

01. Introduction to Data Visualization

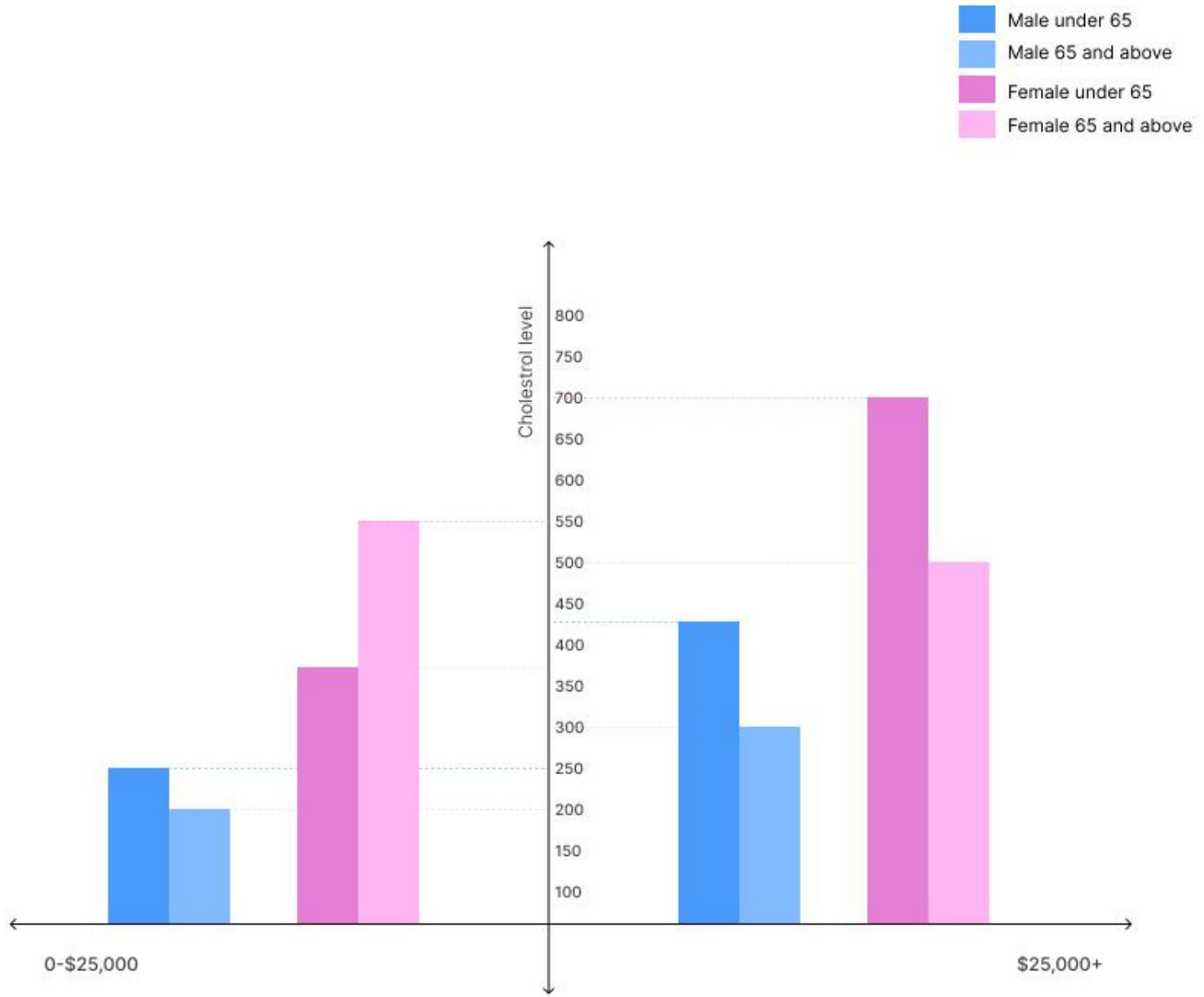
ID 413: Information Graphics and Data Visualization
Spring 2025

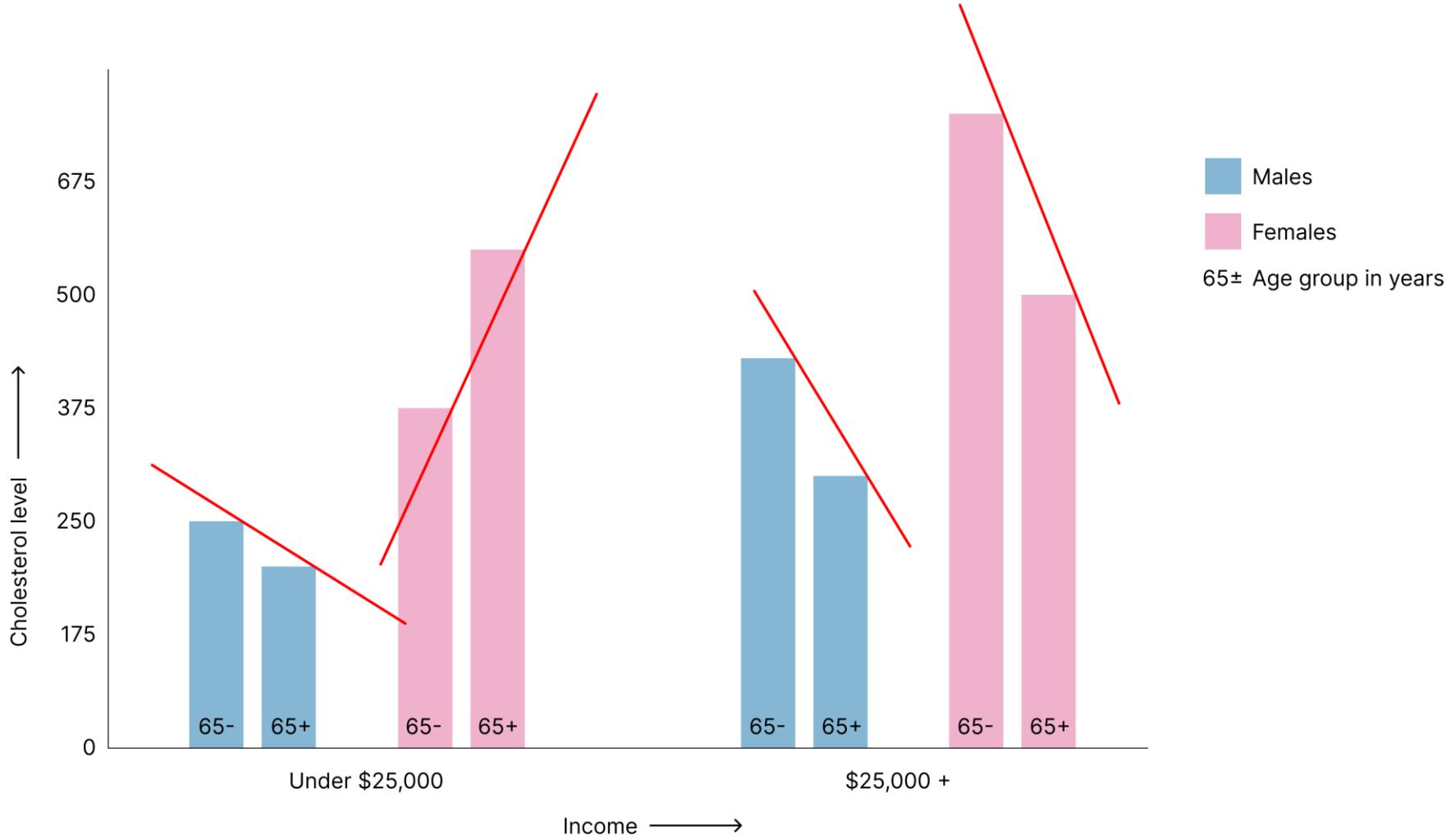
Venkatesh Rajamanickam (@venkatrajam)
venkatra@iitb.ac.in
<http://info-design-lab.github.io>

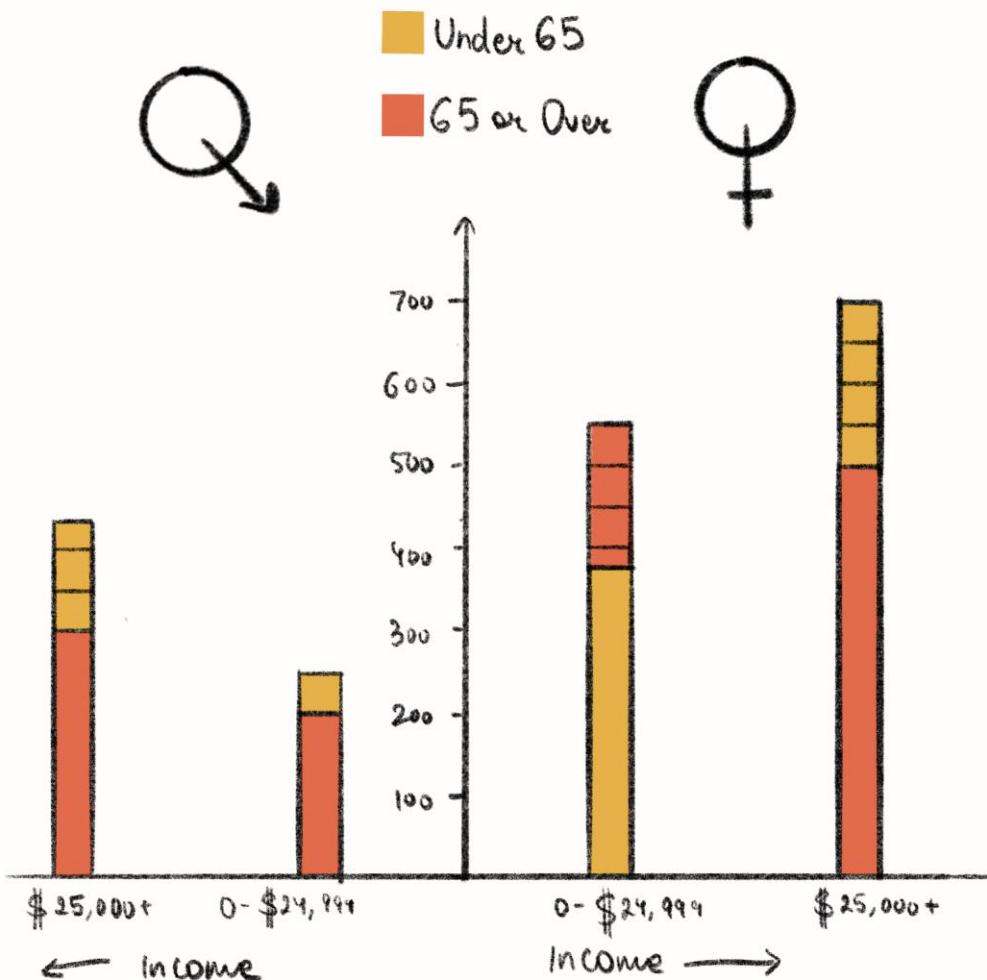
Visualize this!

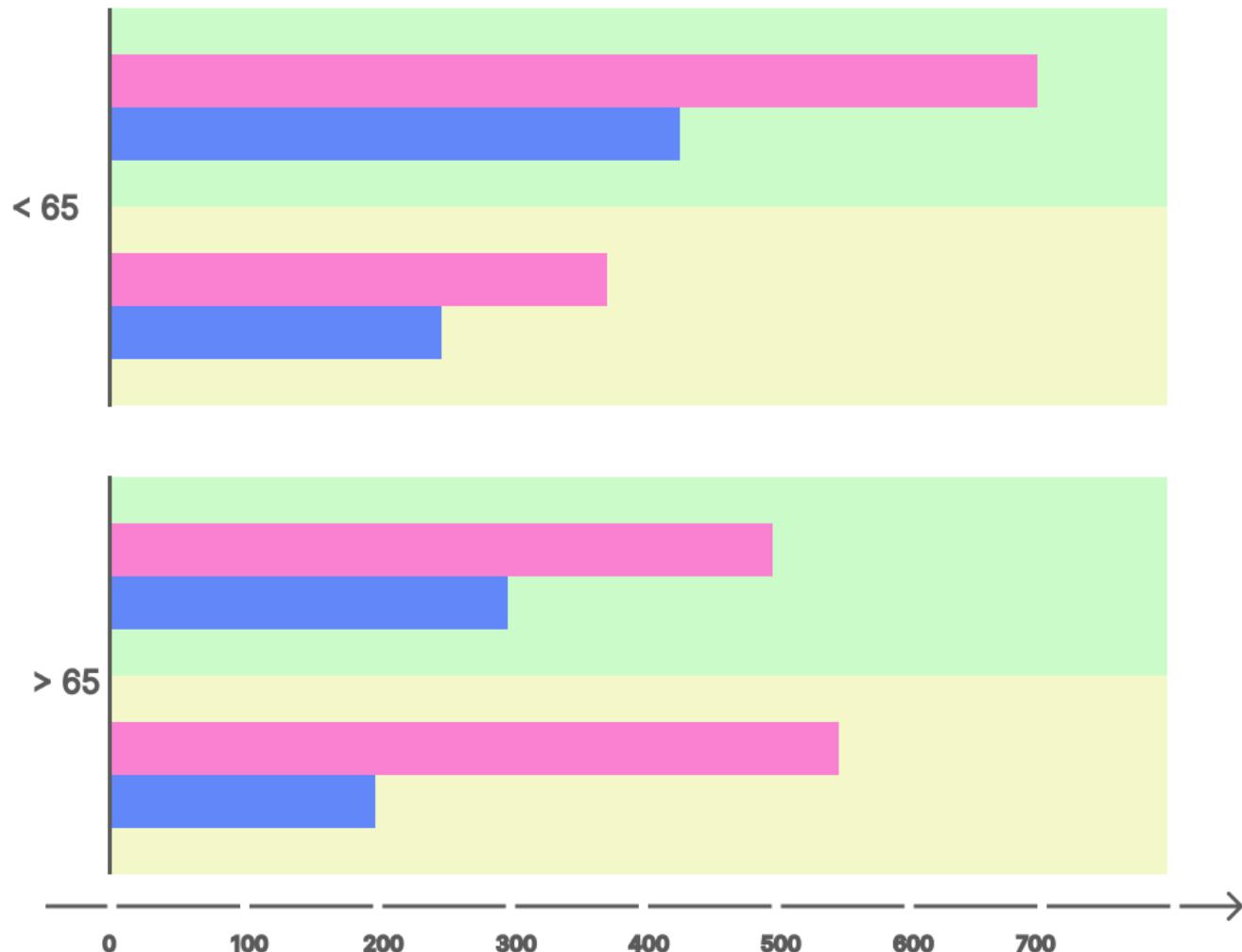
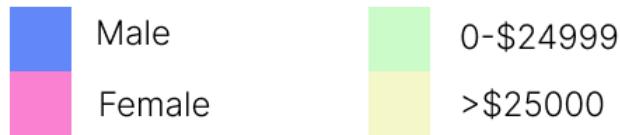
Which gender or income level group shows different effects of age on cholesterol levels?

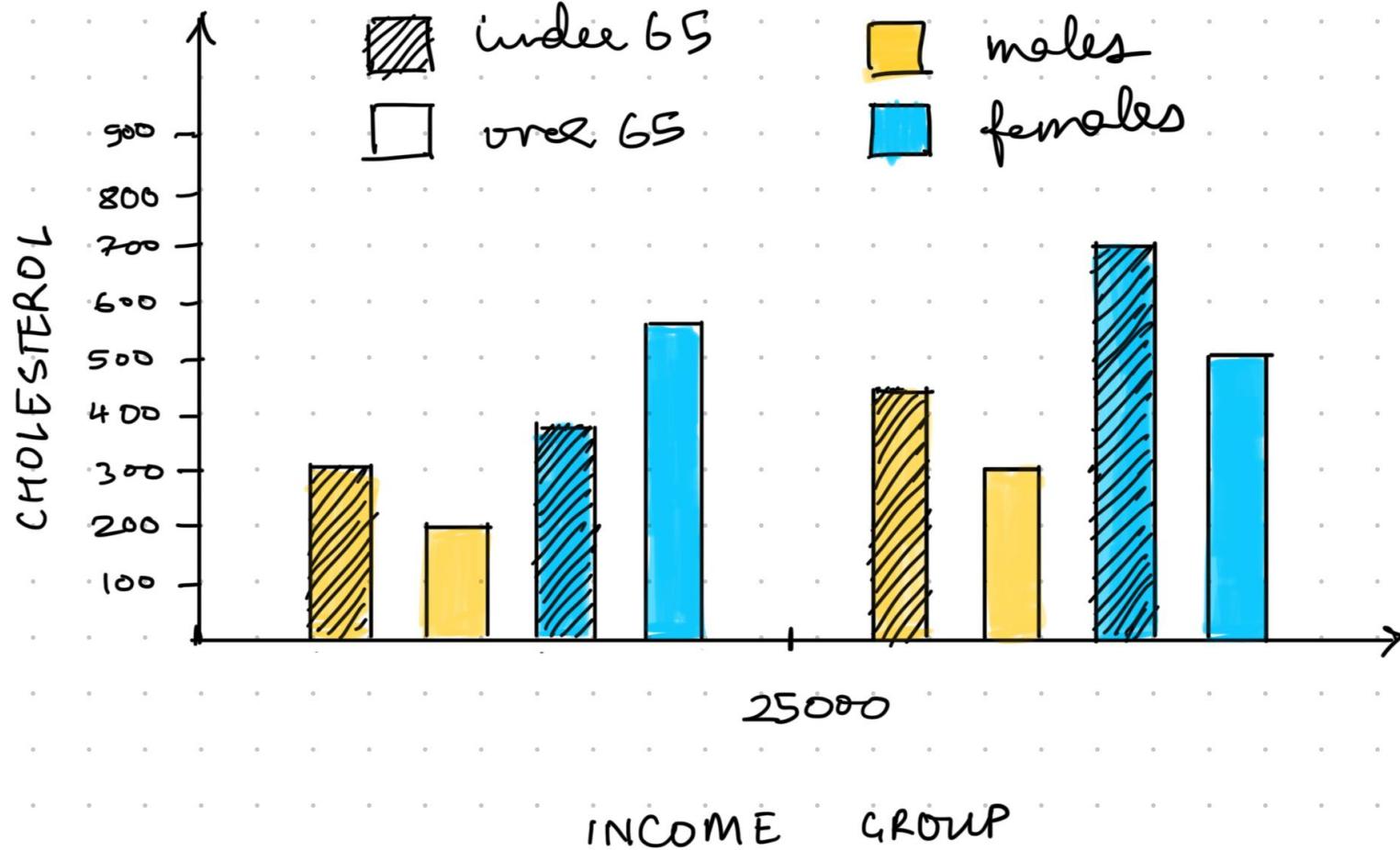
Income Group	Males		Females	
	Under 65	65 or Over	Under 65	65 or Over
0-\$24,999		250	200	375
\$25,000+		430	300	700





