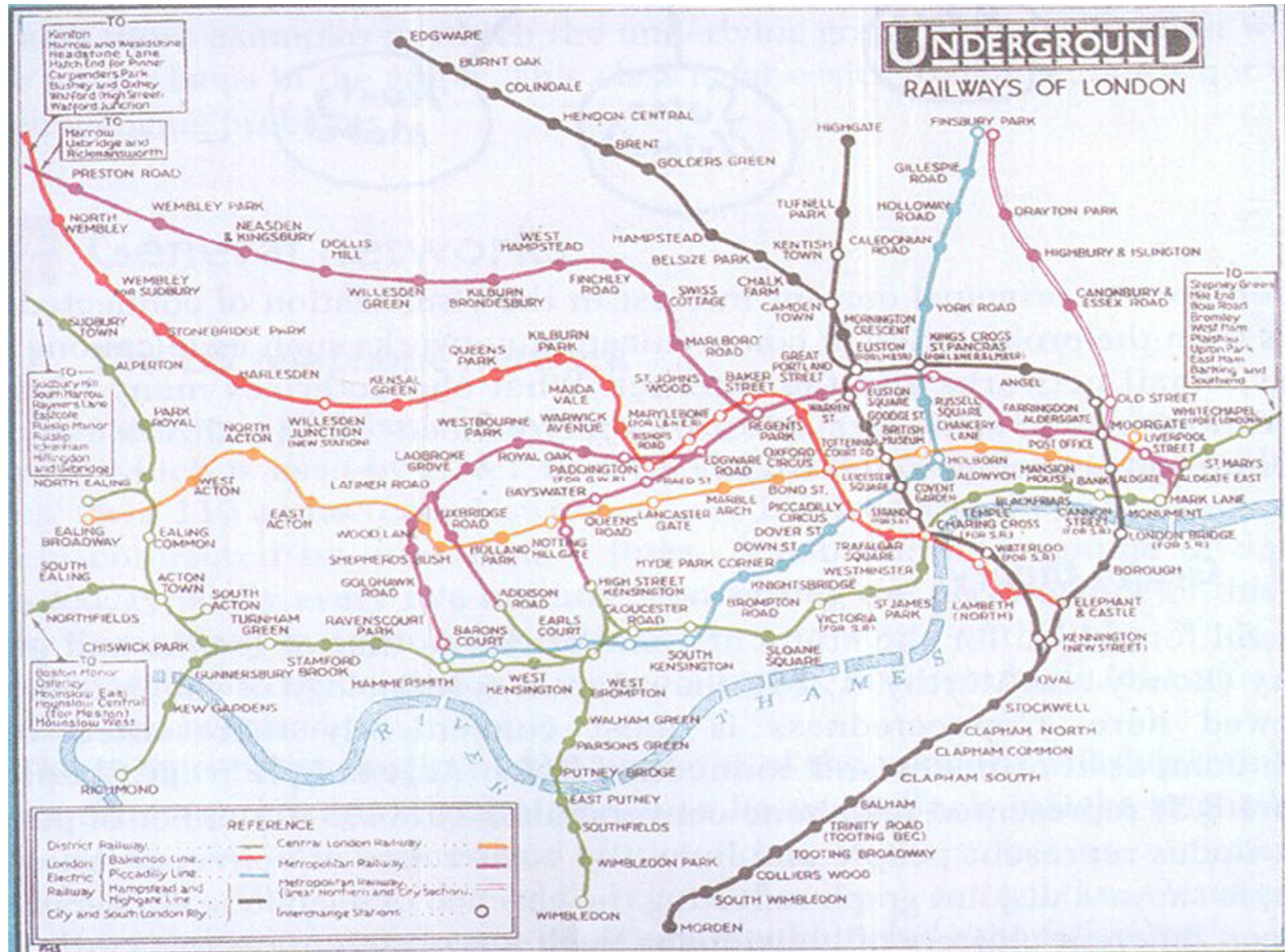
John Snow, 1854

Discover



C.J. Minard, 1869

Clarify



London Subway Map, 1927

Clarify

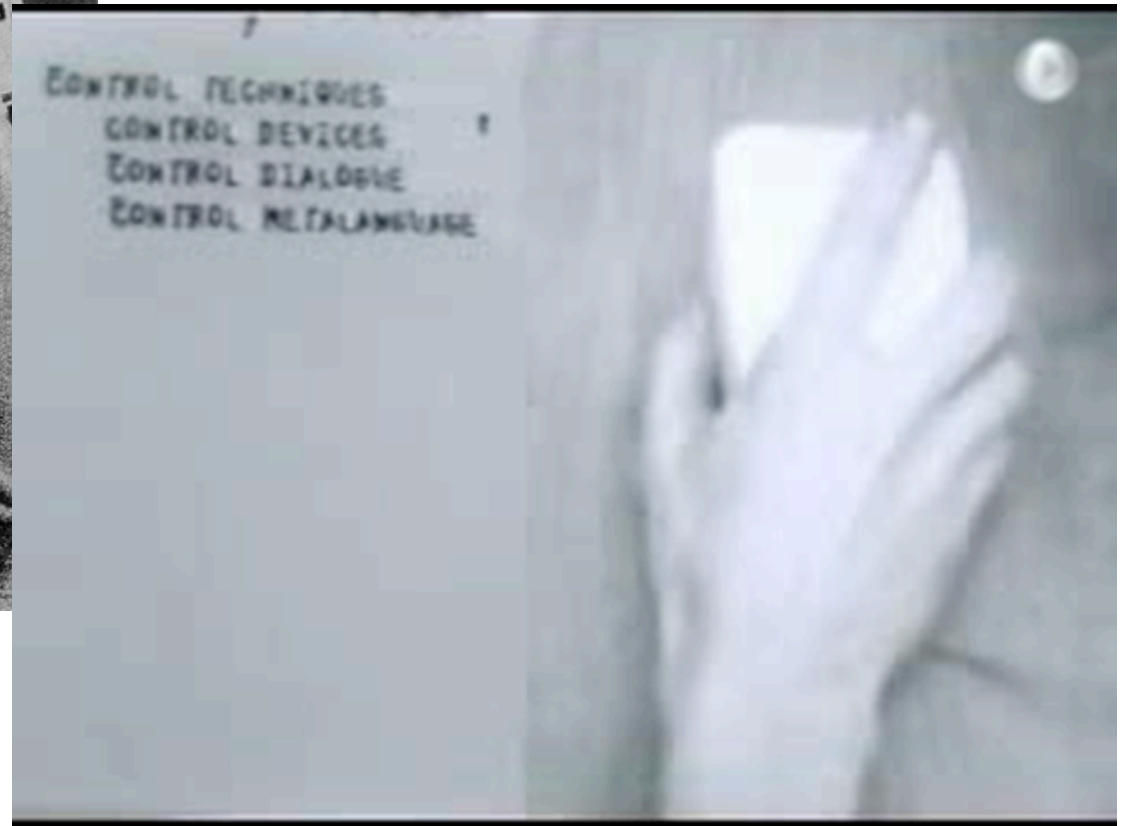


Harry Beck, 1933

Interact



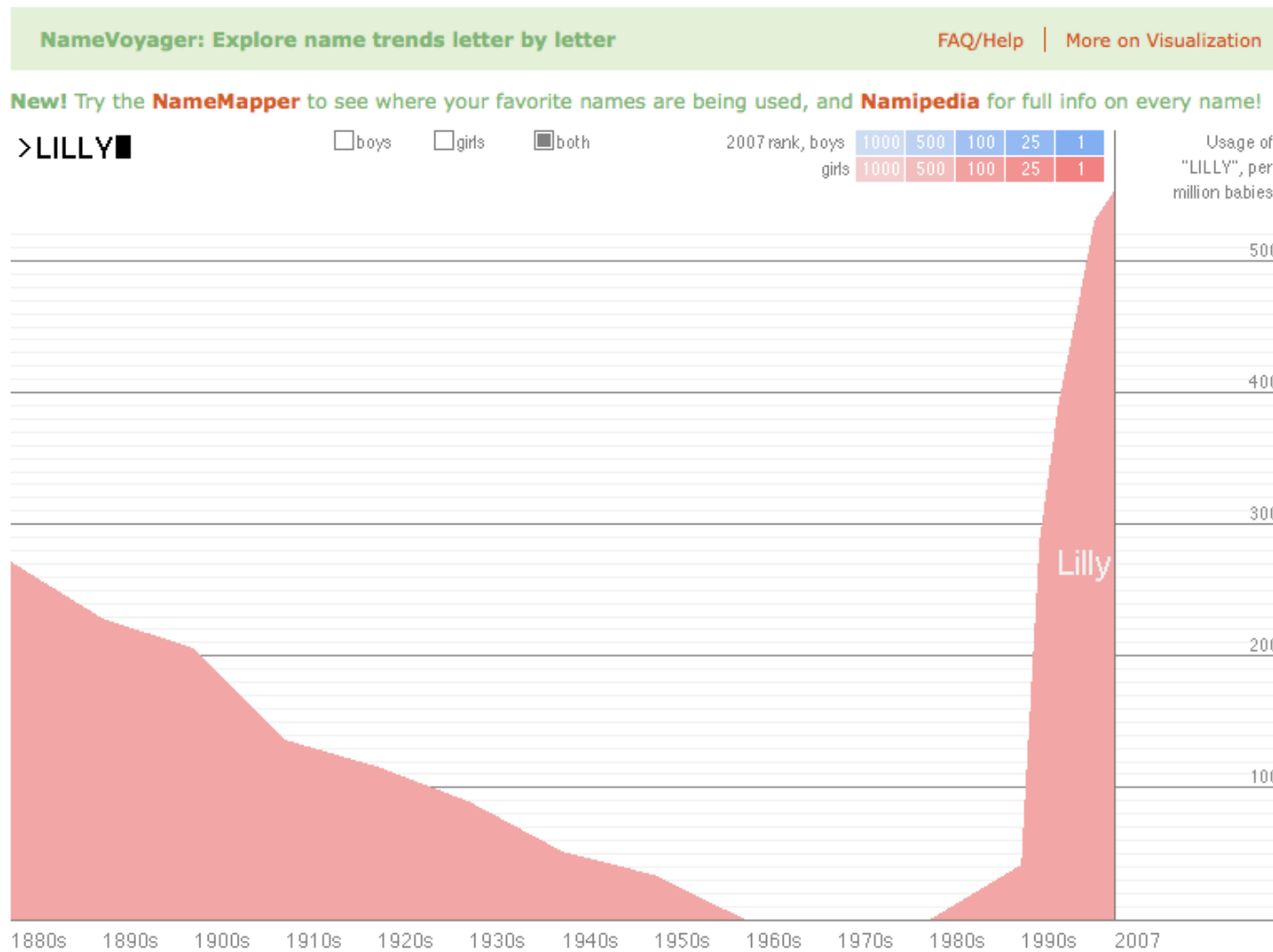
Ivan Sutherland, Sketchpad, 1963



Doug Engelbart, 1968



Interact



M. Wattenberg, 2005

Interact

A Peek Into Netflix Queues

Examine Netflix rental patterns, neighborhood by neighborhood, in a dozen cities. Some titles with distinct patterns are [Mad Men](#), [Obsessed](#) and [Last Chance Harvey](#). [Comments \(131\)](#)

100 titles that were frequently rented from Netflix in 2009

Navigation: [Previous](#) [Next](#) | Slider: Most rented (1) | Least rented

Change how movies are sorted

Sort options: **Most rented** | Alphabetical | By metacore

Paul Blart: Mall Cop



Fat people are funny. Fat people who fall over are funnier. Fat people who fall over and have humiliating working-class jobs? Stop, you're killing me!

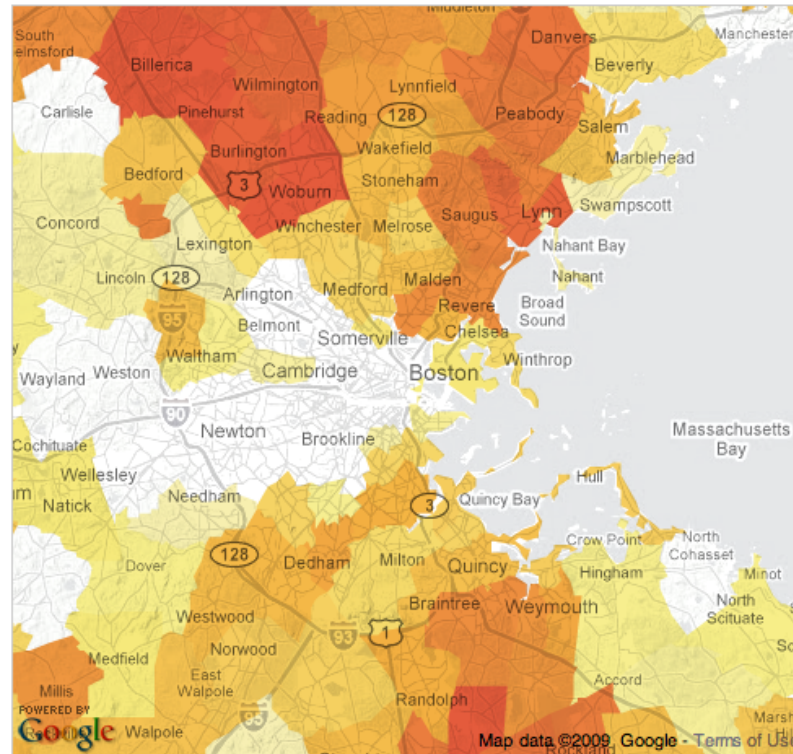
[Read Rest of NYT Review >](#)