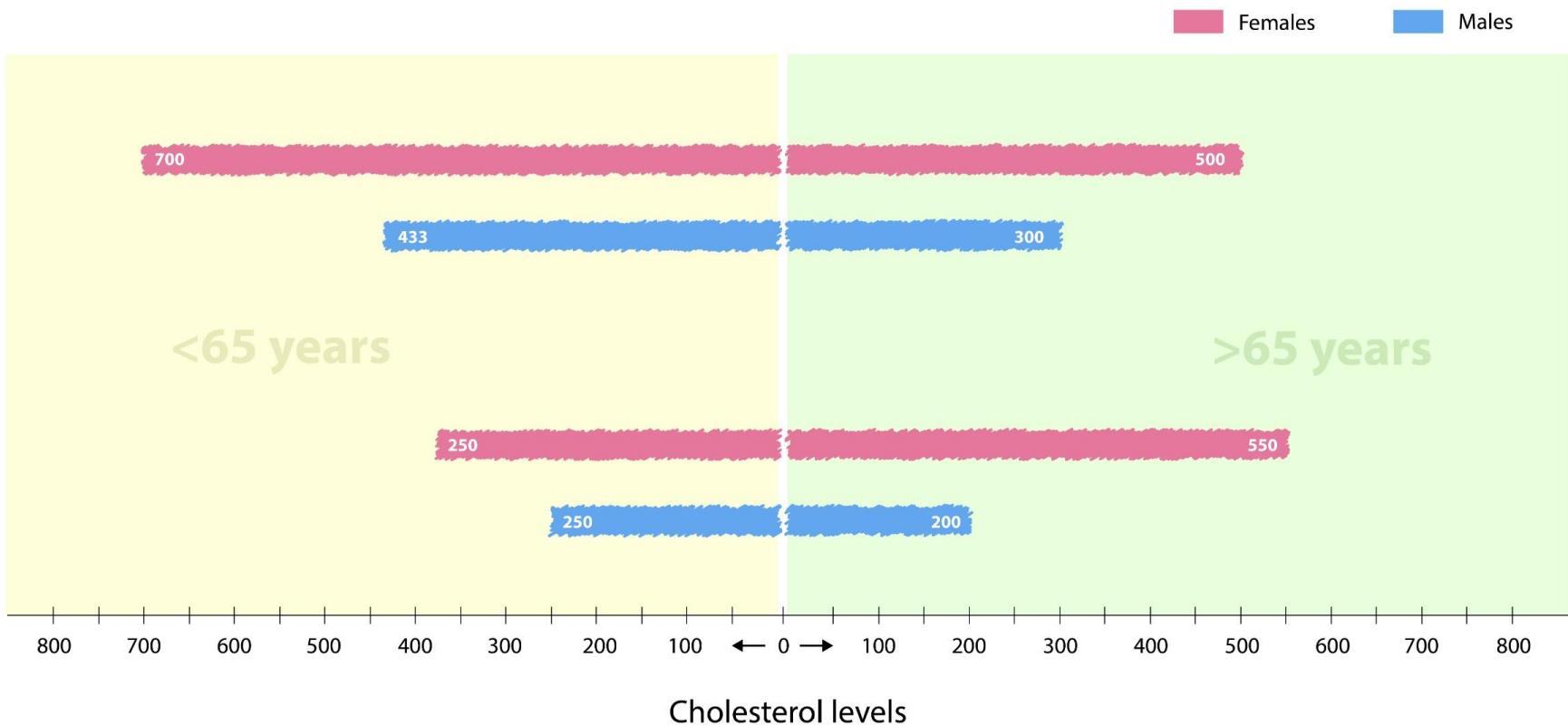




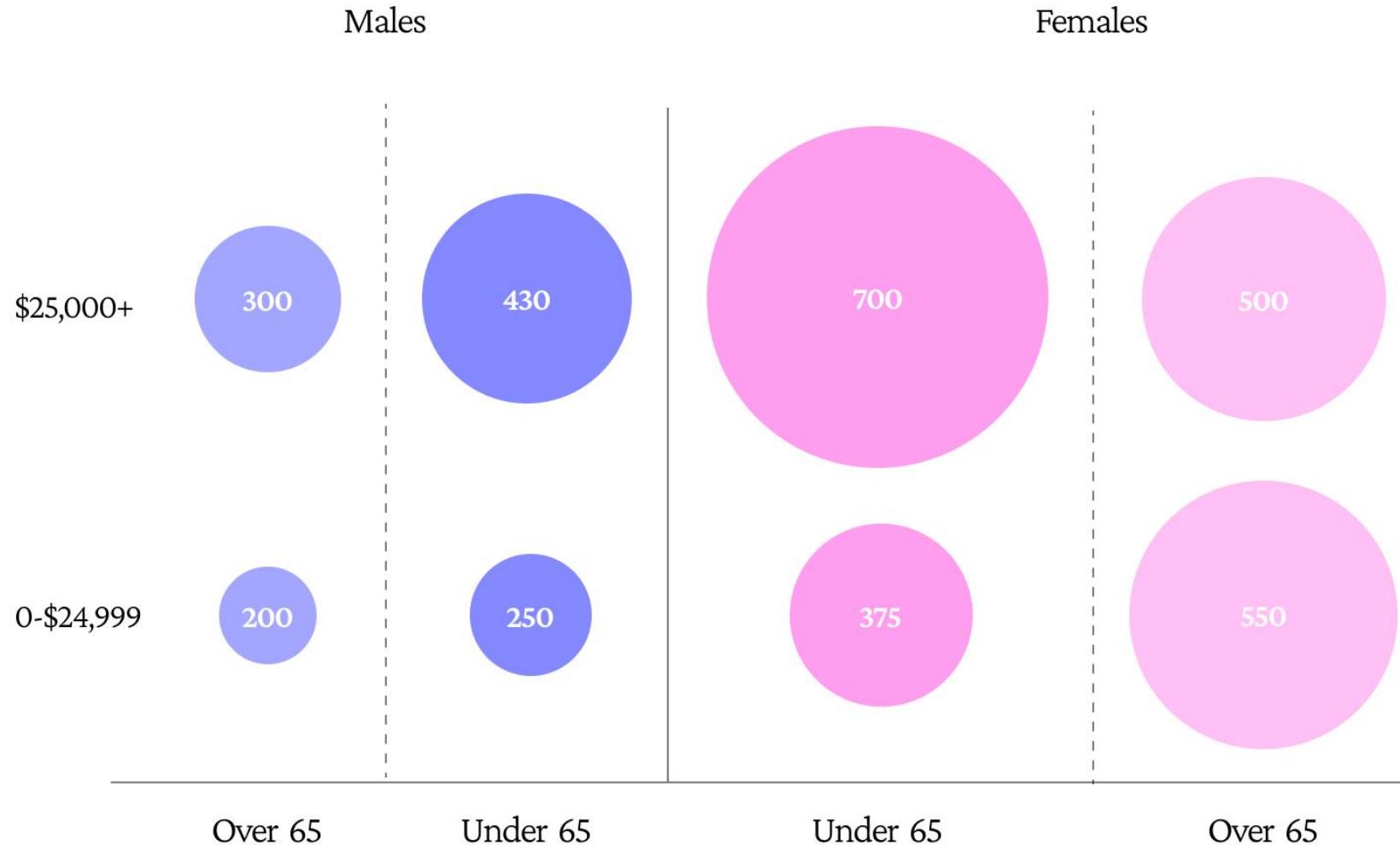
[Data Viz](#)

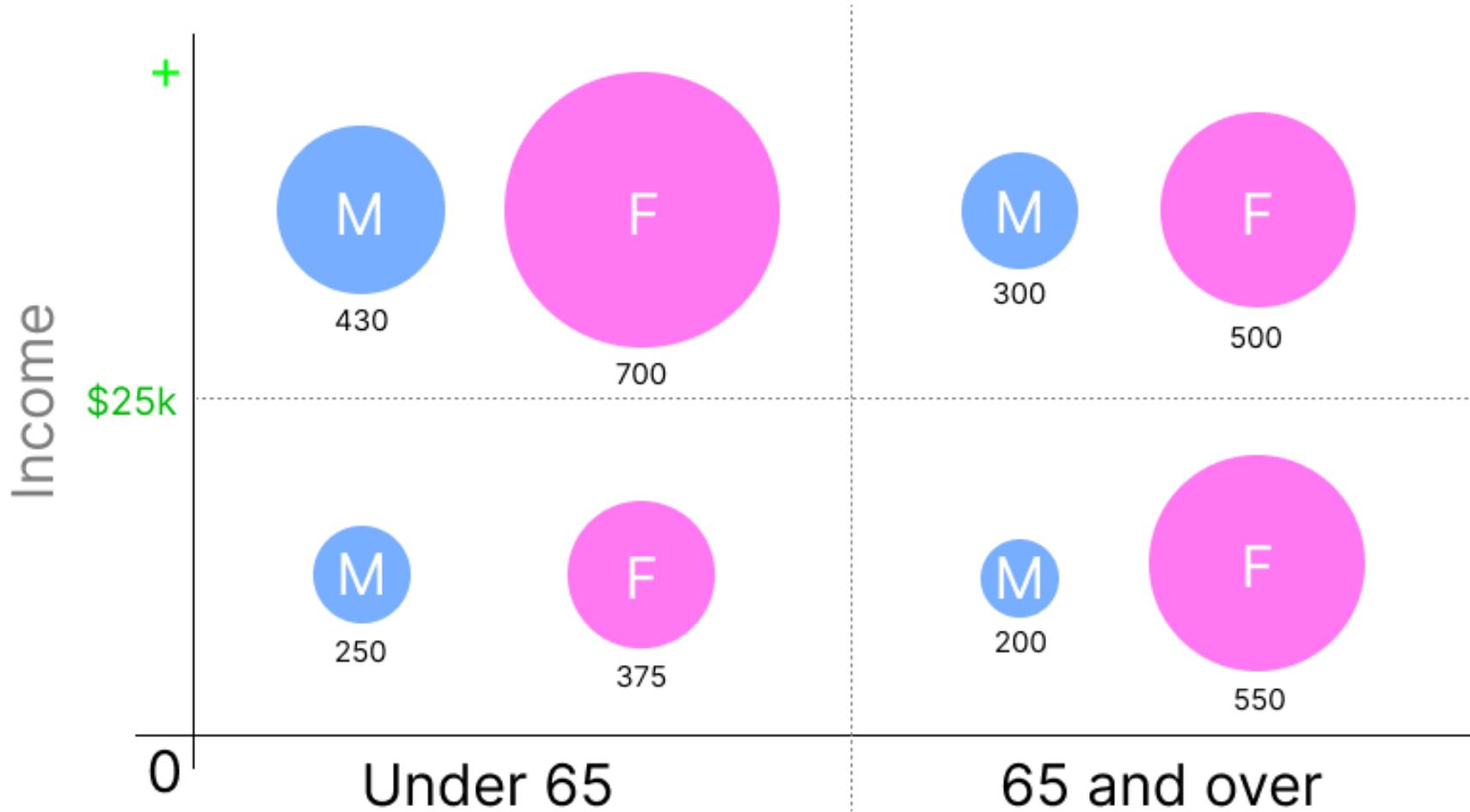
150%





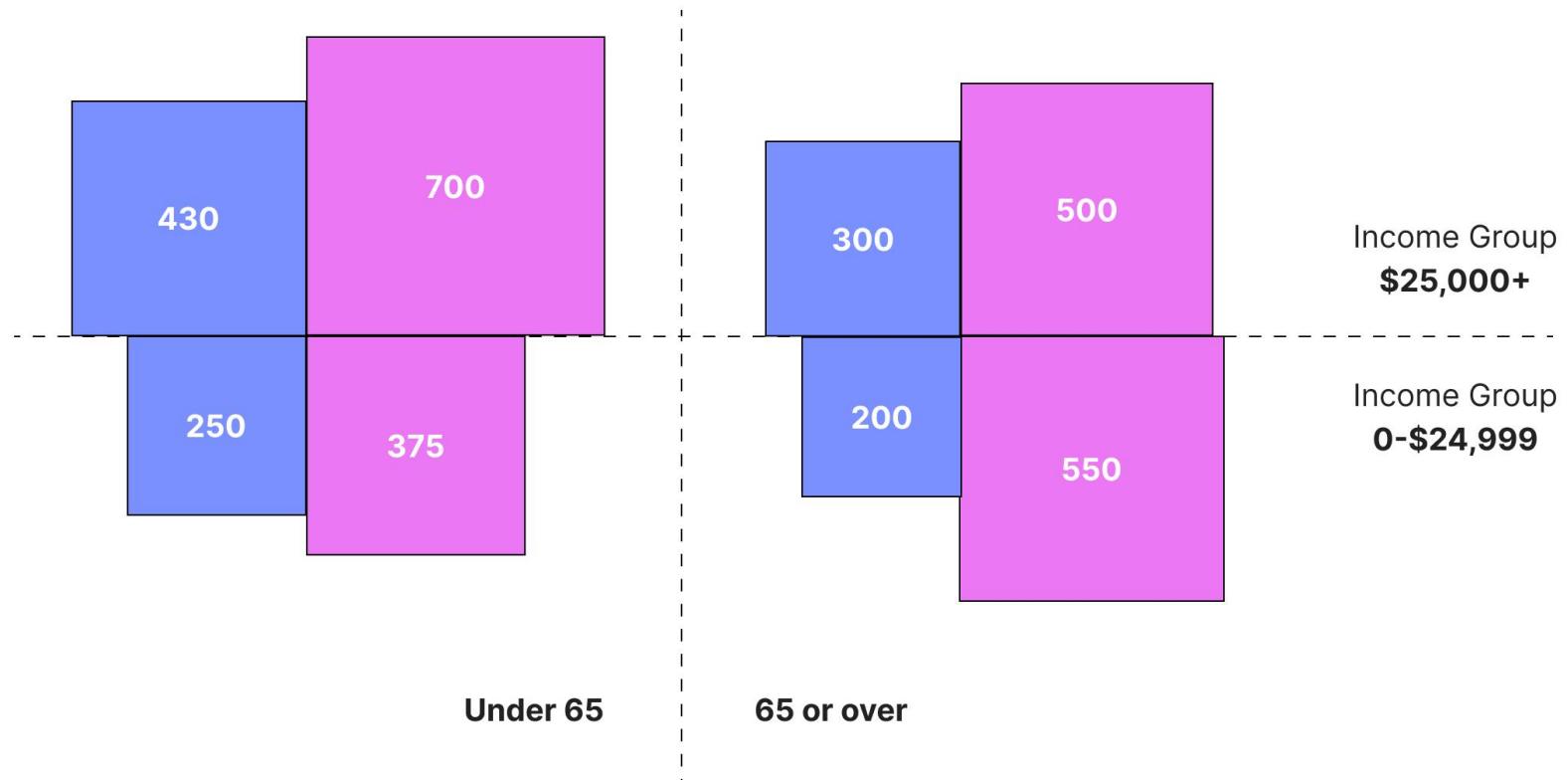
Cholesterol Level among males and females under and over 65 , high and low income

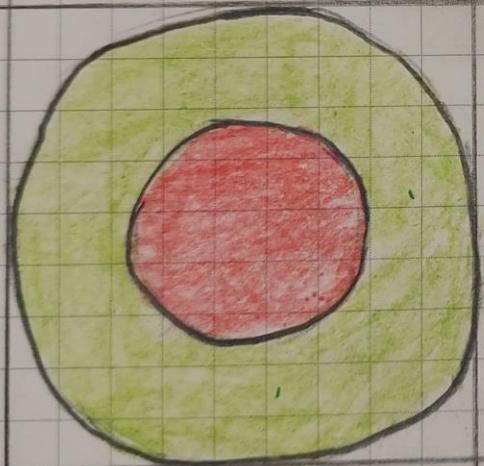
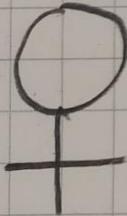
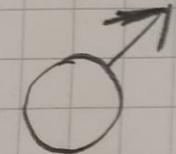