39

Metacritic score

100=loved by critics, 0=hated

The ZIP codes are shaded according to each movie's rank. **Ranked No. 1** (dark red) to **No. 50** (yellow)

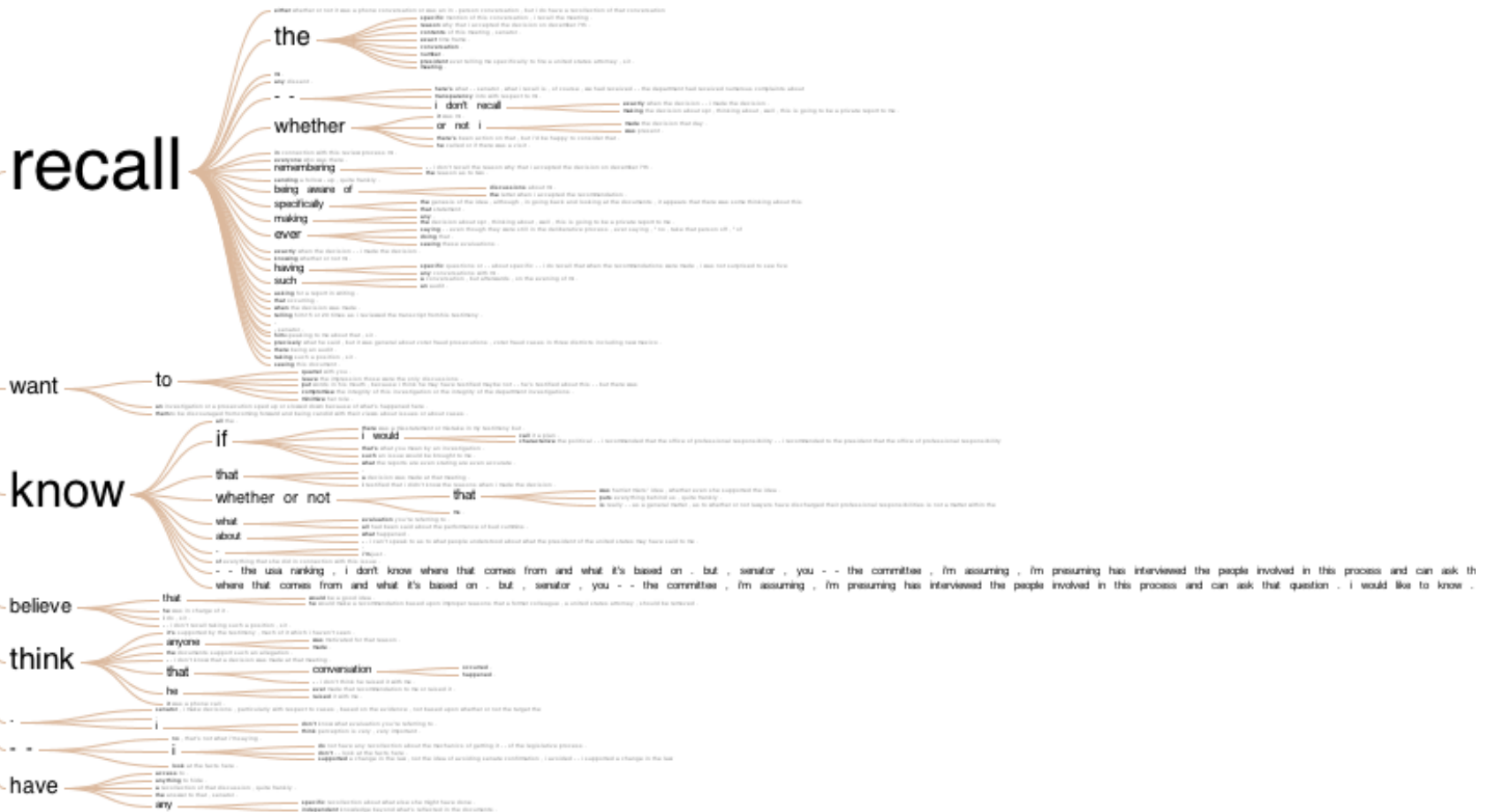


NEW YORK	BOSTON
CHICAGO	WASHINGTON
BAY AREA	L.A.
SEATTLE	MINNEAPOLIS
DENVER	ATLANTA

Communicate

118 hits

i don't



Communicate

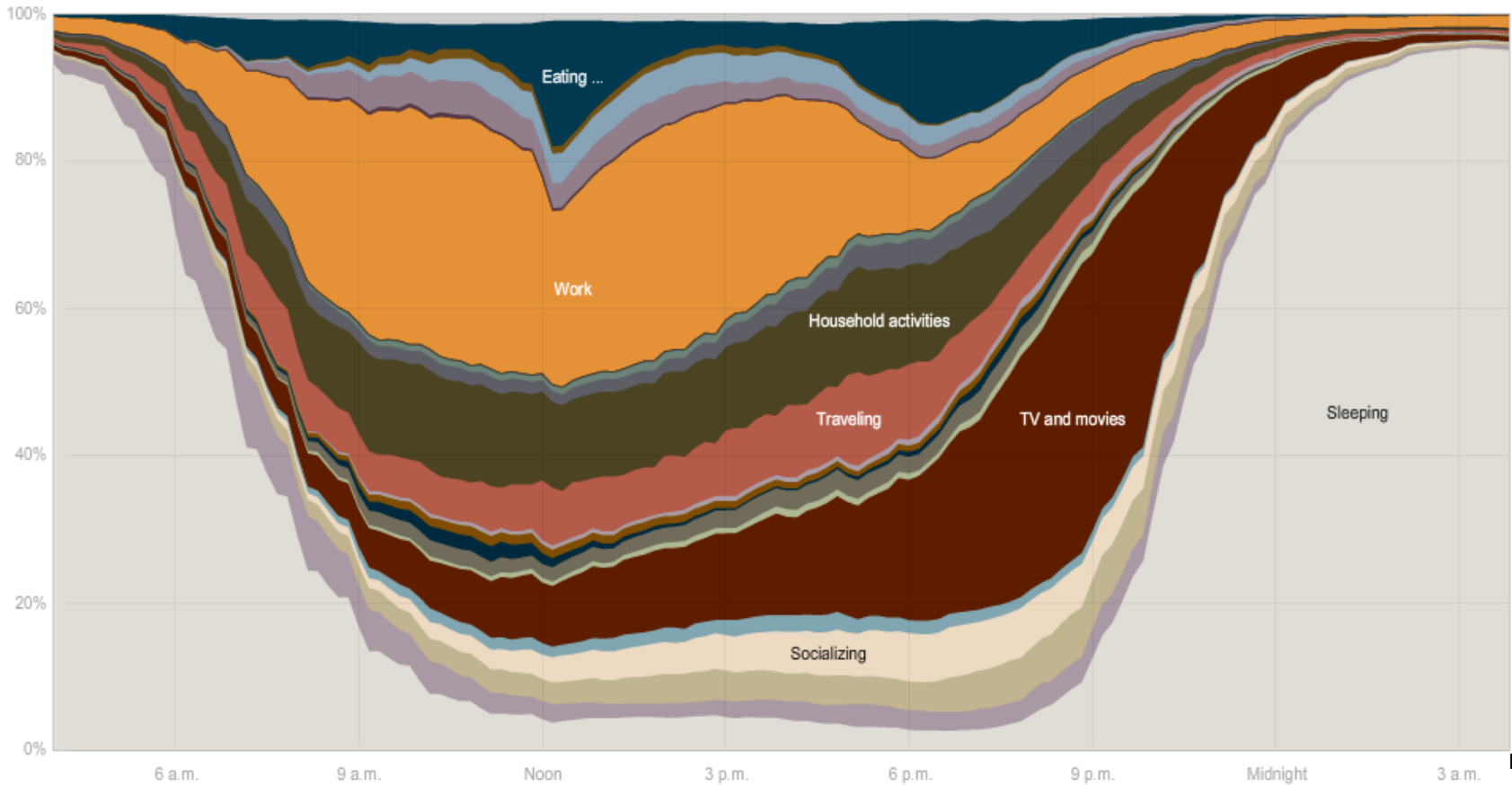
How Different Groups Spend Their Day

The American Time Use Survey asks thousands of American residents to recall every minute of a day. Here is how people over age 15 spent their time in 2008. [Related article](#)

Everyone

Sleeping, eating, working and watching television take up about two-thirds of the average day.

Everyone	Employed	White	Age 15-24	H.S. grads	No children
Men	Unemployed	Black	Age 25-64	Bachelor's	One child
Women	Not in lab...	Hispanic	Age 65+	Advanced	Two+ children



Inspire / Tell a Story



Hans Rosling, TED 2006

Visualization

- To convey information through visual representations

Map

Clarify

Record

Interact

Abstract

Communicate

Discover

Inspire

Goals

- Insight and analysis
 - Extract the information content
 - Make things/coherences visible that are not apparent
 - Analyze the data by means of the visual representation
- Communication
 - Allow the non-expert to understand
 - Present specific information in a way that all of us understand
 - Guide the expert into the right direction
- Exploration
 - Interactively control and drive your application
 - Use the visual representation to understand the phenomena as soon as possible
- “The purpose of computing is insight not numbers”
(Hamming 1962)

What is Visualization?

- What?
- Why?
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- How?

Information Explosion

Google Reader (1000+)

Home

- All Items (1000+)
- Starred items
- Trends
- Your shared items
- Friends' shared items (78)

Home

A look at what's new

Data Mining: Text Mining, Visualization and Social Media (2)

- Wired - The Secret Life of a Blog Post
- TechMeme - Beyond the List

Subtraction (2)

- The Host with the Most
- Bought and Paid For

Calvin and Hobbes (Unofficial) (2)

- Calvin and Hobbes for January 26, 2008
- Calvin and Hobbes for January 25, 2008

[daily dose of imagery] (2)

- m Mozart's house
- corner streetcar

Top Recommendations

- JMLR
- Lightroom-Blog.Com
- decor8

Recently starred

- How to Shave Ten Hours Off Your Work Week
- Sensor Size and Depth of Field from O'Reilly Digital Media Blog

Tips and tricks

Have your own blog? You can display your shared items in your blog as a "clip".

Wikipedia

English Free Encyclopedia 2 192 000+ articles

Deutsch Die freie Enzyklopädie 697 000+ Artikel

Polski Wolna encyklopedia 463 000+ haseł

Nederlands De vrije encyclopedie 403 000+ artikelen

Português A enciclopédia livre

Español la enciclopedia libre 325 000+ artículos

digg

News, Videos, Images

- Barack Obama wins South Carolina Democratic primary
- Driver Who Killed Teen Sues for Damaged Vehicle
- The naked truth about women in Russian politics
- The Terrible Secret Behind the Worlds Greatest Card Trick
- How to Reverse a Car Out of a Moving Plane

Look beneath the surface of Digg

Top in All Topics

- The Internet Was a Real Pile of Shit in 1990
- New Jersey Douches Bags!
- Scariest airport EVER [PIC]
- But how? The only clues were the pictures on the camera
- Seth MacFarlane Written Short re: Writers Strike Negotiation
- URGENT: Oppose Telecom Immunity and Contact Your Senator
- Scientists Build First Man-Made

twitter

Home Profile Find People Settings Help Sign out

What are you doing? 140

Latest: Check out this SlideShare Presentation : Oooooold http://tinyurl.com/5rttme about 1 month ago

hpfinger

14 following 0 followers 0 updates

Home

@Replies

Direct Messages 0

Favorites

Everyone

Following 7 new follower requests!

Device Updates

guykawasaki Ancestor For All Animals Identified http://adjix.com/awh9 Also see http://science.alltop.com/about 1 hour ago from Adjix

guykawasaki RT @ssetela: screen capture illustrating why Contextual Advertising sometimes sucks: http://twitpic.com/1812f Kawasaki Steel? about 1 hour ago from TweetDeck

guykawasaki RT @roehmholdt: Funny comic referencing my mantra belief: http://bit.ly/fWZE about 1 hour ago from TweetDeck

timoreilly RT @bobgourley: Blogging: The Future of Cyber Security and Cyber Conflict http://tinyurl.com/asgj4b about 1 hour ago from tuhit!

guykawasaki Wii Check-up Channel will link you to health professionals http://adjix.com/tr93 Also see http://gaming.alltop.com about 2 hours ago from Adjix

presentationzen My new Starbucks tumbler from Osaka http://is.adjixSA about 2 hours ago from Postomous

facebook

Barack Obama for President in 2008

Information

Group Info

Name: Barack Obama for President in 2008

Type: Student Groups - Political Groups

Description: In July 2006, we began asking of students across the country: "Will you join this group to help encourage Senator Barack Obama of Illinois to run for President of the United States in 2008?"