Number of people with cholesterol

■ Males
■ Females

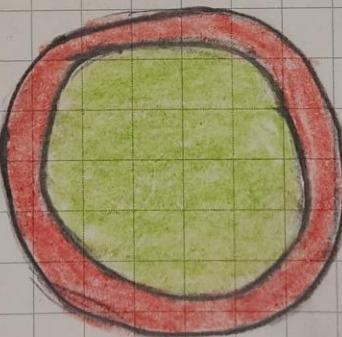




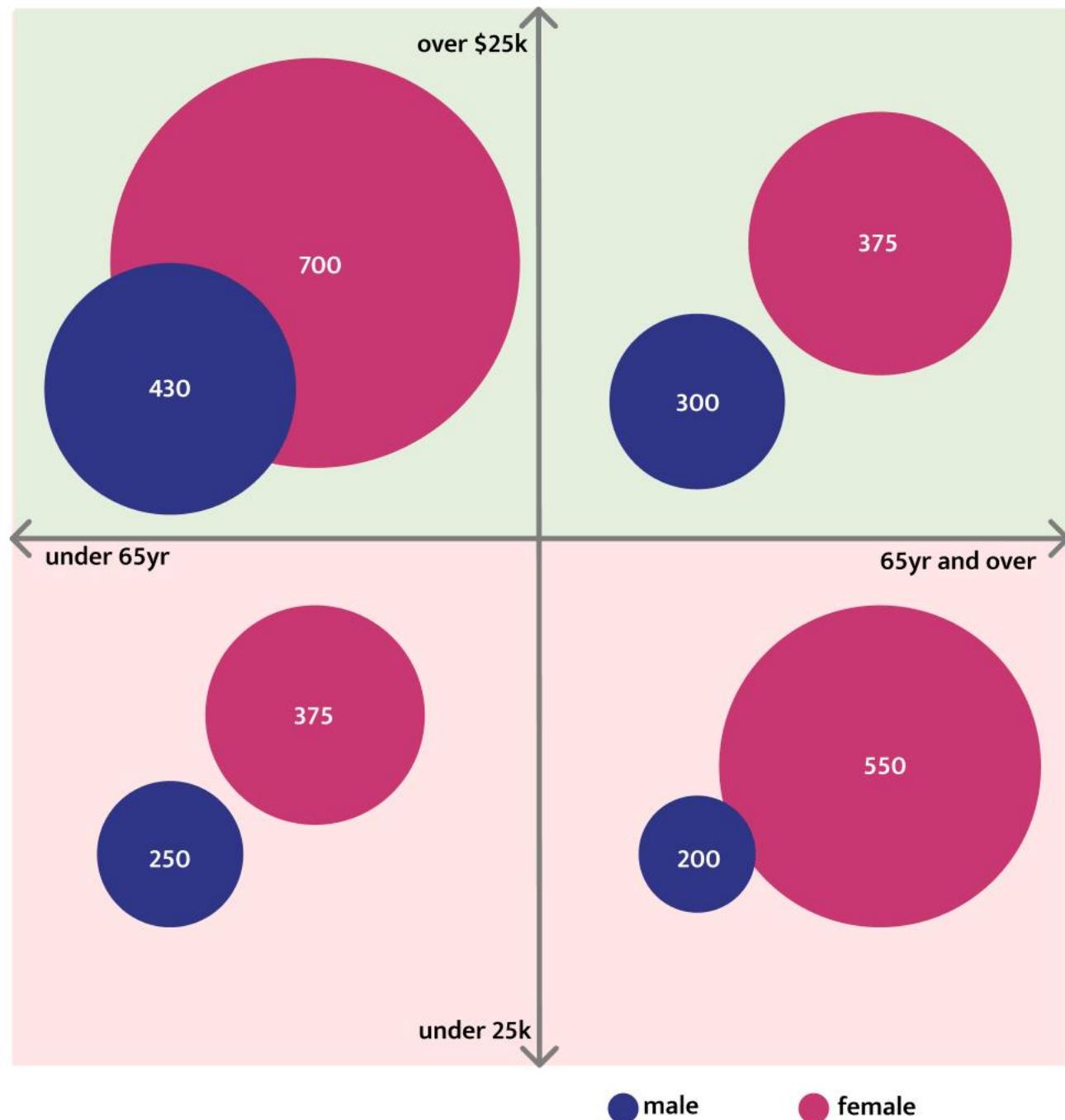
Under 65



65+

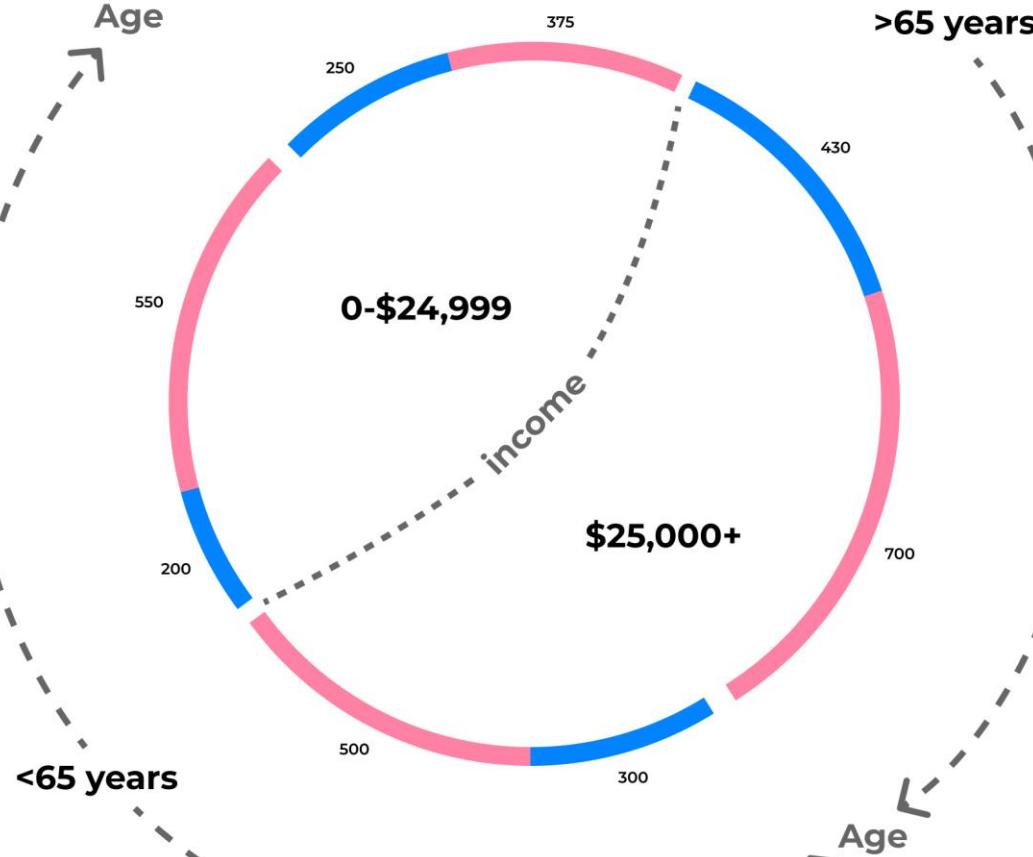


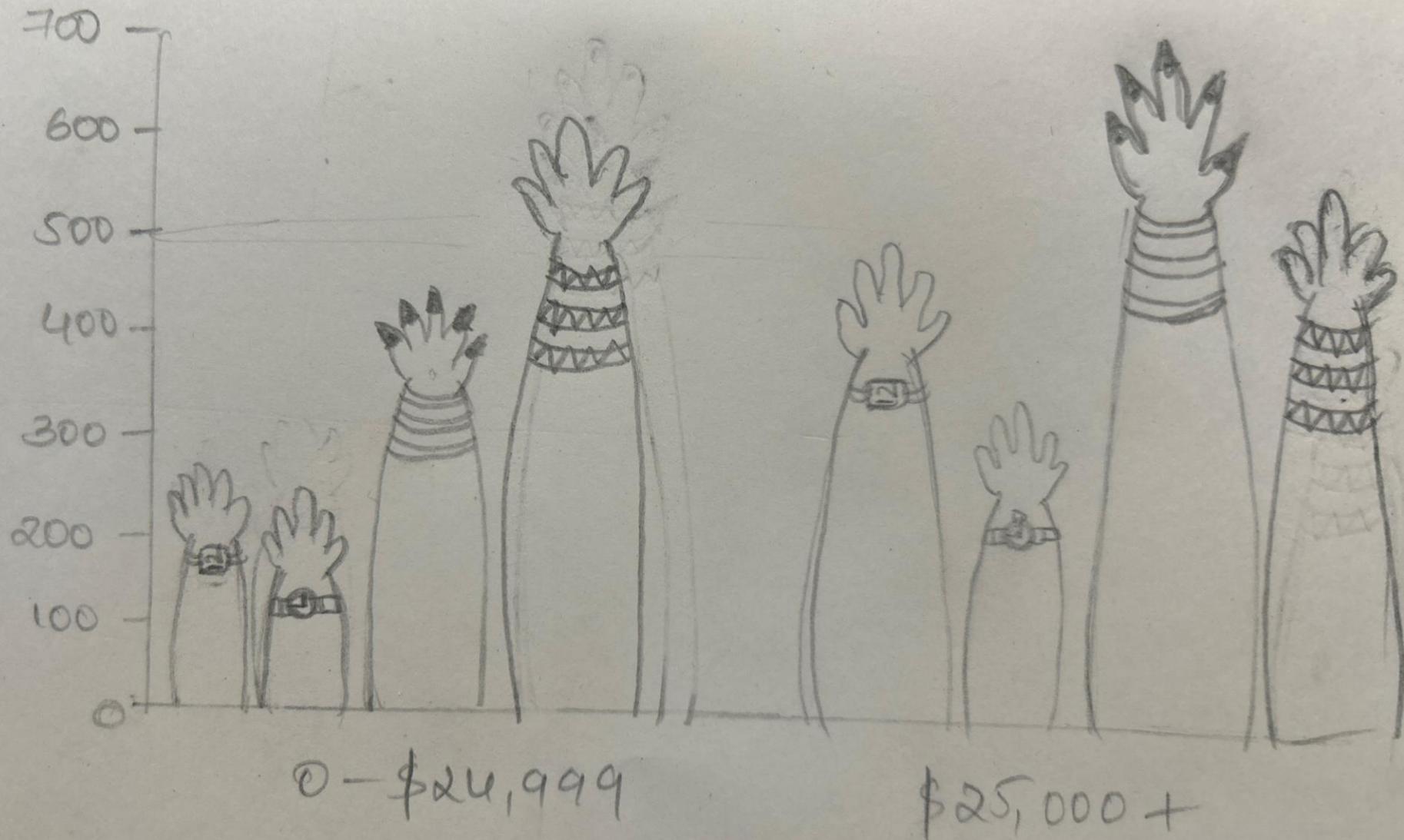
\$25,000+
\$0 - 24,999

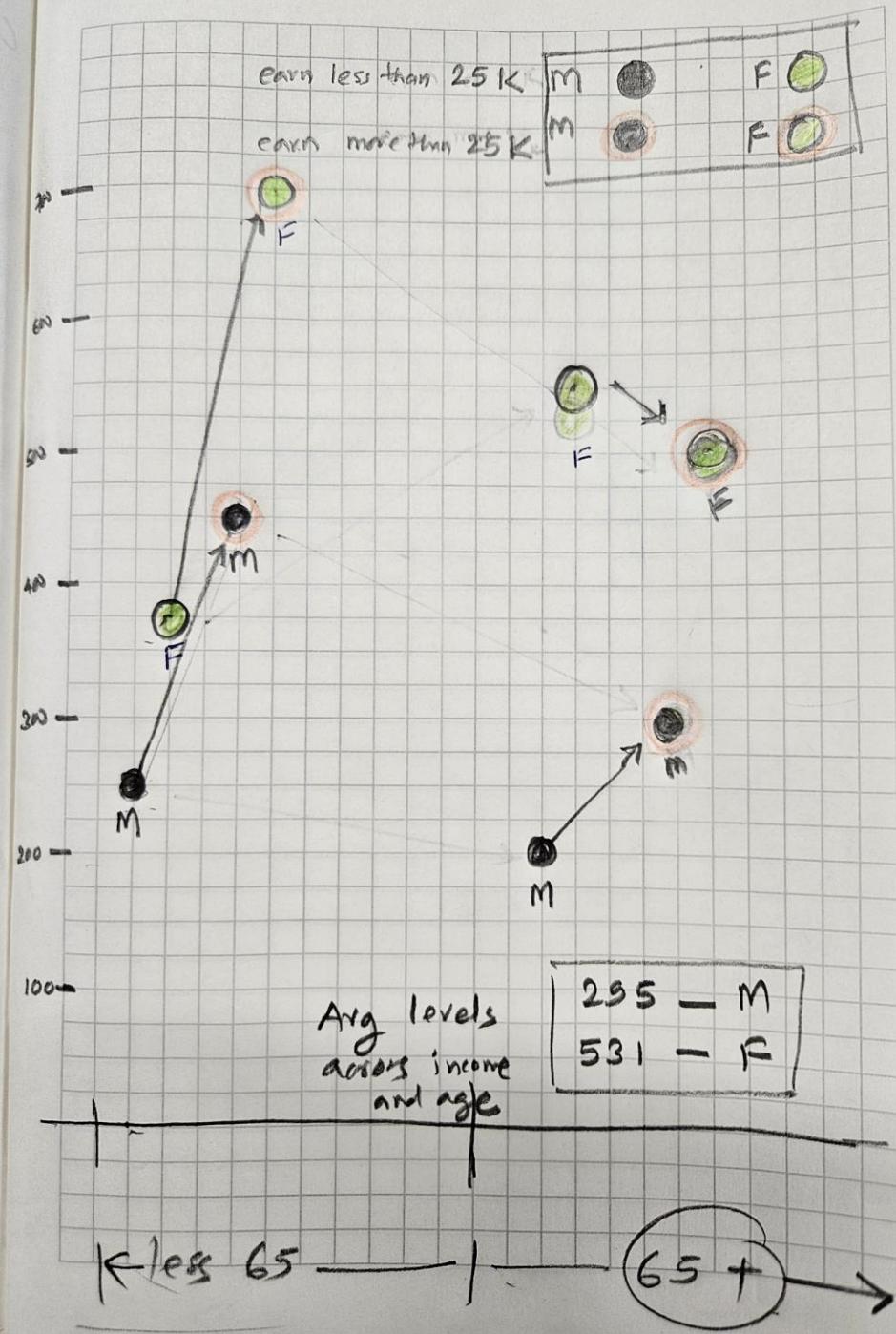


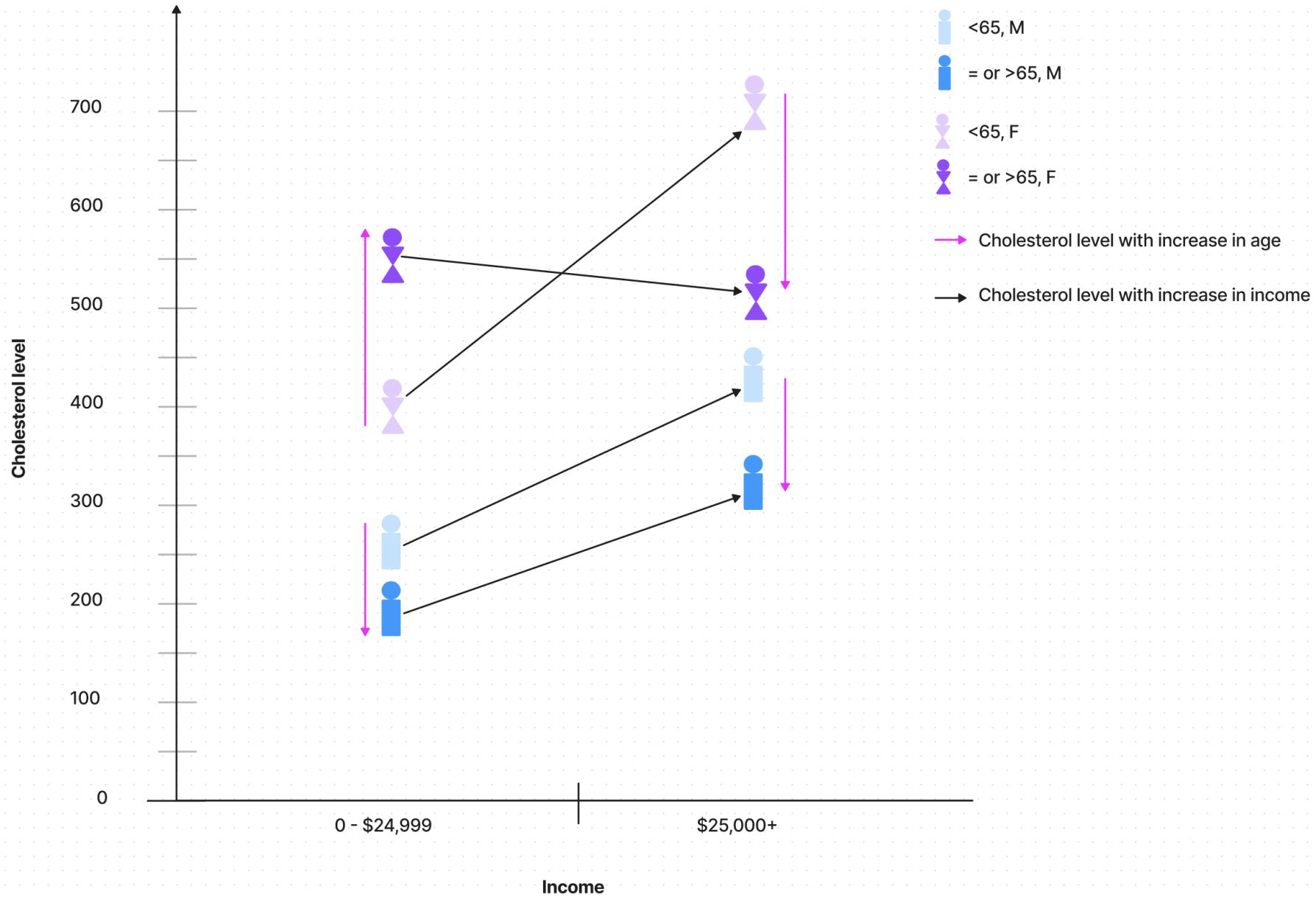
Cholesterol Level

Male Cholesterol Level
Female Cholesterol Level

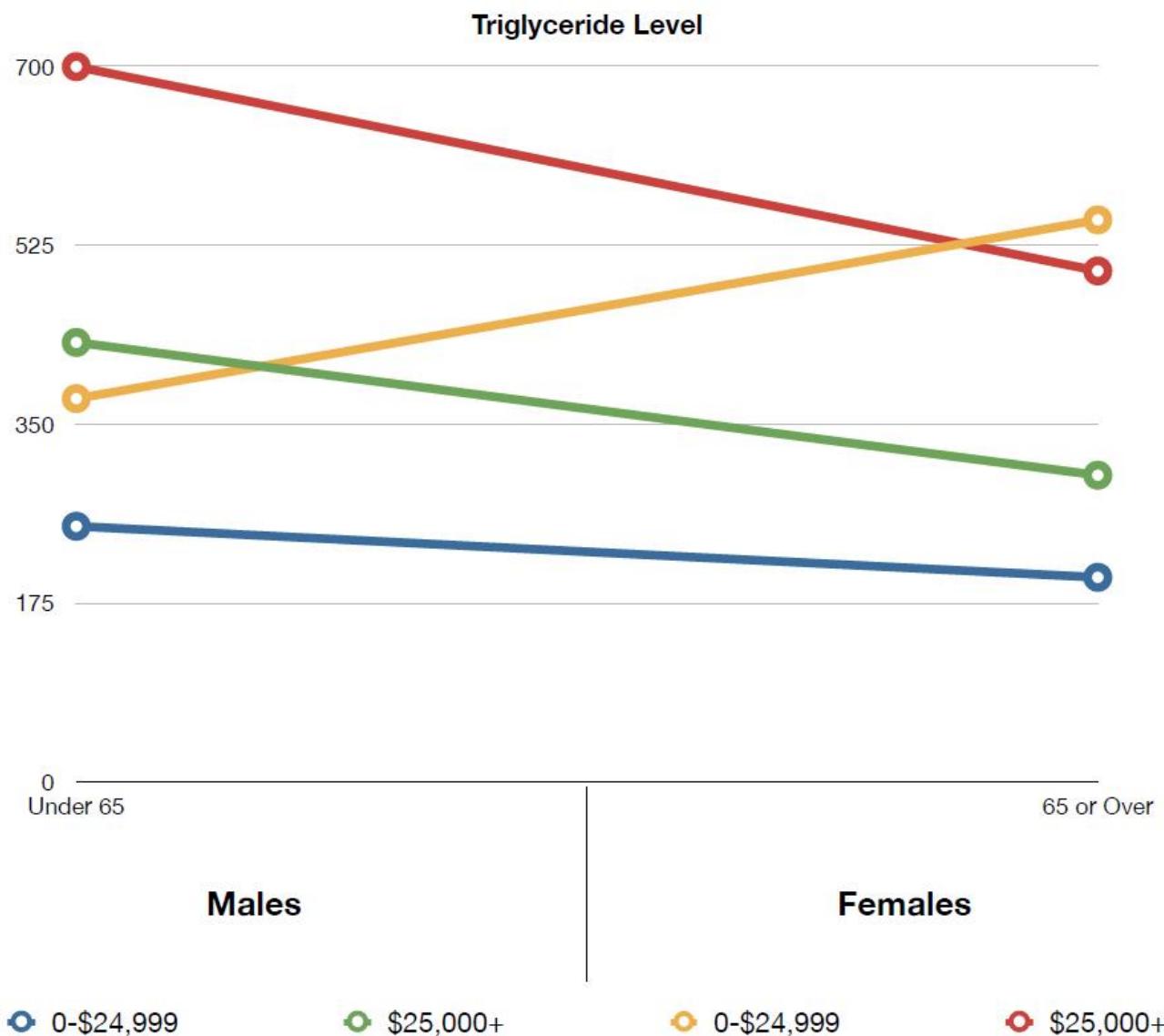


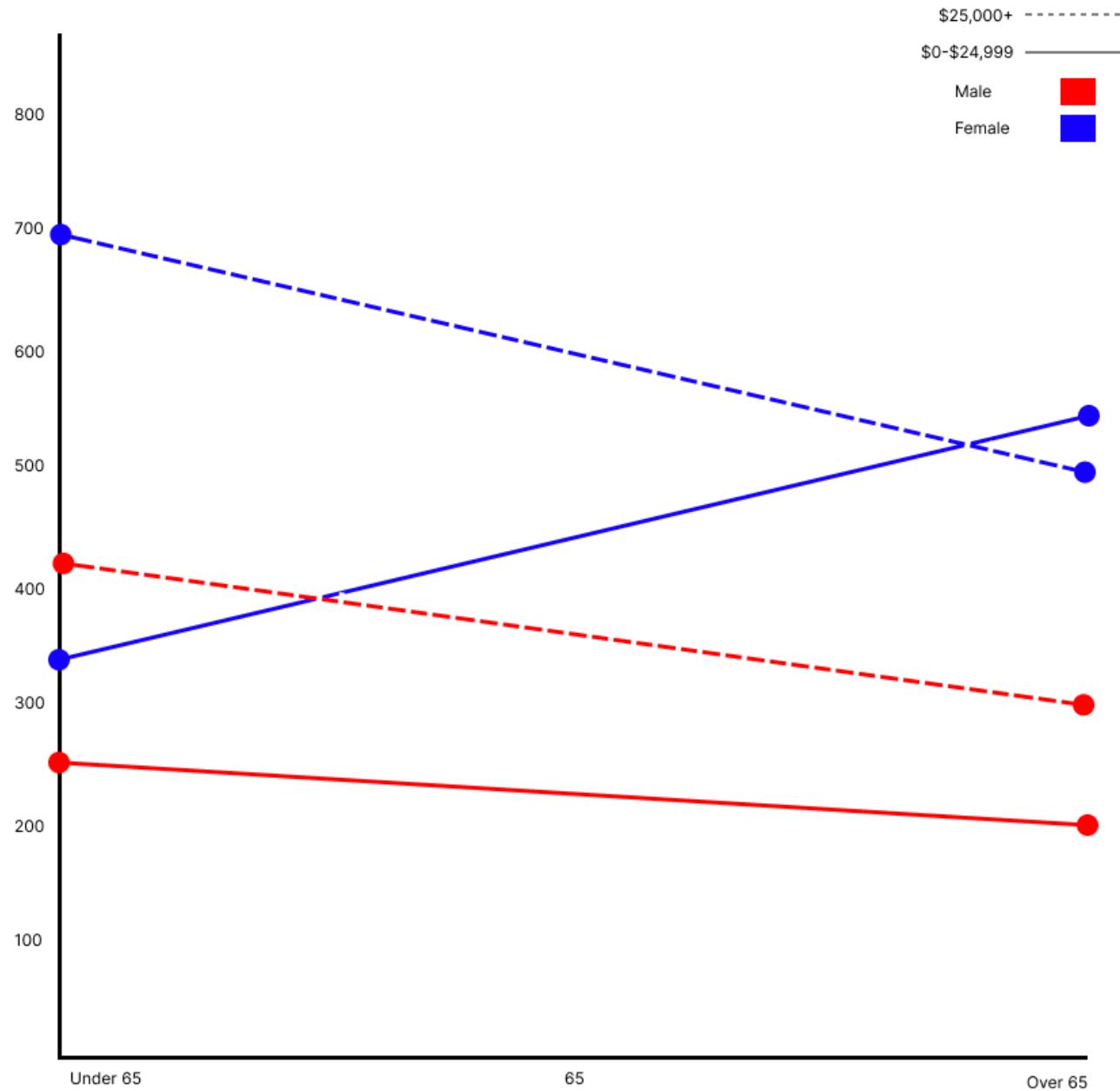






Visualize this! - class participation exercise 1





Cholera epidemic 1854 London – Dr Snow

Cholera epidemic 1854 London – Dr Snow



A COURT FOR KING CHOLERA.