Over 60,000 young Americans responded to the call.

On February 10, 2007, Senator Barack Obama declared, "I stand before you today to announce my candidacy for President of the United States."

Congratulations to Senator Obama! Congratulations to all of us!

Students for Barack Obama, a group formed as a result of the dedication to Senator Obama displayed by students on Facebook, is now thrilled to embark upon the second part of our mission: Electing Senator Barack Obama President of the United States in 2008.

To learn more or to get involved, please e-mail: info@studentsforbarackobama.com

Students for Barack Obama is currently accepting applications for the position of Local Director at

facebook

Barack Obama for President in 2008

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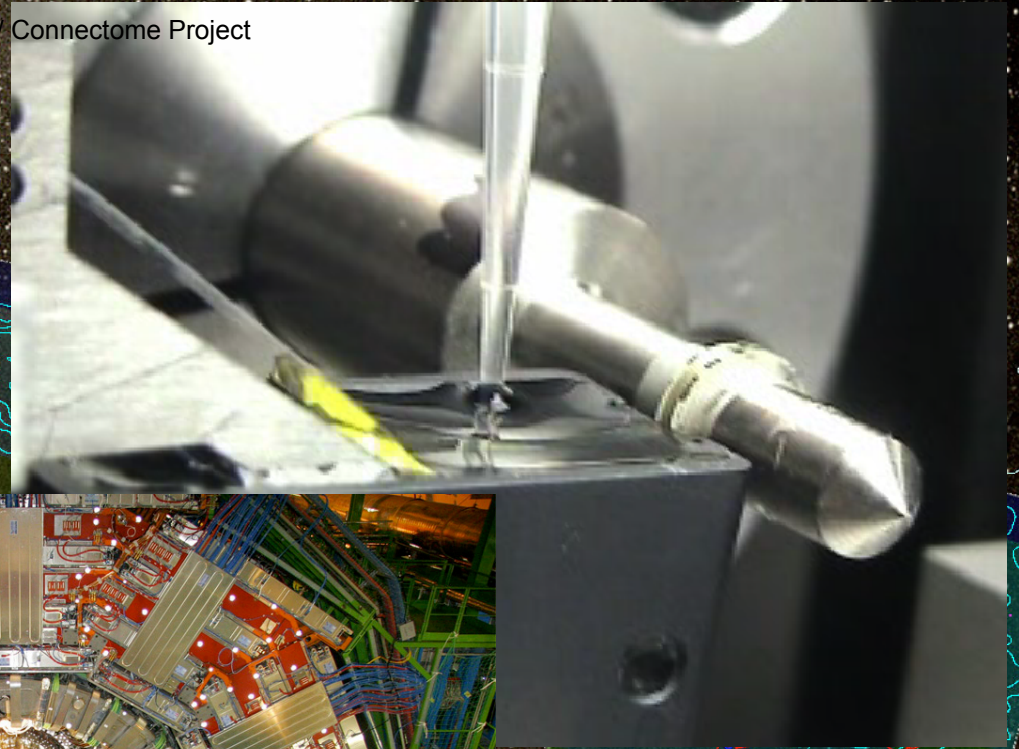
40

Instrument Data Explosion

Sloan Digital Sky Survey



ATLUM / Connectome Project



Maximilien Brice, © CERN

“The Industrial Revolution of Data”

Joe Hellerstein, UC Berkeley



Limits of Cognition



Daniel J. Simons and Daniel T. Levin, Failure to detect changes to people during a real world interaction, 1998

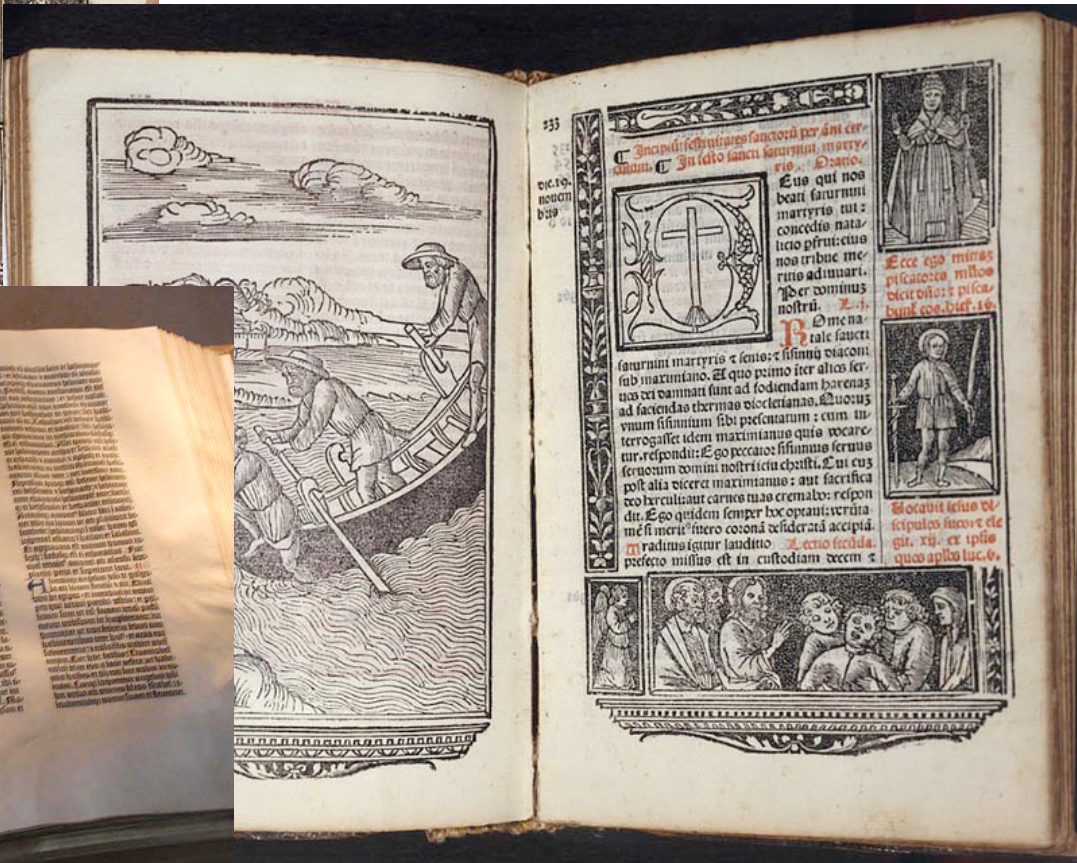
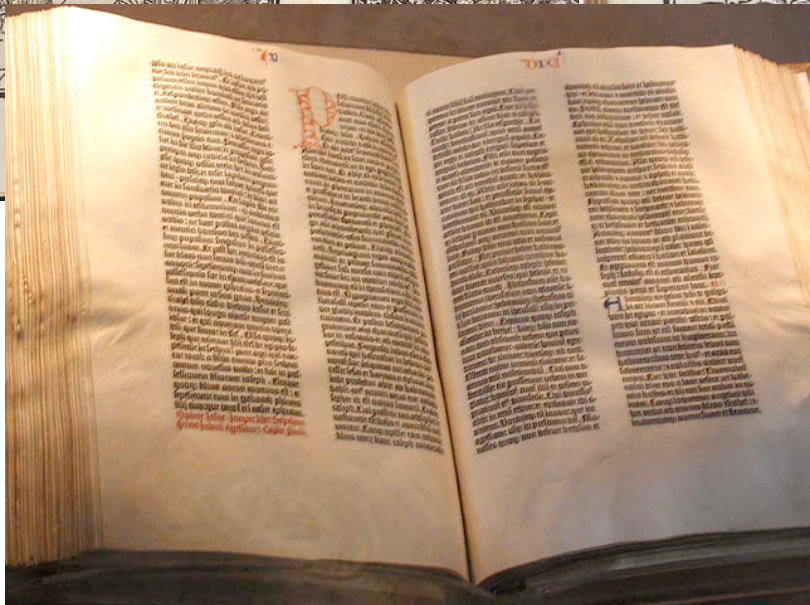
“It is things that make us smart.”