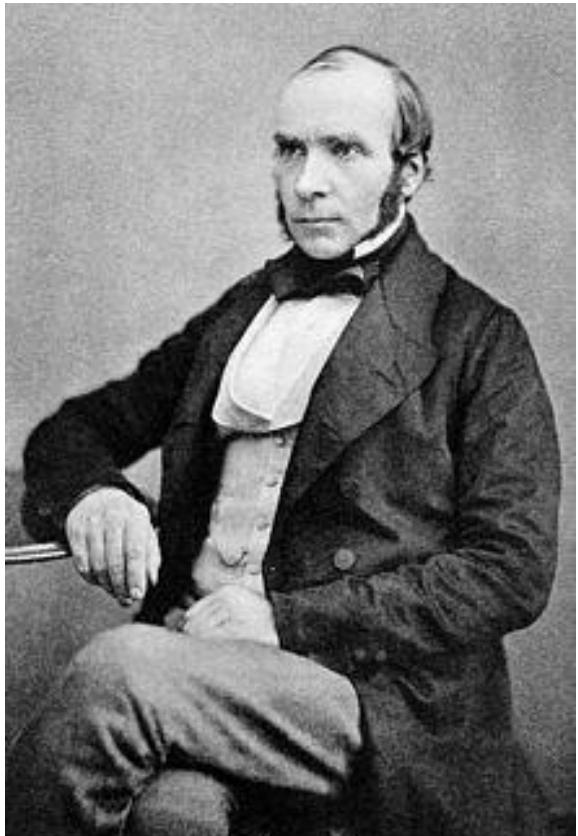
Cholera epidemic 1854 London – Dr Snow



Cholera epidemic 1854 London – Dr Snow



Cholera epidemic 1854 London – Dr Snow



John Snow

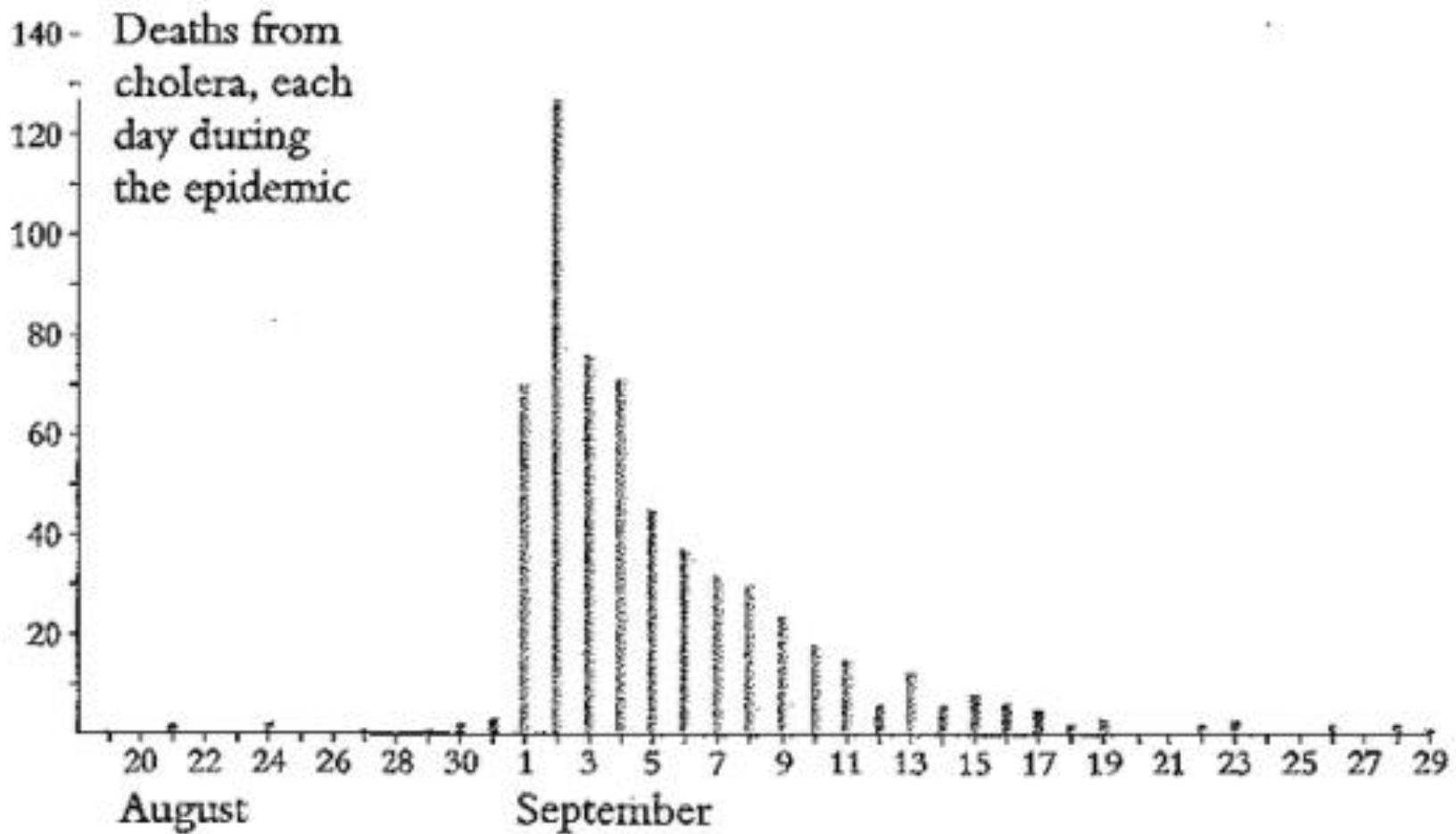
F U N.—August 18, 1886.



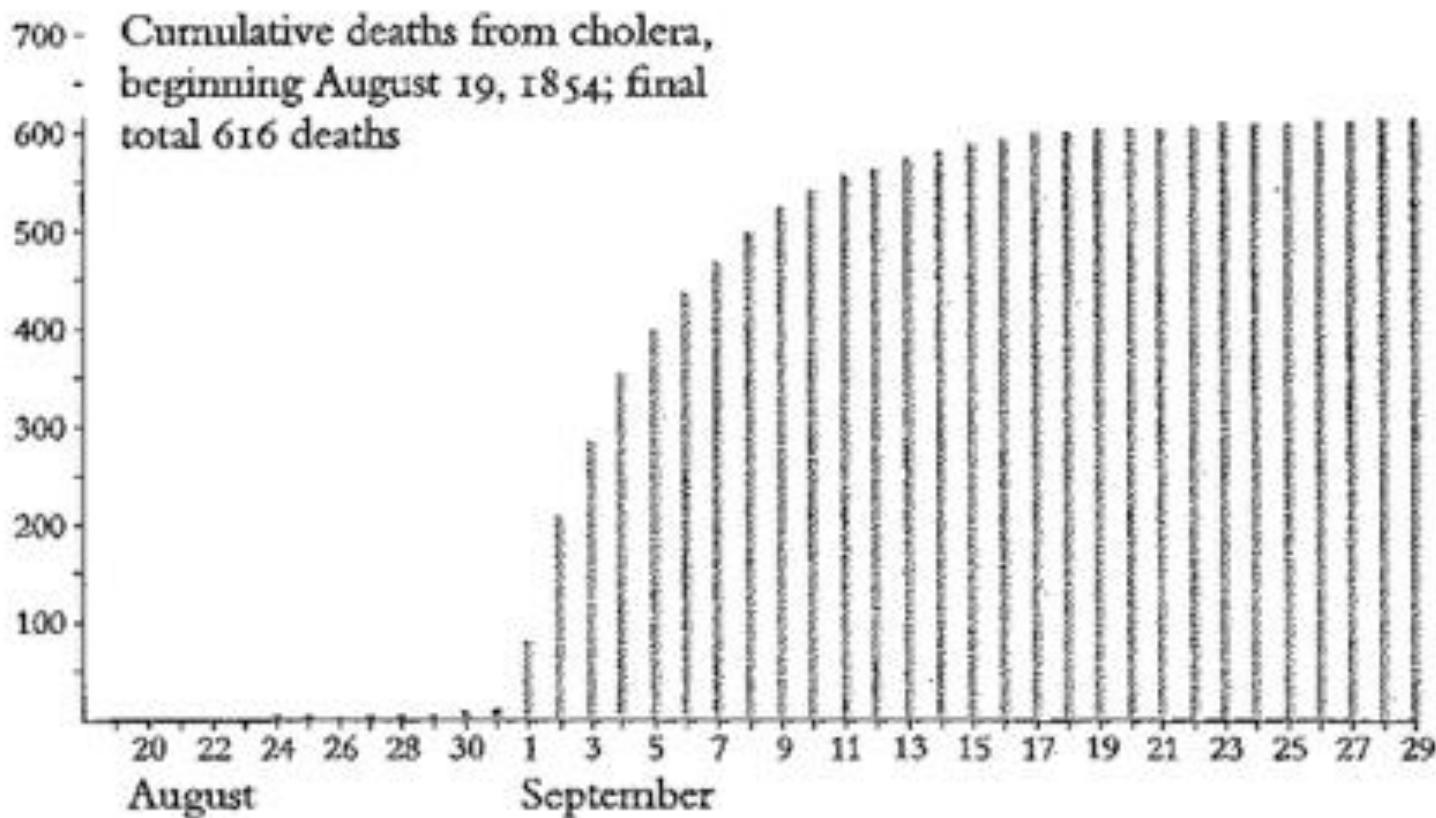
DEATH'S DISPENSARY.

OPEN TO THE POOR, GRATIS, BY PERMISSION OF THE PARISH.

Cholera epidemic 1854 London – Dr Snow



Cholera epidemic 1854 London – Dr Snow



In this case, the task is to create a causal theory about how the disease spread, and time series is a poor match for the task.

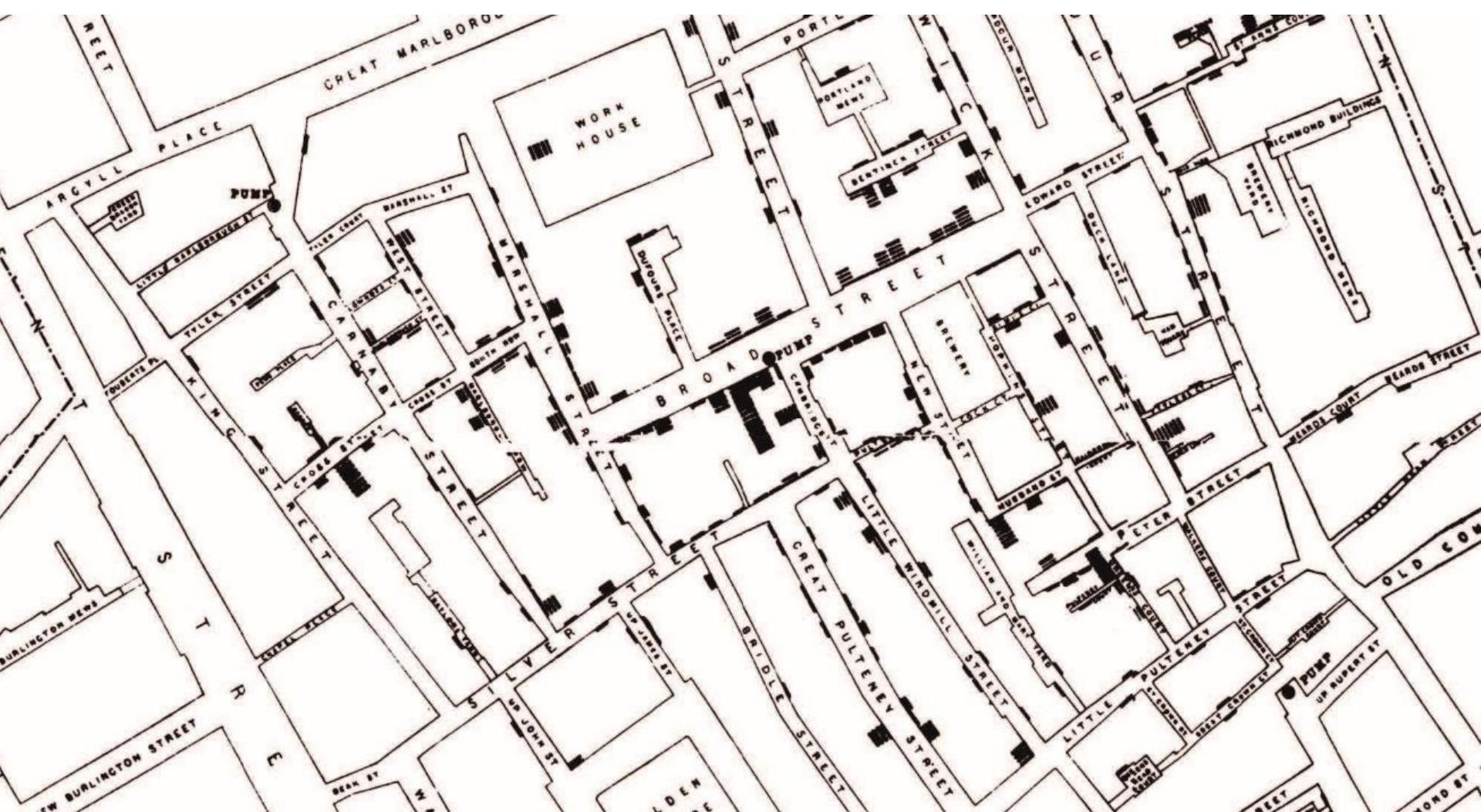
Cholera epidemic 1854 London – Dr Snow

The graphical display was aimed at conveying information about a possible cause-effect relationship.

Snow marked

- deaths from cholera (|||||)
- locations of 11 community water pumps.

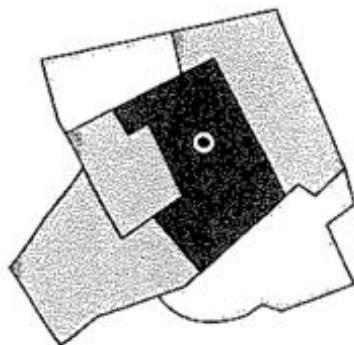
Cholera epidemic 1854 London – Dr Snow



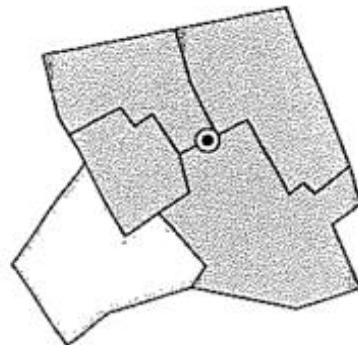
Cholera epidemic 1854 London – Dr Snow

Snow drew a “dot map”, which marks each individual death

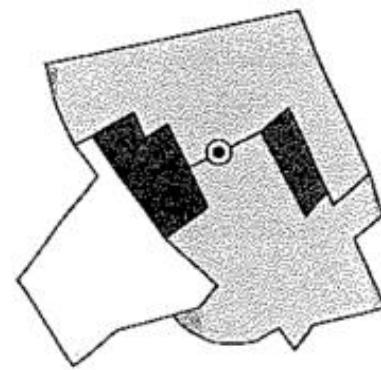
Why not aggregate?



In this aggregation of individual deaths into six areas, the greatest number is concentrated at the Broad Street pump.



Using different geographic subdivisions, the cholera numbers are nearly the same in four of the five areas.



In this aggregation of the deaths, the two areas with the most deaths do not even include the infected pump!

CHOLERA AND WATER.

BOARD OF WORKS

**FOR THE LIMEHOUSE DISTRICT,
Comprising Limehouse, Ratcliff, Shadwell,
and Wapping.**

**The INHABITANTS of the District within
which CHOLERA IS PREVAILING, are
earnestly advised**

**NOT TO DRINK ANY WATER
WHICH HAS NOT
PREVIOUSLY BEEN BOILED.**

Fresh Water ought to be Boiled every Morning for the day's use, and what remains of it ought to be thrown away at night. The Water ought not to stand where any kind of dirt can get into it, and great care ought to be given to see that Water Butts and Cisterns are free from dirt.

BY ORDER,

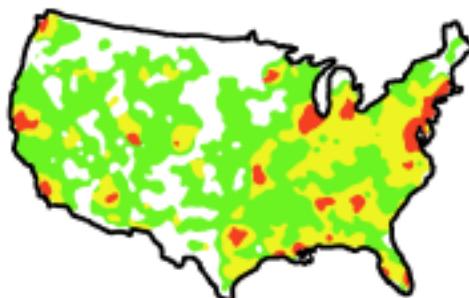
**THOS. W. RATCLIFF,
CLERK OF THE BOARD.**

Cholera epidemic 1854 London – Dr Snow

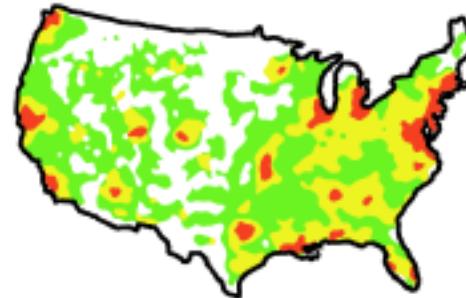
But what is the flip side of Snow's Display?

The dot map does not take into account the number of people living in an area

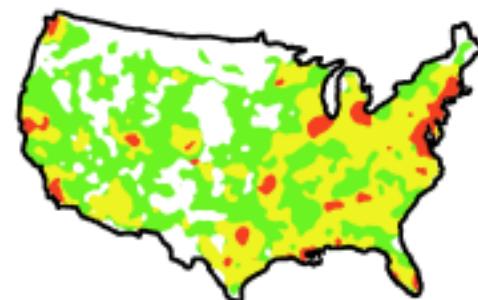
(an area may be free of cases because it is not populated, maybe more people lived near Broad Street pump?)



OUR SITE'S USERS



SUBSCRIBERS TO
MARTHA STEWART LIVING



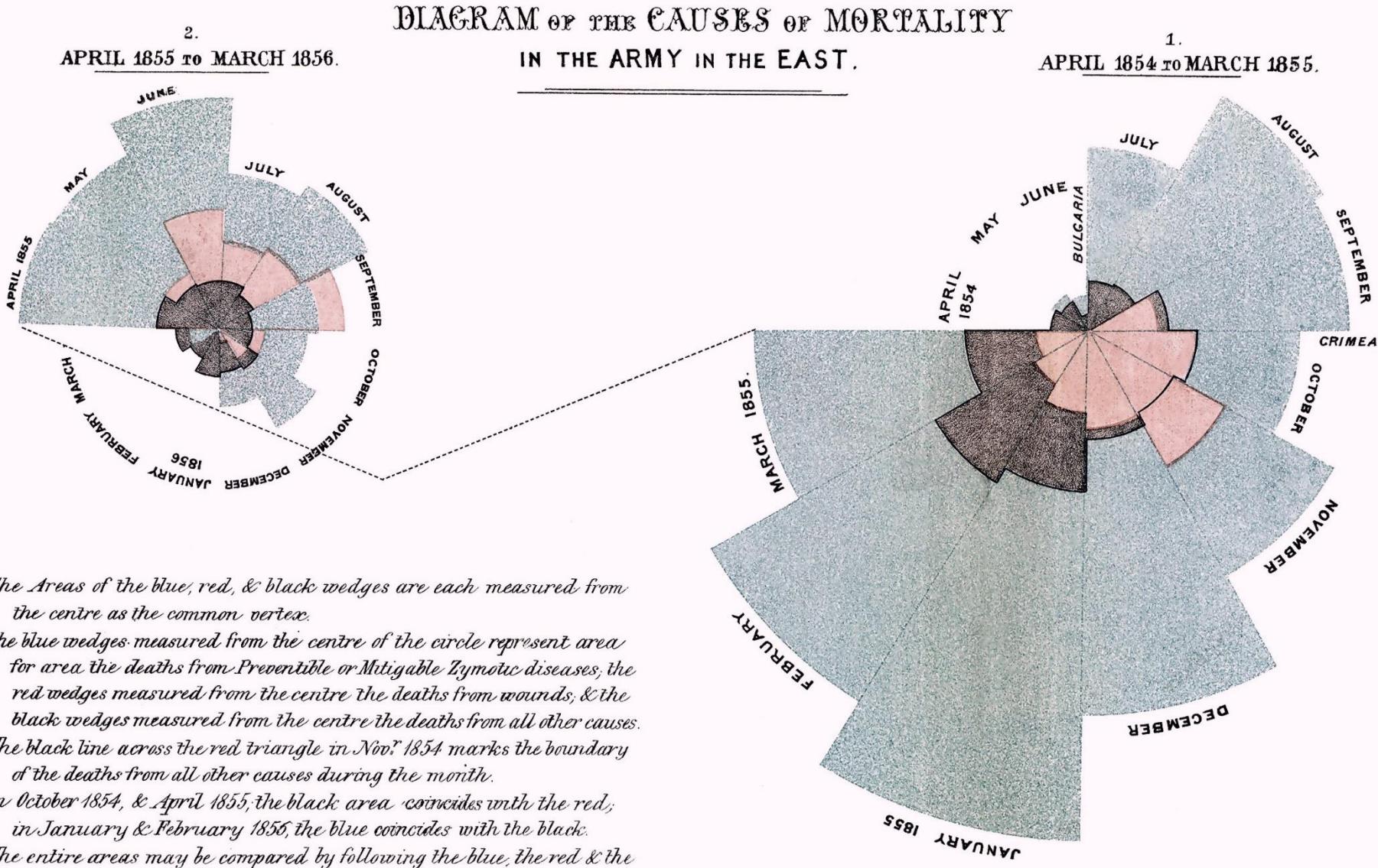
CONSUMERS OF
FURRY PORNGRAPHY

THE BUSINESS IMPLICATIONS ARE CLEAR.



PET PEEVE #208:
GEOGRAPHIC PROFILE MAPS WHICH ARE
BASICALLY JUST POPULATION MAPS

Florence Nightingale on Crimean War. 1858



Napoleon's 1812 Russian campaign – Charles Minard

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

Devisé par M. Minard, Inspecteur Général des Ponts et Chaussées et établi à

Paris, le 20 Novembre 1869

Les nombres d'hommes perdus sont représentés par les longues des lignes colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en blancs ces lignes. Le rouge désigne les hommes qui ont été tués en Russie, le noir ceux qui en sont revenus; — les contingents qui ont survécu à travers la carte sont indiqués dans les ouvrages de M. M. Chatelet, de Léger, de Tocqueville, de Chambry et le journal intime de Jacob, plusieurs fois l'écrivain de l'Armée depuis le 28 Octobre.

Une autre fois, j'ai jugé à l'ordre la diminution de l'armée, j'ai supposé que les corps de l'Armée Napoléon et du Maréchal Davout qui avaient été détachés sur l'Ural et l'Obilak en rejoignirent Orelia en Volga, sans toujours marcher avec l'armée.

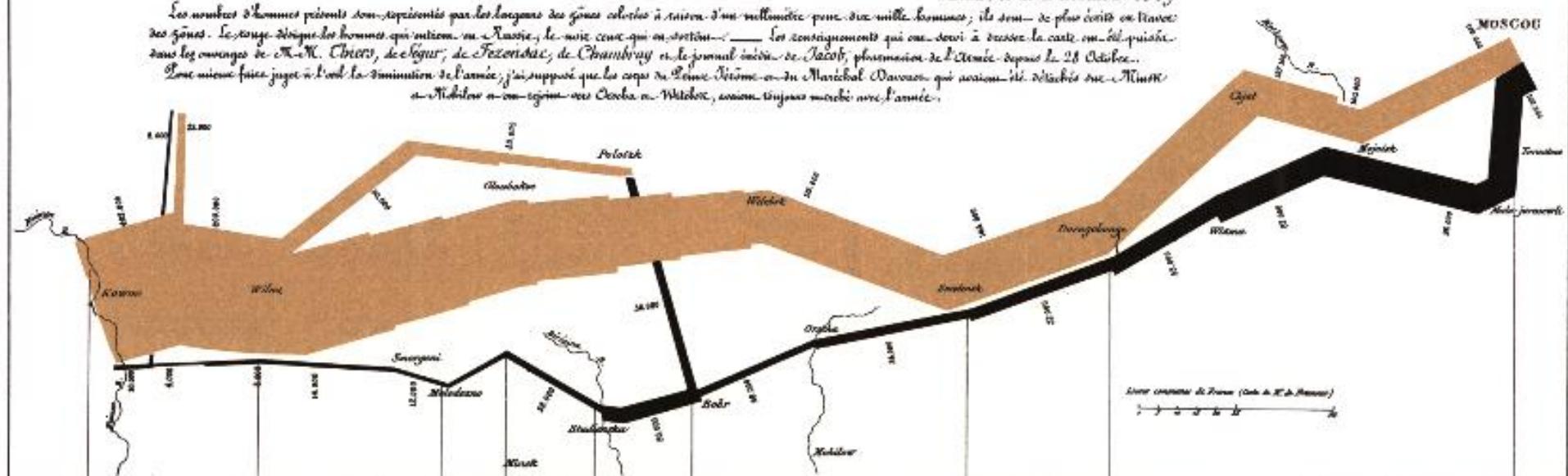
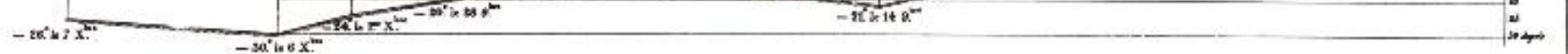
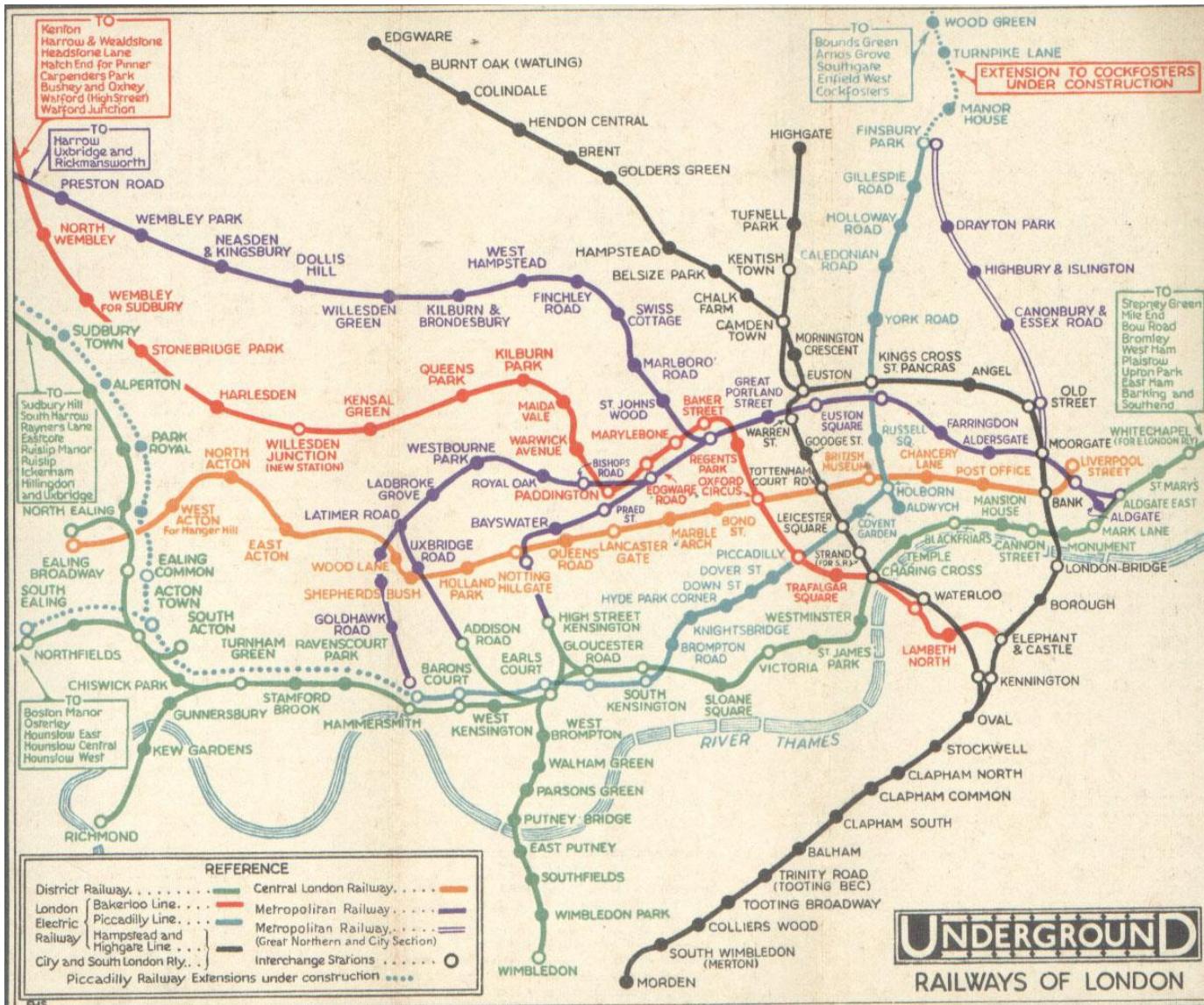


TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

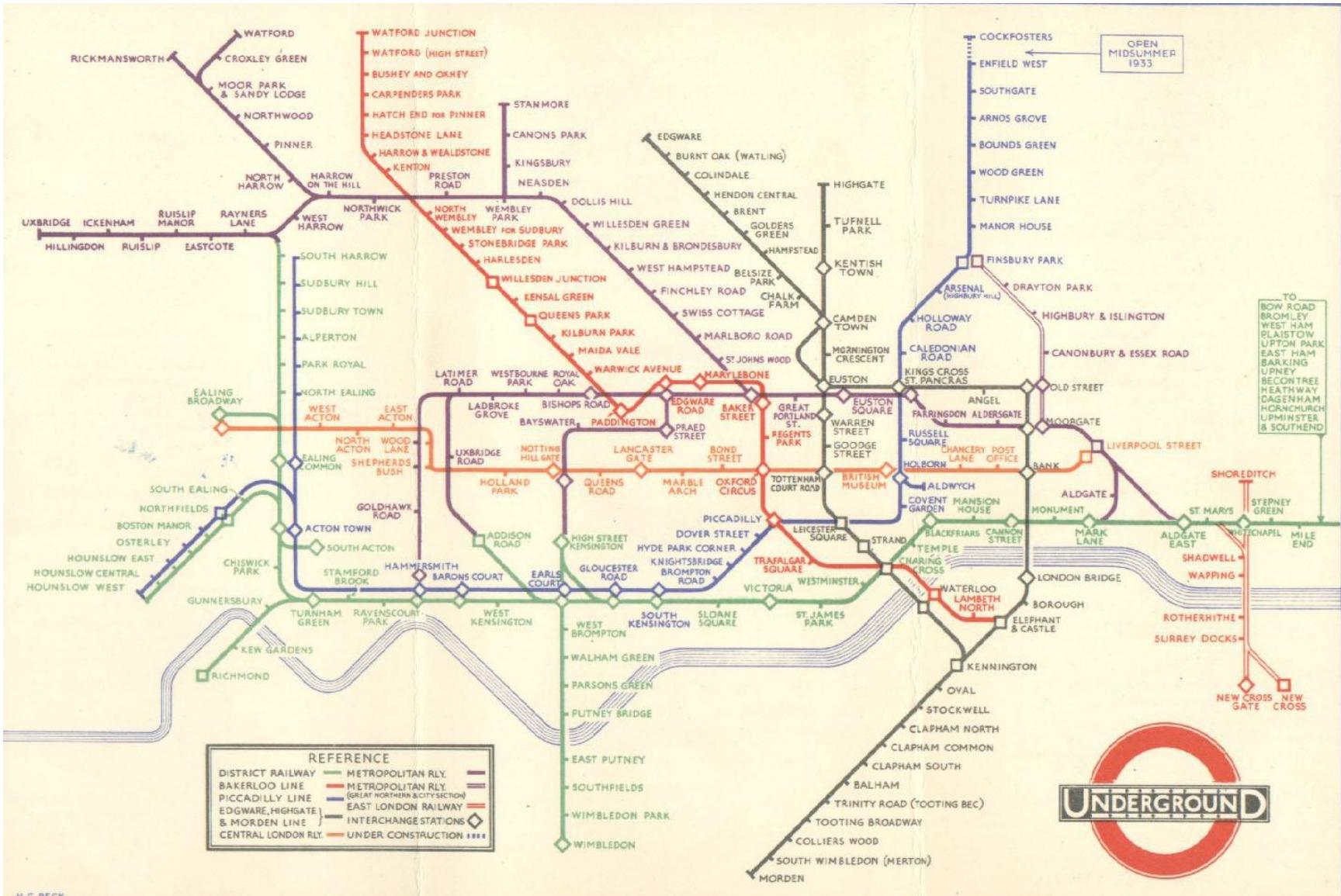
Les températures passent au gelé
à Nivelles, grise.



London Underground Map 1931 – Henry Beck



London Underground Map 1931 – Henry Beck

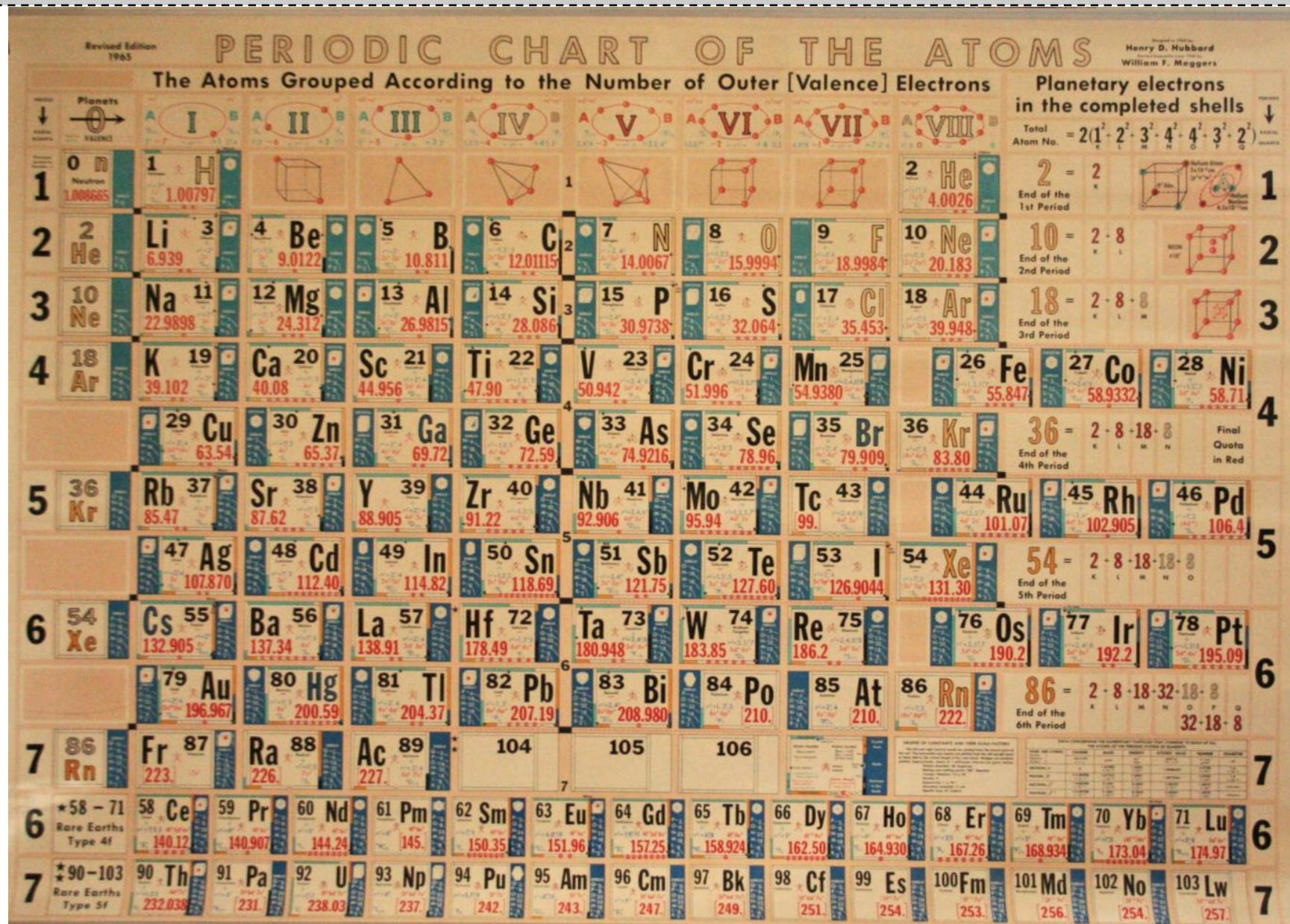


Periodic Table 1869 – Dimitri Mendeleev

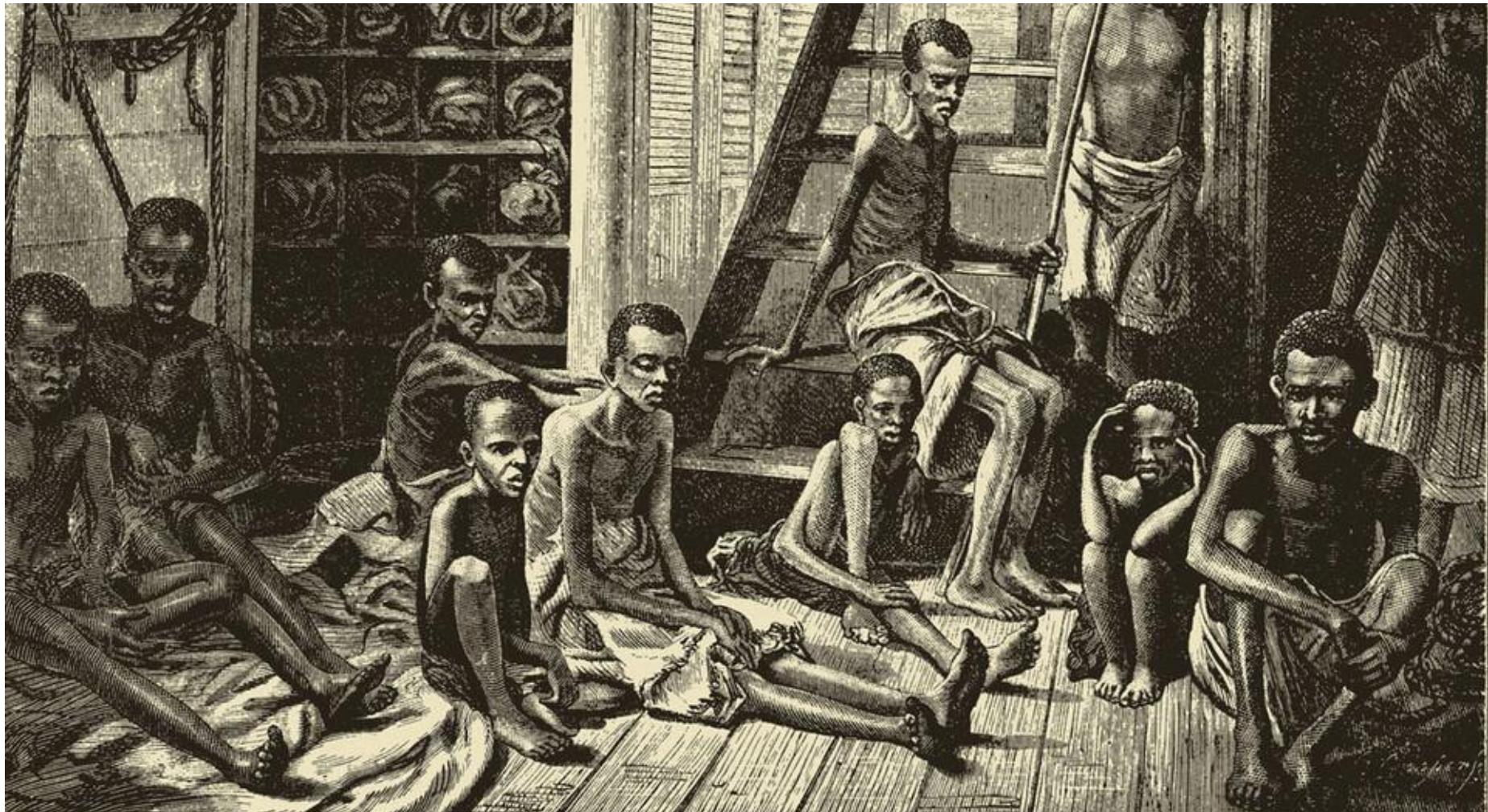
Ueber die Beziehungen der Eigenschaften zu den Atomgewichten der Elemente. Von D. Mendeleeff. — Ordnet man Elemente nach zunehmenden Atomgewichten in verticale Reihen so, dass die Horizontalreihen analoge Elemente enthalten, wieder nach zunehmendem Atomgewicht geordnet, so erhält man folgende Zusammenstellung, aus der sich einige allgemeinere Folgerungen ableiten lassen.