Donald Norman



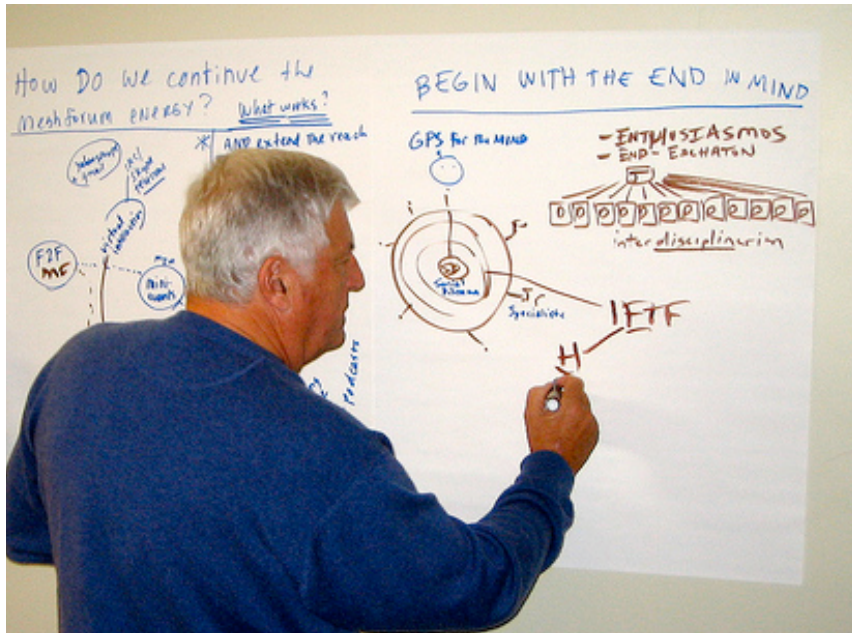
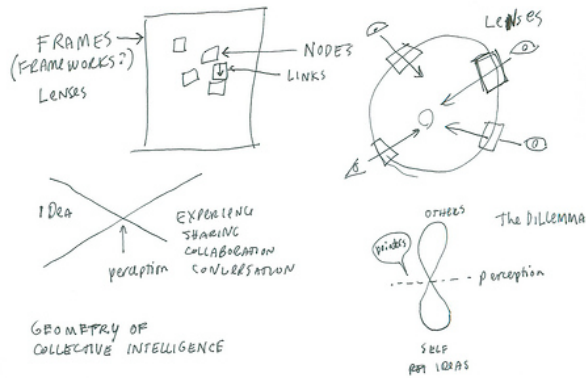
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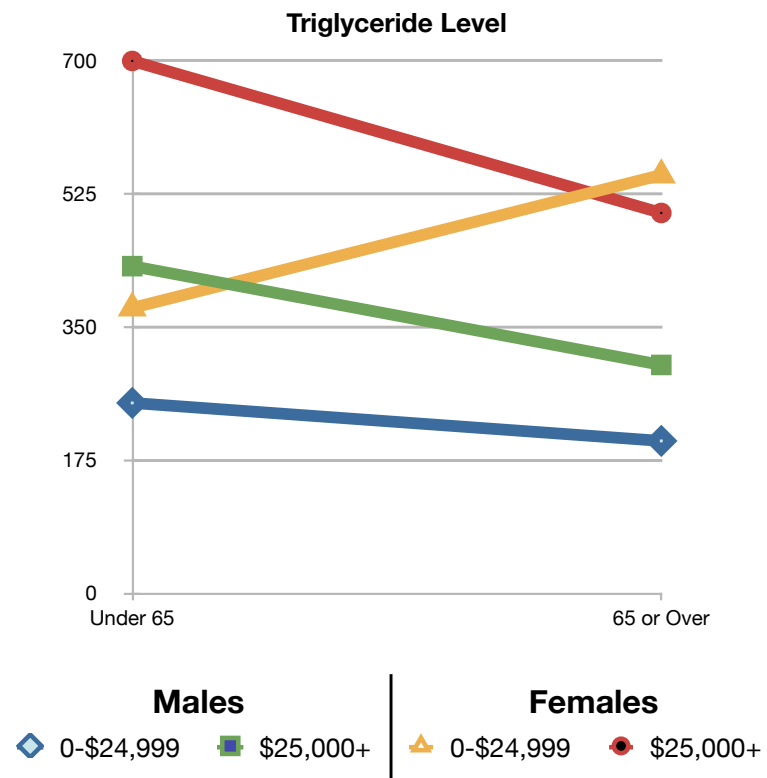


Mental Queries

Which gender or income level group shows different effects of age on triglyceride levels?