		Ti = 50	Zr = 90	? = 180
		V = 51	Nb = 94	Ta = 182
		Cr = 52	Mo = 96	W = 186
		Mn = 55	Rh = 104,4	Pt = 197,4
		Fe = 56	Ru = 104,4	Ir = 198
H = 1		Ni = Co = 59	Pd = 106,6	Os = 199
		Cu = 63,4	Ag = 108	Hg = 200
	Be = 9,4	Mg = 24	Zn = 65,2	Cd = 112
	B = 11	Al = 27,4	? = 68	Ur = 116
	C = 12	Si = 28	? = 70	Sn = 118
	N = 14	P = 31	As = 75	Sb = 122
	O = 16	S = 32	Se = 79,4	Te = 128?
	F = 19	Cl = 35,5	Br = 80	J = 127
Li = 7	Na = 23	K = 39	Rb = 85,4	Cs = 133
		Ca = 40	Sr = 87,6	Tl = 204
		? = 45	Ce = 92	Pb = 207
		?Er = 56	La = 94	
		?Yt = 60	Di = 95	
		?In = 75,6	Th = 118?	

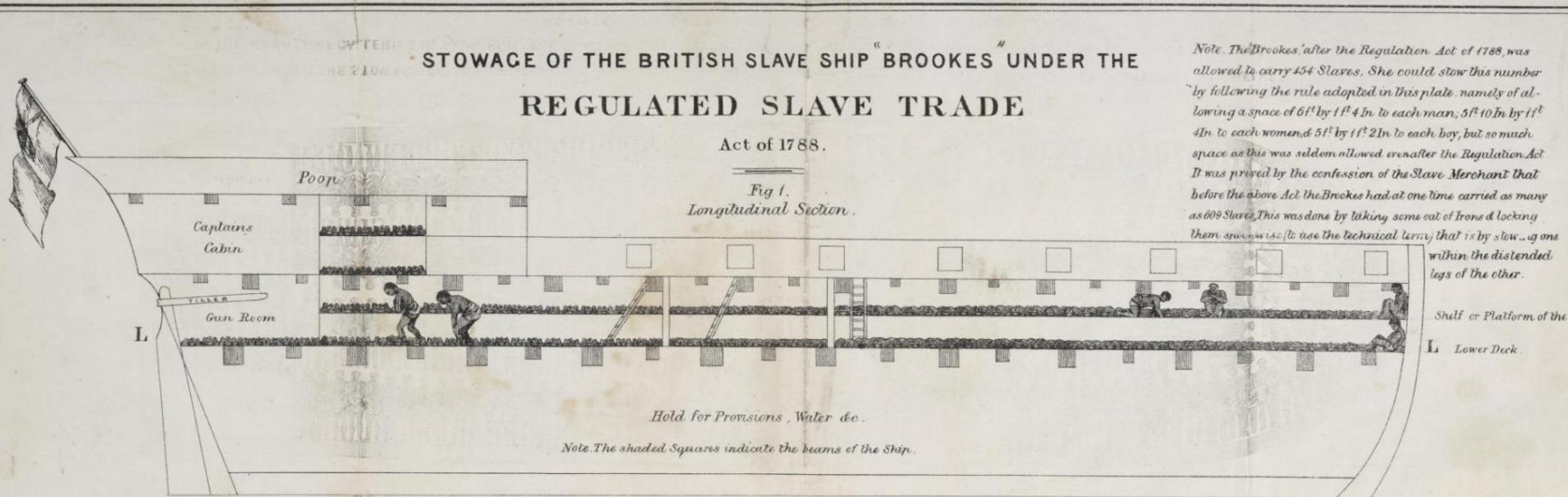
Periodic Table 1950 – Henry Hubbard



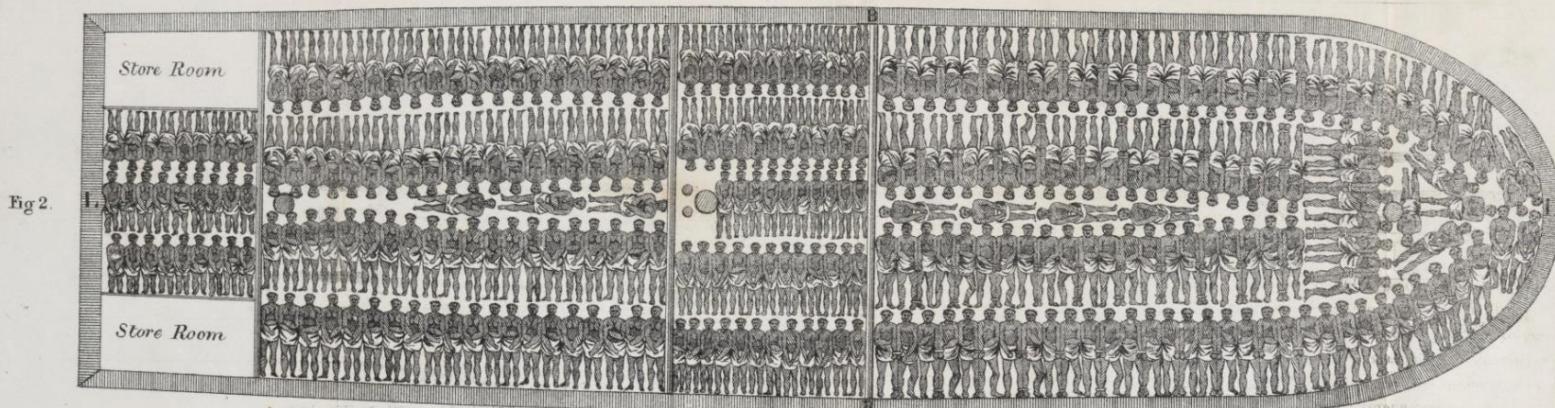
Drawings of slave ship Brookes by British abolitionist William Elford. 1788



Drawings of slave ship Brookes by British abolitionist William Elford. 1788

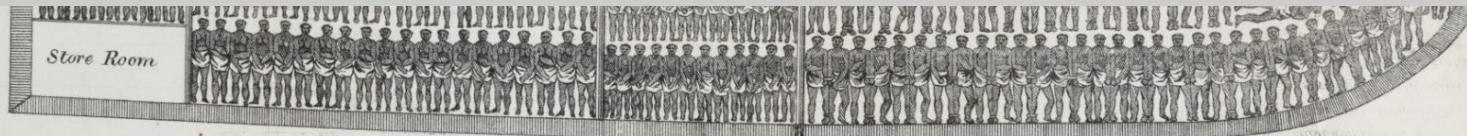


PLAN OF LOWER DECK WITH THE STOWAGE OF 292 SLAVES
130 OF THESE BEING STOWED UNDER THE SHELVES AS SHEWN IN FIGURE B & FIGURE S.



PLAN SHEWING THE STOWAGE OF 130 ADDITIONAL SLAVES ROUND THE WINGS OR SIDES OF THE LOWER DECK BY MEANS OF PLATFORMS OR SHELVES

Drawings of slave ship Brookes by British abolitionist William Elford. 1788



PLAN SHEWING THE STOWAGE OF 130 ADDITIONAL SLAVES ROUND THE WINGS OR SIDES OF THE LOWER DECK BY MEANS OF PLATFORMS OR SHELVES
(IN THE MANNER OF GALLERIES IN A CHURCH) THE SLAVES STOWED ON THE SHELVES AND BELOW THEM HAVE ONLY A HEIGHT OF 2 FEET 7 INCHES
BETWEEN THE BEAMS: AND FAR LESS UNDER THE BEAMS. See Fig 1.

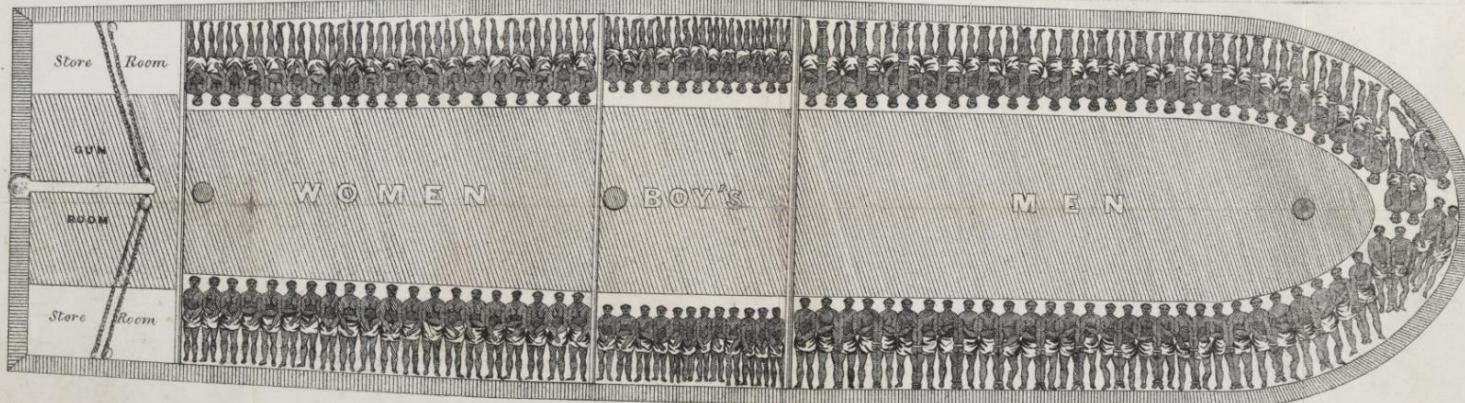


Fig 3.

Fig 4.
Cross Section
at the Poop.

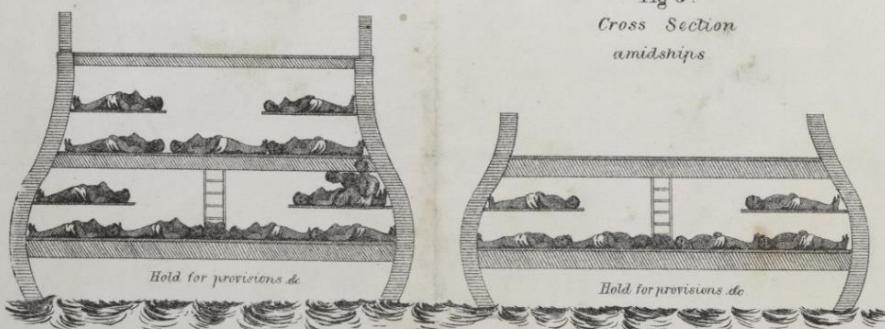


Fig 5.
Cross Section
amidships

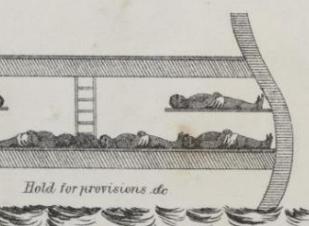


Fig 6.
Lower tier of Slaves under the Poop.

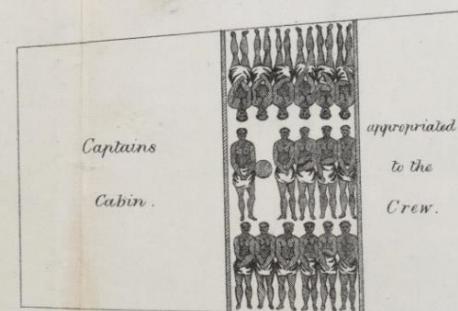
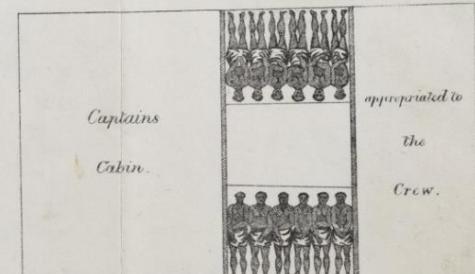


Fig 7.
Shelf tier of Slaves under the Poop.



Scale of Feet
0 5 10 15 20 25

What is visualization?

Clear thinking made visible – Edward Tufte

It is not about designing graphics. It is all about designing information
– Richard Saul Wurman

Vision can no longer be employed simply to support verbal and conceptual meanings: Its potential as a cognitive power in its own right must be exploited – Kepes

Visualization is really about external cognition, that is, how resources outside the mind can be used to boost the cognitive capabilities of the mind – Stuart Card

Why visualize?

To convey information through visual representations in order to:

- Map/record
- Clarify/explain
- Instruct/communicate
- Discover
- Inspire/tell a story

// PROGRAMM

MITTWOCH 21.04.2004

LAGERHALLE

**KUNSTHALLE
DOMINIKANERKIRCHE**

DONNERSTAG 22.04.2004

LAGERHALLE

BRAVE NEW WORLD
13:00 // 58 min

ELSEWHERE
13:30 Le Gout du Kosmique // 66 min

MEMORIES ARE MADE OF THIS
14:00 // 84 min

JONAS AT THE OCEAN
14:30 // Peter Sculpol / adam /
2001 / 95 min

ARTHOUSE 4

DIE PERLE IN DER KACKE
15:30 // Birte MBL / 80 min

**EWIG
15:30 /
Artik**

ARTHOUSE 5

MINATORI WA HADASHI DA
15:30 // Aizuma Meritaki / Japan 2003 / 34 min / 0 msU

**ARAO
15:30 /
Furb**

**HAUS DER
JUGEND (HDJ)**

STUDENT FORUM: MEDIA ACADEMIES / PART I
13:00 LAMAS Kyoto
Christina Semmerer (A/JP)

13:00 Academy of Fine Arts, Prague
Anetta Maria Chlouba (E/CZ)

STUDENT FORUM: MEDIA ACADEMIES / PART II
14:00 HFG Offenbach
Rainer Fapo (D)

14:00 AKI Saitama
HIE Sylahessan (NL)

14:00 KHM Köln
Karina Peters (D)

FREITAG 23.04.2004

LAGERHALLE

SUICIDE
12:00 // Amanda Trosvagoe / 70 min

OF(F) BALANCE
13:30 // 46 min

RETROSPEKTIVE: C. MACLAINE
14:00 // 70 min / 60 min

VISIONS OF DELIGHT
16:00 // 98 min

ARTHOUSE 4

EWIGE SCHÖNHEIT
15:30 // Marcel Scherzer / 90 min / mit Vor-
lesung: Achikaracan

**DIE PI
15:30 /**

ARTHOUSE 5

VAMPIRE HUNTER
15:30 // Yoshiaki Kawajiri / Japan 2000 / Anime / 105 min /
5men / Deutsche Fassung

**NEWA
15:30 /**

**HAUS DER
JUGEND (HDJ)**

TRANSMITTER PART I
13:00 Dr. Karla Kwasniak, Uni
München / Irritation

13:00 Ken Felingold (USA) / Div-Arts

14:00 Tim Fritze/Chaos Computer
Club (B) / diktionslichte

TRANSMITTER PART II
15:30 Padamaya (B) - Transmitter,
Transponder, RFI-TV

15:30 Taric Ruiz Gell (E) »The Media
Matters«

DGB-GEBAUDE

HURRICANE BETSY
was one of three direct hits on the New Orleans area in the last 100 years. Almost a Category 5 storm when it hit shore at Grand Isle, Betsy had weakened to a Category 3 an hour later when its eye was 35 miles west of New Orleans, battering the city with 125 mph winds. A storm surge ranging from 8 to 16 feet flooded an estimated 5,000 square miles of the coast, toppling 8-foot levees in Chalmette, along the Mississippi River-Gulf Outlet near New Orleans, and at Camp Leroy Johnson on the outer barrier. The surge also pushed through a hole underneath a levee along the Inner Harbor Navigation Canal, flooding the 9th Ward.



DAMAGE

Widespread flooding in St. Bernard Parish, eastern New Orleans and the 9th Ward, and 50 people lost their lives in a capsized boat. Many drowned in the water they attempted to escape floodwaters that rose 20 feet in some areas. About 17,000 people were injured and 250,000 homes were damaged. Some buildings washed off their foundations, were carried 30 feet into water and ended up against levees or as the middle of debris. Several stages are mapped on the Mississippi River levees.



Left: Much of the 9th Ward under water, volunteers ferried people stranded on high ground, such as the bridge over the Industrial Canal. PHOTO BY G.E. ARNOLD

SOLUTION

With public concern resulting from Betsy, the Army Corps of Engineers began raising financing for a series of flood control and levee buildings that were already under way to protect the New Orleans area from similar to hurricanes that hit the city in 1935 and 1947.



Left: U.S. Engineers begin building the first section of levees along the east bank of the Industrial Canal, such as here between New Orleans and Canal Street, in 1960. PHOTO

HURRICANE GEORGES HIT NEW ORLEANS

New Orleans most recently dodged catastrophic flooding in 1998, when Hurricane Georges cut across the Gulf of Mexico on a beeline to the mouth of the Mississippi River. As half the population fled, the storm veered to the east and made landfall in Mississippi. The hurricane caused flooding in St. Bernard Parish and also pushed waves from Lake Pontchartrain up against its south shore levees, leaving many to ponder: What if?

5 ST. CHARLES SUBMERGED
Here, water in the lake would reach heights of 8 to 10 feet above normal during the next 24 hours. If Hurricane Georges and St. John persist, the water would be deepest near the river levees.

6 GRAVITY'S GATEWAY

Fearless winds from the stated hurricane would bring 10 feet of water to above sea level at the base of the levee. The storm's water would top low levees and floodwaters and move east into Jefferson and Orleans parishes. Jefferson Parish may see some flooding, but protection would be lower near the river.

1 THE MODEL

A computer model developed by USGS can project Georges' likely path. An armada of ships and government agencies to prepare evacuation plans shows what would have happened if Georges had continued westward. Instead, the storm continued on the track and intensity forecast by the National Hurricane Center on Sunday, Sept. 26, 1998, at 4 a.m. In the model, Georges' eye would pass directly over New Orleans at 115 mph winds while it makes landfall just west of the mouth of the Mississippi. During the next two days, it moves slowly northward, bringing Category 1 and Category 2 winds over eastern New Orleans. Here's what would happen ...

CITY BELOW THE SEA

What a hurricane even stronger than Georges has done: Lake Pontchartrain — a foot higher than sea level — will be the city's biggest threat. Surge water from the Gulf of Mexico, topped by towering waves, will swell the lake above levees and cause widespread flooding. A look at average surge levels by category, compared to a cross-section of the city known as "the bowl."

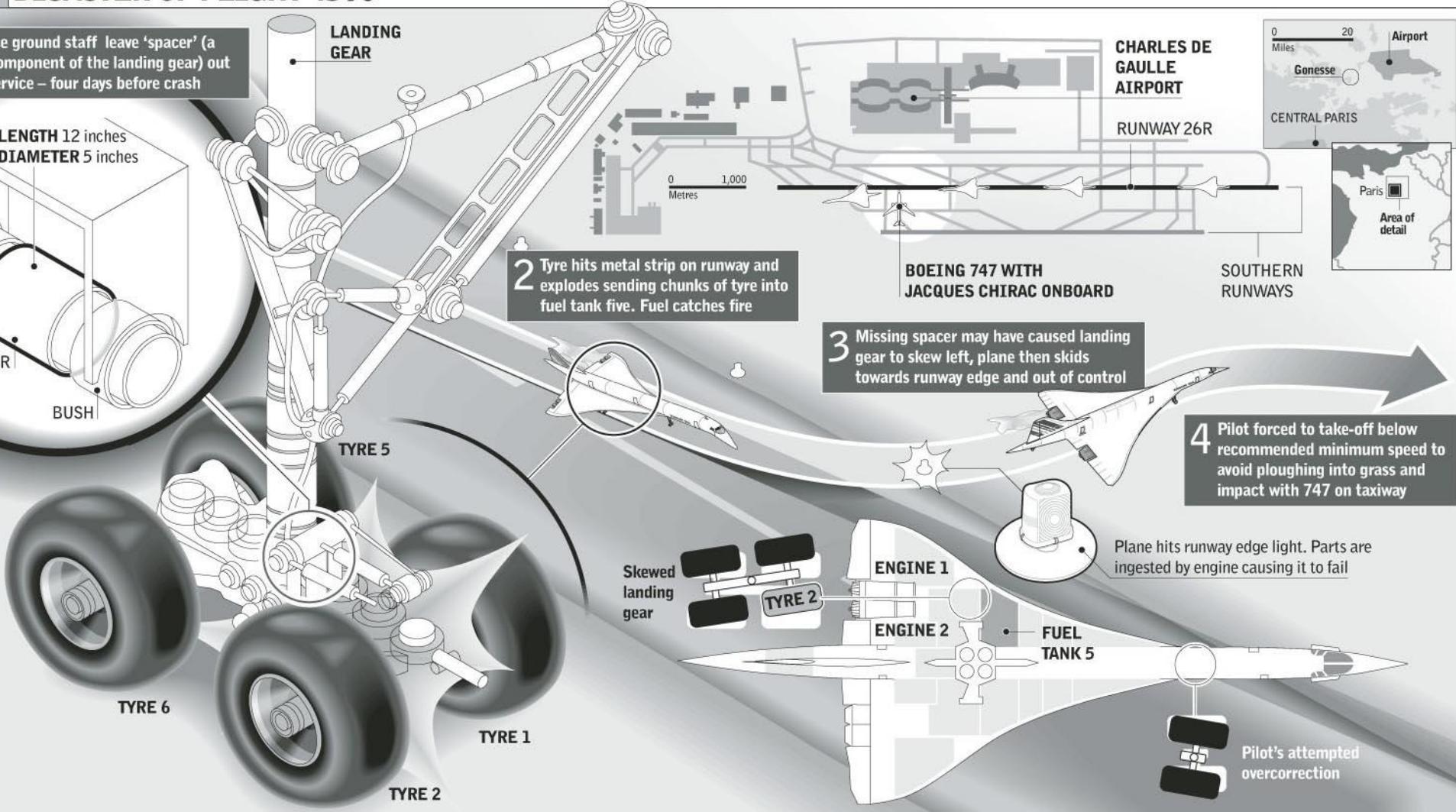
Hurricane Category	Surge and waves at low tide*	Effect on New Orleans
1	2 feet	Lake Pontchartrain's levees stop the low-tide surge. Levees stand tall, but high waves could find their way over.
2	4 feet	Levees stop bulk of waves, but water could cause considerable flooding.
3	8 feet	Levees breached, causing catastrophic flooding.
4	12 feet	Entire city submerged including Mississippi River levees.

Surge crosses inland with high wind-driven waves on top.

Normal lake level:

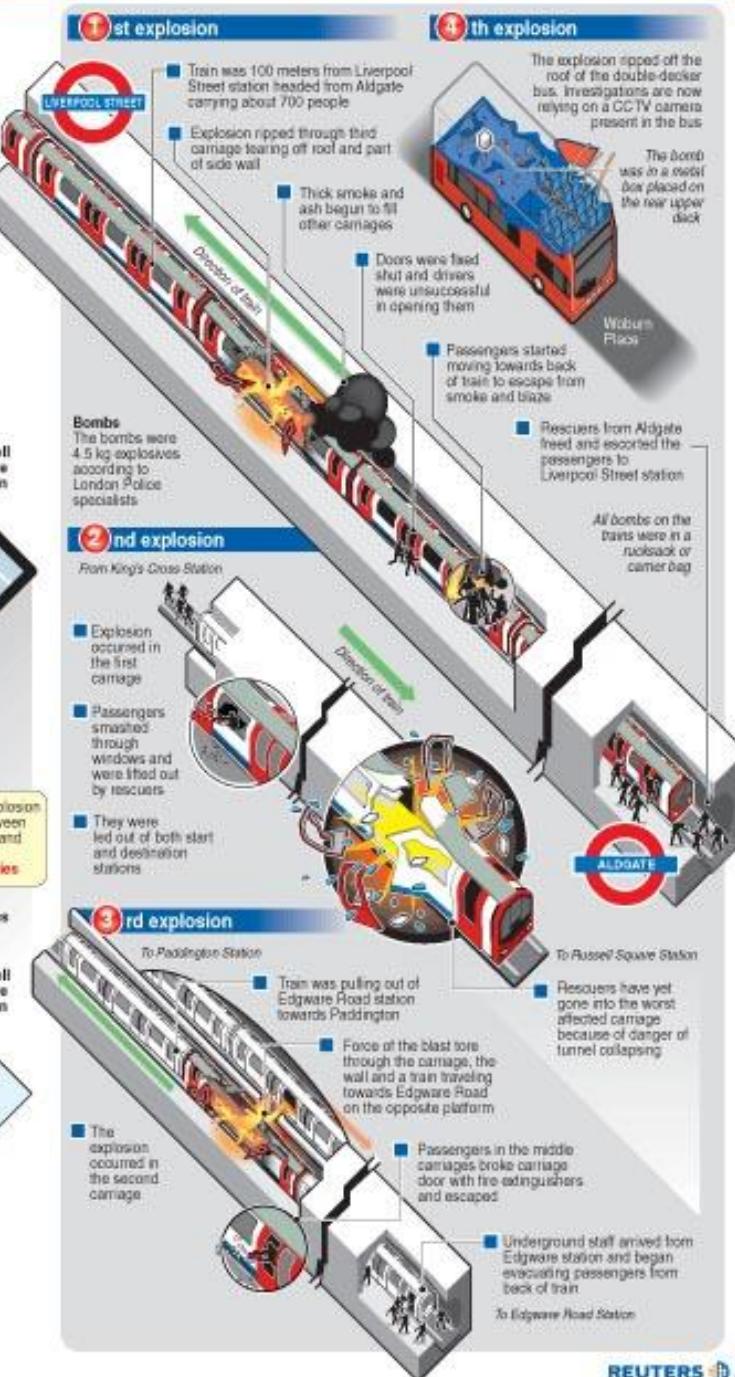
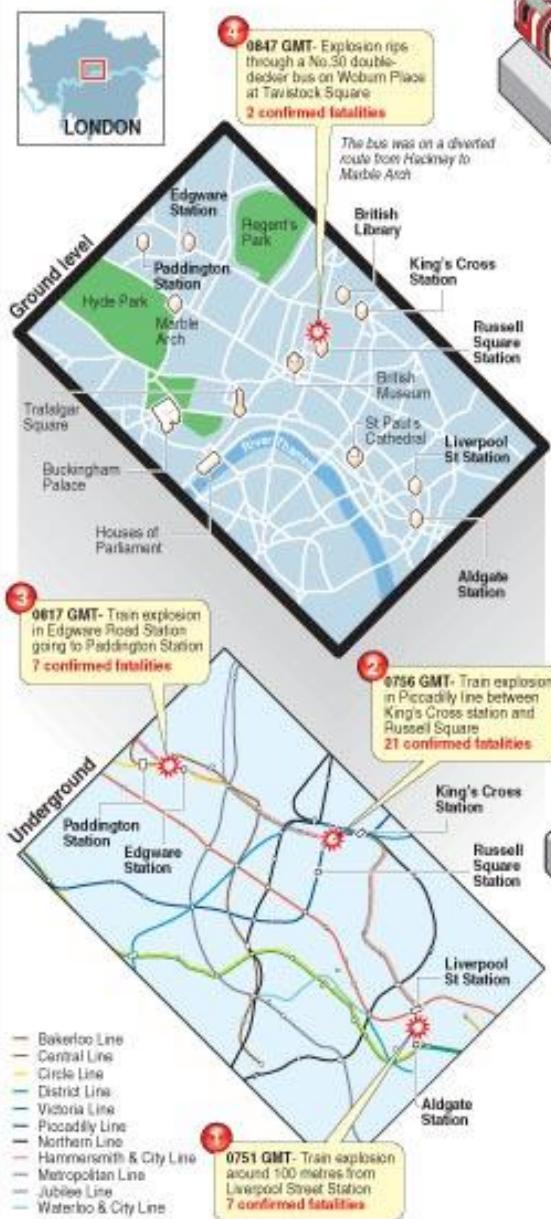
1 foot above sea-level

DISASTER OF FLIGHT 4590



LONDON BLASTS

More than 50 people were killed and 700 injured in bomb attacks on a bus and several underground trains in London on Thursday. Officials believe the blasts bore hallmarks of an al-Qaeda terrorist attack



SUPERintrigante

Perguntas instigantes, respostas surpreendentes

Boca em ação

COMO É O TRÁFICO NA FAPELA?

Os pontos de tráfico de drogas, conhecidos como "bocas", operam como empresas, escondidos em favelas e bairros pobres das grandes cidades. Os criminosos se organizam em uma hierarquia preocupada em garantir duas coisas: o abastecimento constante de cocaína, maconha e outros entorpecentes e o sistema de proteção contra a polícia ou quadrilhas rivais.

Para garantir a eficiência do negócio, são contratados diversos funcionários. O esquema de segurança e a acirrada disputa entre traficantes põem em risco a vida de compradores e moradores da Favela. "Alé chegar à boca, o usuário tem que andar na favela. Ele é avisado e nem percebe. Se os seguranças pensarem que ele é um policial disfarçado, alaram", diz o delegado Carlos Roberto Alves de Andrade, da Delegacia de Repressão ao Crime Organizado do Departamento de Narcóticos de São Paulo. **5**

Foto: Cesar da Silveira

CRIME ORGANIZADO

Vários funcionários estão envolvidos no esquema de tráfico

AVIÖEZINHOS

Os garotos que levam a droga da boca para os clientes são mais comuns no Rio de Janeiro. Em São Paulo, onde as favelas são planas, a distância entre a boca e o consumidor é pequena e o serviço deles nem sempre é necessário.

5 Outubro 2004

BOCA

Perguntas instigantes, respostas surpreendentes

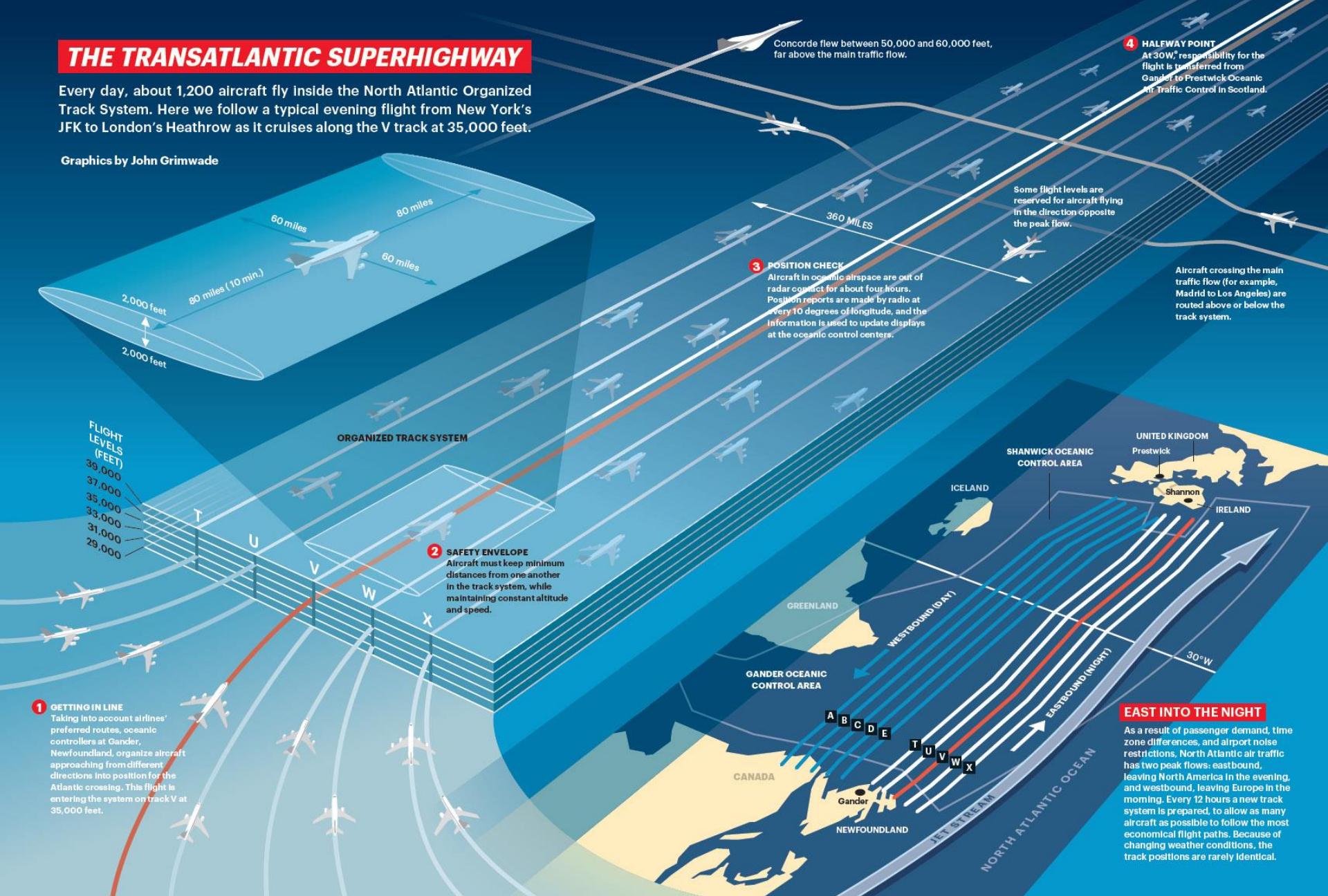
BOCA

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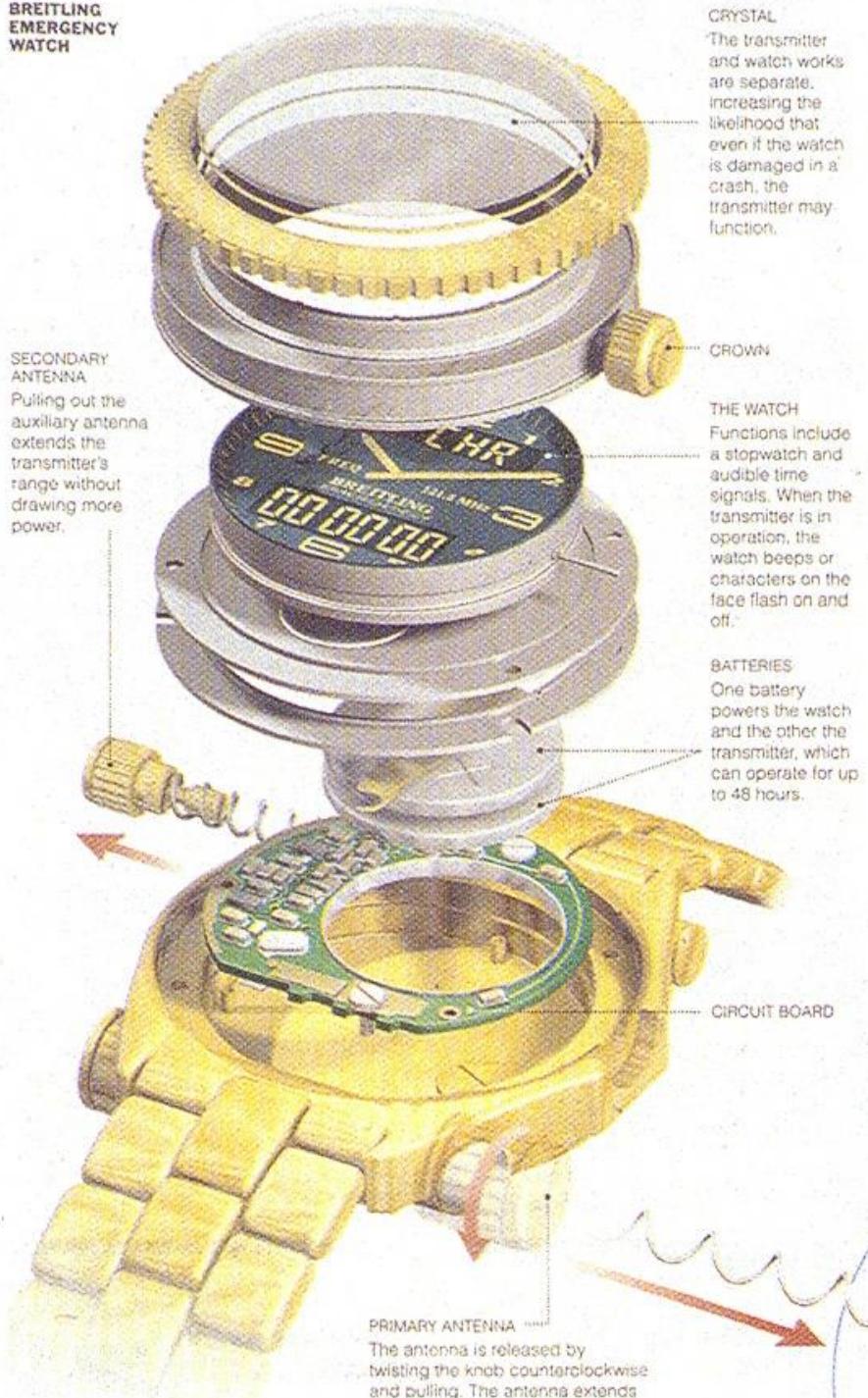
THE TRANSATLANTIC SUPERHIGHWAY

Every day, about 1,200 aircraft fly inside the North Atlantic Organized Track System. Here we follow a typical evening flight from New York's JFK to London's Heathrow as it cruises along the V track at 35,000 feet.

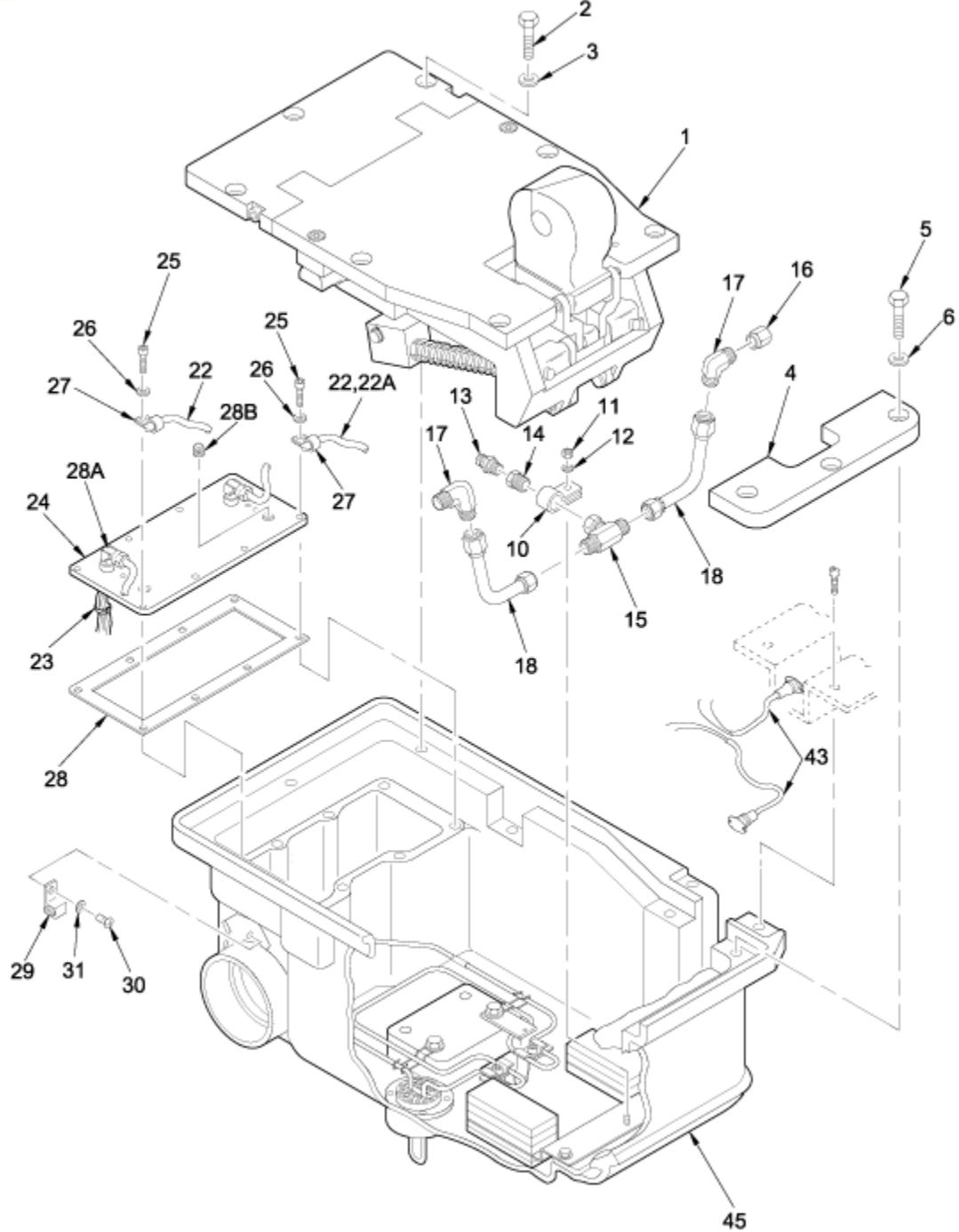
Graphics by John Grimwade



BREITLING
EMERGENCY
WATCH



The antenna is released by twisting the knob counterclockwise and pulling. The antenna extends



JOB LOSSES SOAR; U.S. VIRUS CASES TOP WORLD



Since the coronavirus descended on Brooklyn Hospital Center three weeks ago, the staff has handled over 800 potential cases.