Income Group	Males		Females	
	Under 65	65 or Over	Under 65	65 or Over
0-\$24,999	250	200	375	550
\$25,000+	430	300	700	500

Visual Queries



Visualization

- Helps us think
- Reduces load on working memory
- Offloads cognition
- Uses the power of human perception

What is Visualization?

- What?
- Why?
- Who?
- How?

Our team

- Asil: asil.cetin@univie.ac.at
- Christian: christian.knoll@univie.ac.at
- Florian: Florian.Windhager@donau-uni.ac.at
- Laura: laura.koesten@univie.ac.at
- Tim: timothee.schmude@univie.ac.at
- Torsten: torsten.moeller@univie.ac.at
- Tutor Bernhard:
bernhard.jordan@univie.ac.at
- Visualization and Data Analysis (VDA) Lab

About You

What is Visualization?

- What?
- Why?
- Who?
- How?

Goals of this course

- Learn basic design and perceptual principles
- Explore different visualization methods
- Implement an interactive visualization

Educational Goals

- Visualization specialist ... practitioner ... novice++
- Theory
 - Classification
 - Algorithms
 - Visual design
- Application
 - Methods
 - Visualization packages
- Experience
 - How to visualize something in the best way

Outline

- Fundamentals
 - What is vis?
 - Design principles
 - The visualization process
 - Data abstractions + Task abstractions
 - Design studies
- Visual Encodings + Algorithms
 - Basic visual encoding principles
 - Tables
 - Spatial data
 - Networks / trees
 - Time-varying data
 - 3D scalar fields (isosurfaces + volume rendering)
 - 3D vector and tensor field visualization
- Perception + Cognition
 - Color
 - Aggregation: Items + Attributes
 - Space / Order; Multiple views
 - Depth / Occlusion; Focus + Context
- Interaction
- Evaluation

Syllabus

See Web Page

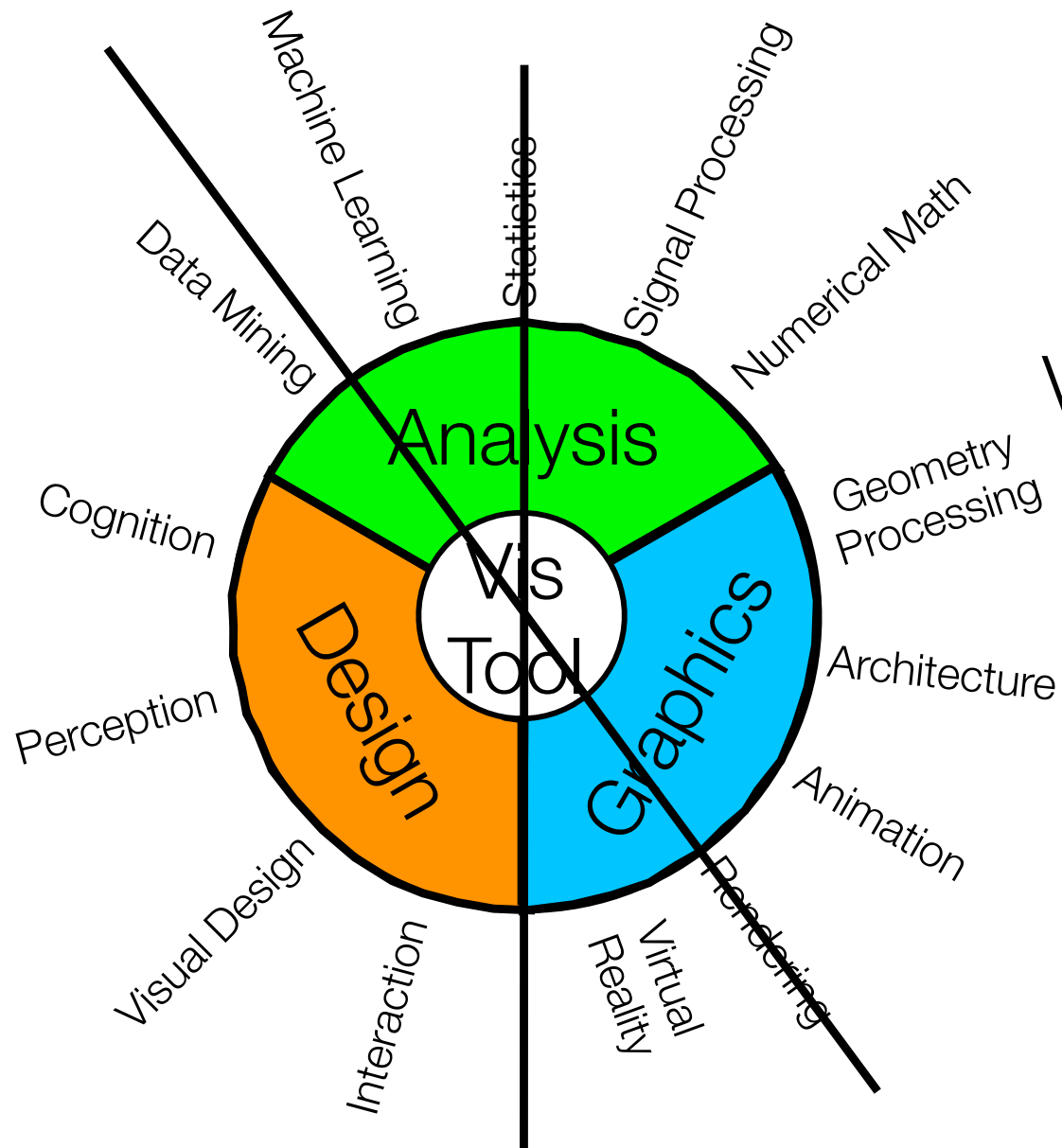
<http://vda.cs.univie.ac.at/Teaching/Vis/23s/>

Related Fields

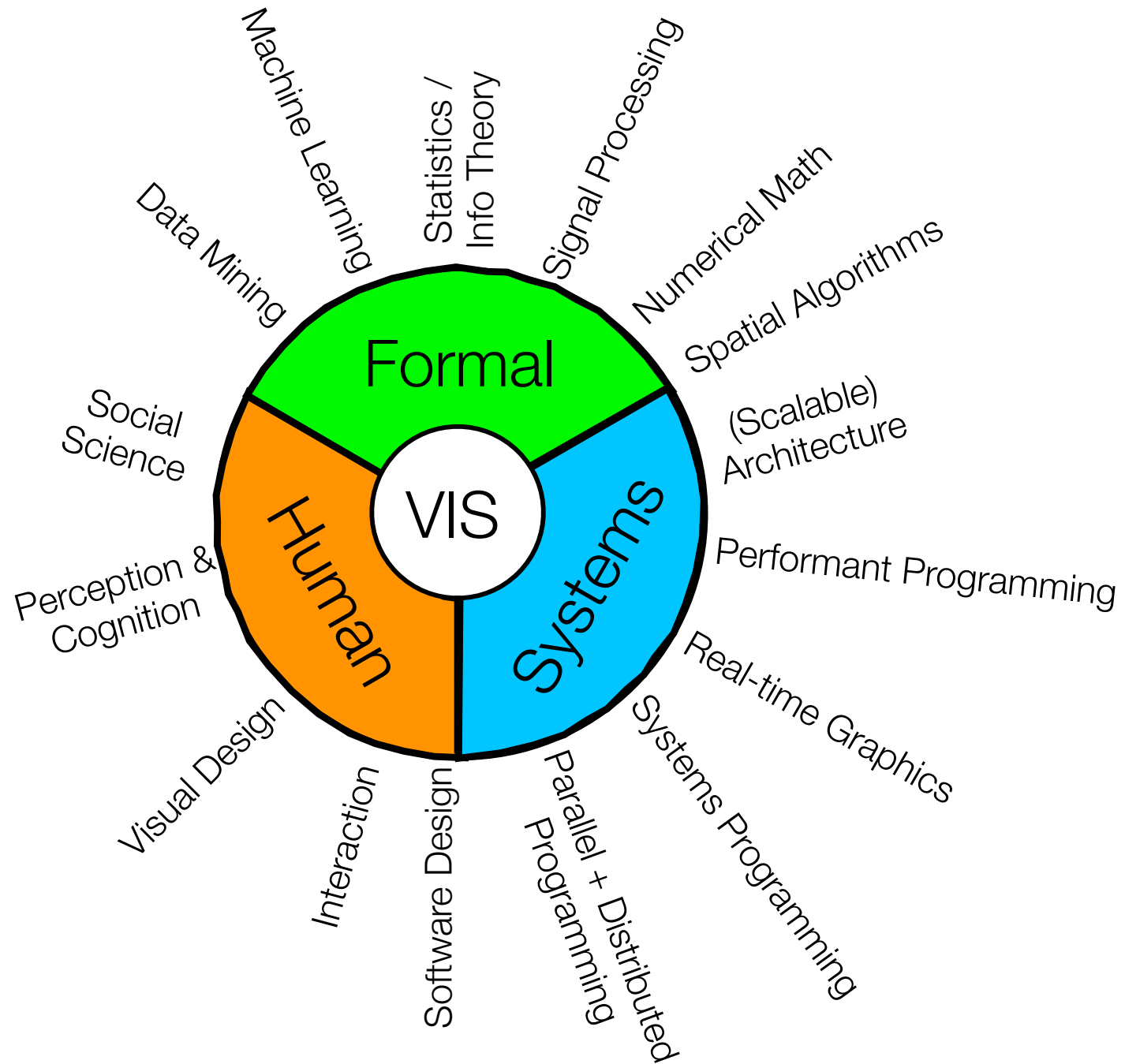
“Visual Analytics”

“Scientific Visualization”

“Information Visualization”



Related Fields



Visualization Flavors

- Spatial Data Vis (aka: Scientific visualization)
 - User Interfaces
 - Data representation/processing
 - Algorithms
 - Visual representations
 - Mainly: *Continuous* models + Mathematical approach
- Non-Spatial Data Vis (aka: Information visualization)
 - Abstract data
 - WWW documents
 - File structures
 - Arbitrary relationships
 - ...
 - Mainly: *Discrete* models + Human-Centered Design

Textbook

- Tamara Munzner, **Visualization Analysis & Design: Abstractions, Principles, and Methods**, CRC Press, 2014

Further Reading

- Primary book on perception and visual design:
 - C. Ware: **Information Visualization: Perception for Design**, Elsevier/Morgan Kaufmann, (1st ed. 2000, 2nd ed. 2004)
 - C. Ware: **Visual Thinking for Design**, Morgan Kaufmann, 2008
- Primary book(s) on Spatial Data / Volume Graphics
 - C.D. Hansen, C.R. Johnson (eds.):
The Visualization Handbook, Elsevier, 2005
 - K. Engel, M. Hadwiger, J.M. Kniss, C. Rezk-Salama, D. Weiskopf,
Real-time volume graphics, AK Peters, 2006
- Primary book(s) on Non-Spatial Data
 - Ch. Chen, **Information Visualization: Beyond the Horizon**, Springer Verlag, 2004
 - Card, Mackinlay, and Shneiderman, (eds.), **Readings in Information Visualization: Using Vision To Think**; Morgan Kaufmann 1999

Further Reading

- References:
 - G.M. Nielson, H.Hagen, H. Müller: **Scientific Visualization**, IEEE CS Press, Los Alamitos, 1997
 - W.J. Schroeder, K.W. Martin, B. Lorensen: **The Visualization Toolkit: An Object-Oriented Approach to 3D Graphics**, 4th ed., Kitware, Clifton Park, 2006
 - **The Visualization Toolkit User's Guide**, 11th ed, Kitware, 2010
 - E.R. Tufte, **The Visual Display of Quantitative Information**, Graphics Press 1983
 - E.R. Tufte, **Envisioning Information**, Graphics Press 1990
 - E.R. Tufte, **Visual Explanations**, Graphics Press 1997⁶³

(Spatial) Visualization Tools

- Great / free:
 - VTK (The Visualization Toolkit) <http://www.vtk.org>
- Commercial tools:
 - Amira <http://www.amiravis.com>
 - AVS/Express <http://www.avs.com>
 - IDL <http://www.exelisvis.com/IntelliEarthSolutions/GeospatialProducts/IDL.aspx>
 - IRIS Explorer http://www.nag.co.uk/Welcome_IEC.asp
 - OpenDX (now open software): <http://www.opendx.org>

(Non-Spatial) Vis. Tools

- Tamara's resources page!
<http://www.cs.ubc.ca/~tmm/courses/533-11/resources.html>
- Free:
 - Processing <http://www.processing.org/>
 - Prefuse (java) <http://prefuse.sourceforge.net/>
 - D3 <http://alignedleft.com/work/d3-book>
 - Xgobi <http://www.research.att.com/areas/stat/xgobi/>
- Commercial tools:
 - Tableau <http://www.tableausoftware.com/>