Unfilled Posts Force Scramble With No Way To Get There

By Washington

NICKI STEWART
It was not even 6 a.m. on Friday when Allie Phillips was excited about putting up her first mask in her car last week. She did not want to miss any classes and already knew she was already awake.

On Monday, the first day of school, Phillips, 11, had to skip remote learning, the 10-year-old said. She had been set up over her pillow on a twin bed in a studio that she shares with her mother. Her mother, who would screen nearly 100 walks in patients for the coronavirus, had to leave the house inside a homeless shelter on the street.

And then, Allie saw nothing. "I went downstairs to find out that my mom had been sick," she said. "She had a fever." And so had her mother.

The Department of Education, which runs the largest school system in the country, has closed all schools across the state of New York, and now former administrators and teachers are worried experts say the coronavirus has exposed those failing as never before.

Continued on Page A11

Courage at a Brooklyn Hospital, At the Front of an Invisible War

By SHERIFF TINK

Allie Phillips was excited about putting up her first mask in her car last week. She did not want to miss any classes and already knew she was already awake.

In freezing rain on Monday, she emerged from her car to find her emergency department had closed. On Tuesday, she had to skip remote learning, the 10-year-old said. She had been set up over her pillow on a twin bed in a studio that she shares with her mother. Her mother, who would screen nearly 100 walks in patients for the coronavirus, had to leave the house inside a homeless shelter on the street.

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Continued on Page A11

With Supplies Waning, Workers Soldier On

DAN BARRY

Phillips' baseball glove had a new season this afternoon with a Opening Day game for the ages, an extra-inning thriller that ended with a walk-off home run in the ninth inning.

Shutting the vast system, which includes 1,500 schools, was a serious challenge for the city, and the decision to close them after school closures are uncharted territory, altering the lives and joy nearly everywhere.

From the moment the first bat tipped his helmet — and bird song filled the air — the world had run by a halting, half-timed, 11-inning, affair redefining what a serious challenge for the city, and the decision to close them after school closures are uncharted territory, altering the lives and joy nearly everywhere.

Don't misunderstand: This

game between the New York Gophers and the Cincinnati Reds was a grueling affair, with the ball flying off the field of the imagination. The pitch, which included 1,500 schools, was a serious challenge for the city, and the decision to close them after school closures are uncharted territory, altering the lives and joy nearly everywhere.

"I could've played the game," he said. "But the redeemed Gophers left fielder Sammy Sosa, who had been in the leadoff spot after steering so hard that he strained a ligament in his back." I didn't

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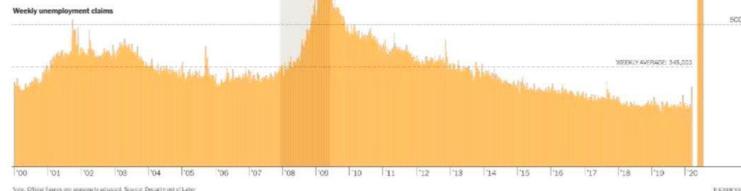
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Continued on Page A11



Note: Official figures are seasonally adjusted. Source: Bureau of Labor Statistics

BUSINESS B1-9

Armed With Sewing Machines
With no masks available in markets, people are pulling out their sewing machines to fill the void.

PAGE A18

INTERNATIONAL A18-20

Maduro Is Indicted in U.S.
The Venezuelan president, who the U.S. no longer recognizes, of participating in a narco-terrorism conspiracy.

PAGE A20

Netanyahu Rival Relents

The Israeli prime minister was set to file criminal charges against his political rival, creating the pandemic.

PAGE A20

Starting Over on Foster Care

A lawsuit led New Mexico to change its foster care system, one advocate says, will serve as a national model.

PAGE A22

Brushing Aide a Slaughter

Snow and China, which often reveal in grudges against other countries, are bringing selective memory to a new mass killing that occurred on their border in 1900.

PAGE A22

NATIONAL A21-23

New Focus on Health System
Healthcare workers have stepped up to a central issue that was always a major talking point for Joseph R. Biden Jr. and other Democrats.

PAGE A24

WEEKEND ARTS C1-16

For Filmgoers, a Pandemic
COVID-19 has created a "Take a peek" or two pages reported from The New York Times for Kids.

PAGE C23

OBITUARIES A24-25

Champions of U.S. History
Richard Reeves, a historian, Clinton and others could be an inspiring as his. PAGE A24

PAGE A25

Globetrotters' Dean of Dribble

Fred "Curly" Neal dazzled fans with his basketball wizardry in more than 6,000 games. He was 77.

PAGE A25

EDITORIAL OP-ED A26-27

It's Virtually Perfect
Paul Krugman

PAGE A27

WEEKEND ARTS C1-16

Show to Embrace a Delay
Athletes question why U.S. Olympic leaders took so long to join calls to postpone the Tokyo Games.

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New Data Shows Staggering Toll of Outbreak

This article is by Ben Casselman, Patricia Cohen and Tiffany Hsu.

More than three million people lost their jobs in the first week of March, sending a collective shudder throughout the economy and leaving millions of Americans to experience.

The government, in a report released by the Labor Department on Thursday, provide some of the earliest evidence of the economic toll of the coronavirus pandemic, which has shut down parts of the economy faster than government statistics can keep track.

Just two weeks ago, barely

200,000 people applied for jobless benefits in a single day, on average.

In the half-century that the government has tracked applications, the weekly total has grown to 693,000 so-called initial claims, last week.

Thursday's figure is nearly 3.3 million at a grim record. "A large part of the country has collapsed," said Ben Herzson, executive director of the Job Training Fund, a business and labor group that tracks jobless claims.

The numbers provided only the first look at the scale of the calamity in progress. Even comparatively optimistic forecasters expect a much larger increase in joblessness, with them foreclosures, evictions and bankruptcies. Thousands of companies have filed for bankruptcy in response to the pandemic, and economists say the decline in gross domestic product this year will be as bad as during the Great Depression.

There was fresh evidence on Thursday of the relentless course of the virus itself. Cases in New York City reached 100,000, the most of any nation, even China and Italy, according to a New York Times analysis. More than 1,000 deaths across the country were reported on Thursday.

At least 160 million people

were

Continued on Page A17

Labeling Regions by Risk
President Trump told governors he planned to classify counties according to the danger of the coronavirus infection. Page A11

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Under Trump, Unfilled Posts Hinder Action
By Jennifer Steinbauer and Zoë Clark

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Online Class With No Way To Get There
By Washington

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Courage at a Brooklyn Hospital, At the Front of an Invisible War
By Sheriff Tink

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Lacking a Crowd,

Oliver Byrne's *Elements of Euclid*. 1847

44

BOOK I. PROP. XLIII. THEOR.



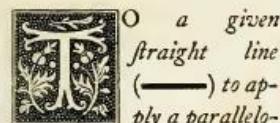
THE complements
of the parallelograms which are about
the diagonal of a parallelogram are
equal.



Q. E. D.

BOOK I. PROP. XLIV. PROB.

45



Given a straight line (—) to apply a parallelogram equal to a given triangle (), and having an angle equal to a given rectilinear angle ().

Make = with = (pr. 42.)

and having one of its sides ----- conterminous with and in continuation of —.

Produce till it meets || -----
draw — produce it till it meets ----- continued;
draw ----- || ----- meeting ----- produced, and produce -----.

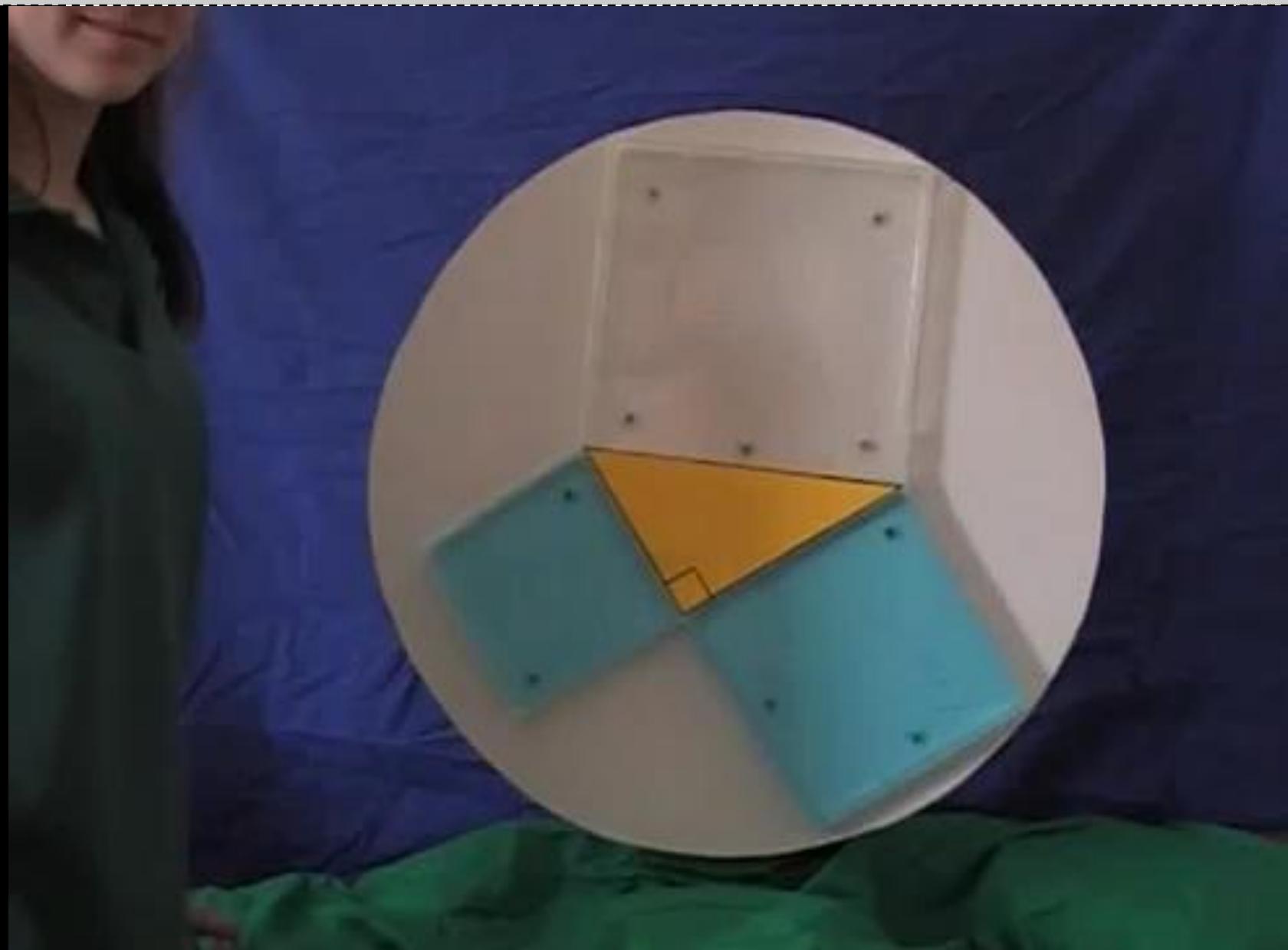


but = (const.)

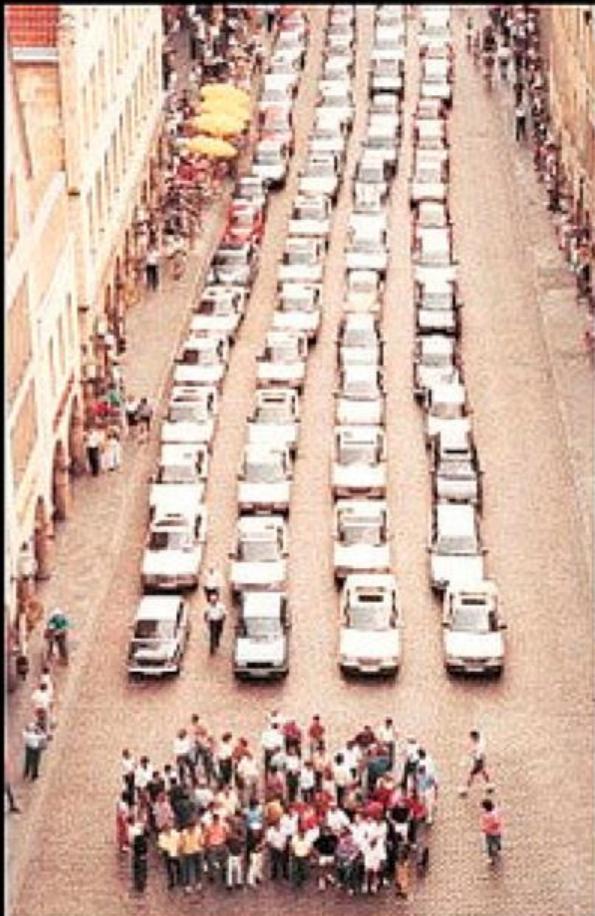
∴ = ; and

= = = (pr. 19. and const.)
Q. E. D.

A tangible visualization of Pythagorean theorem



space required to transport 60 people



car



bus



bicycle

Nadeem Haidary's visualization of caloric consumption per capita



PIZZAEXPRESS

1 car space = 10 bicycles





Hungry Planet: What The World Eats – Peter Menzel
<https://time.com/8515/what-the-world-eats-hungry-planet/>



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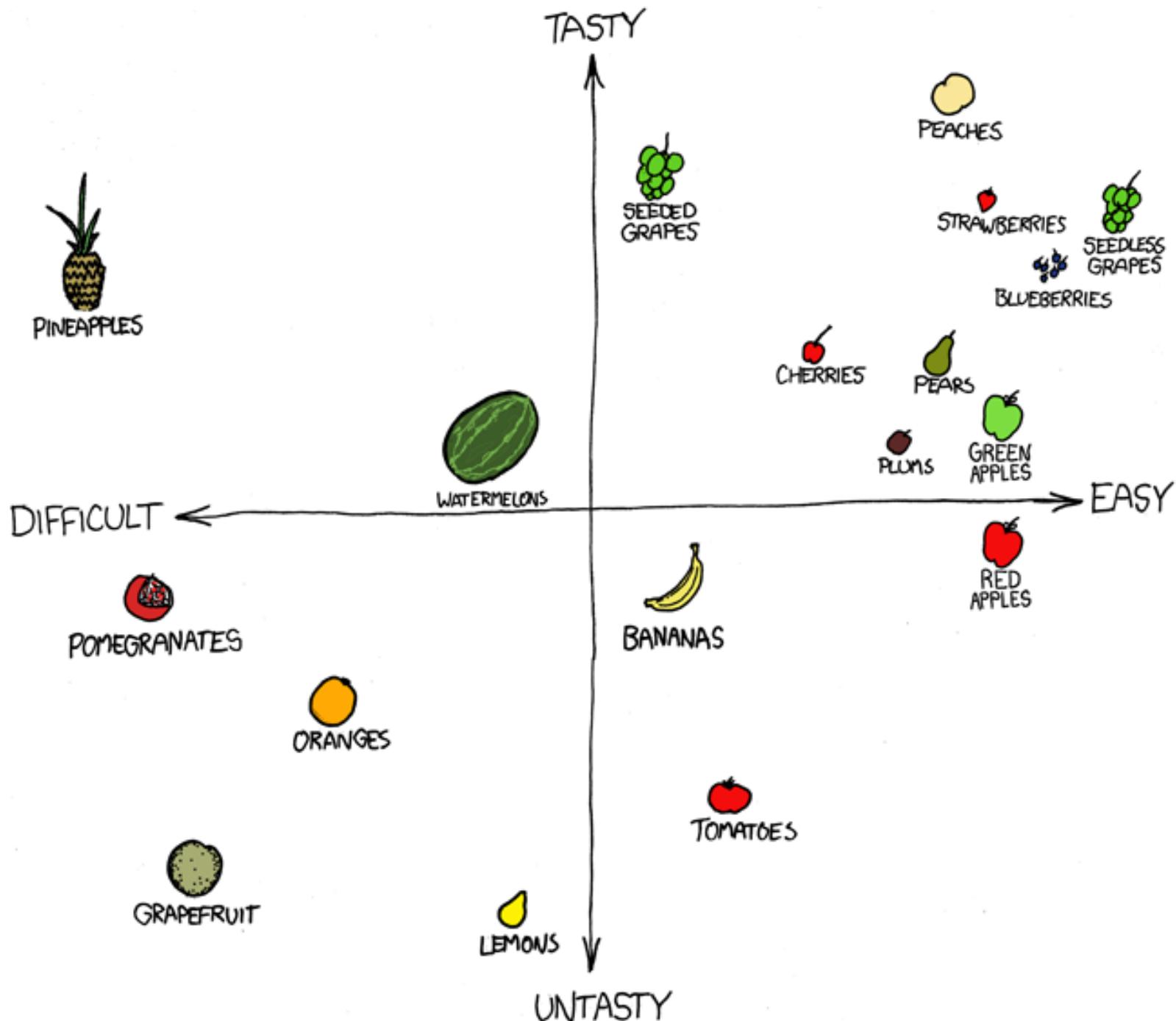
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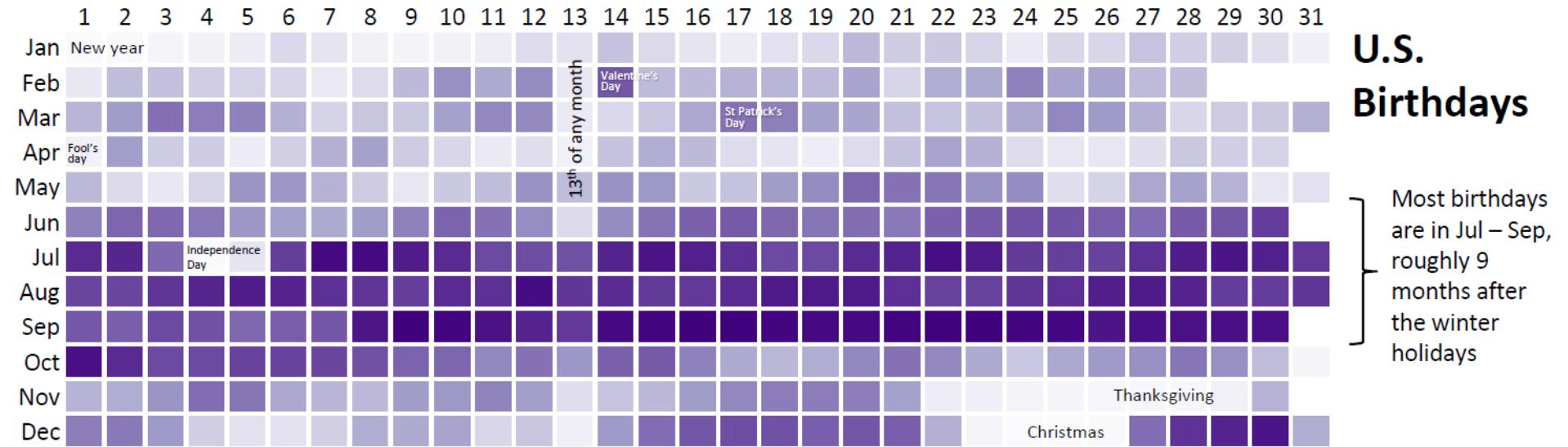


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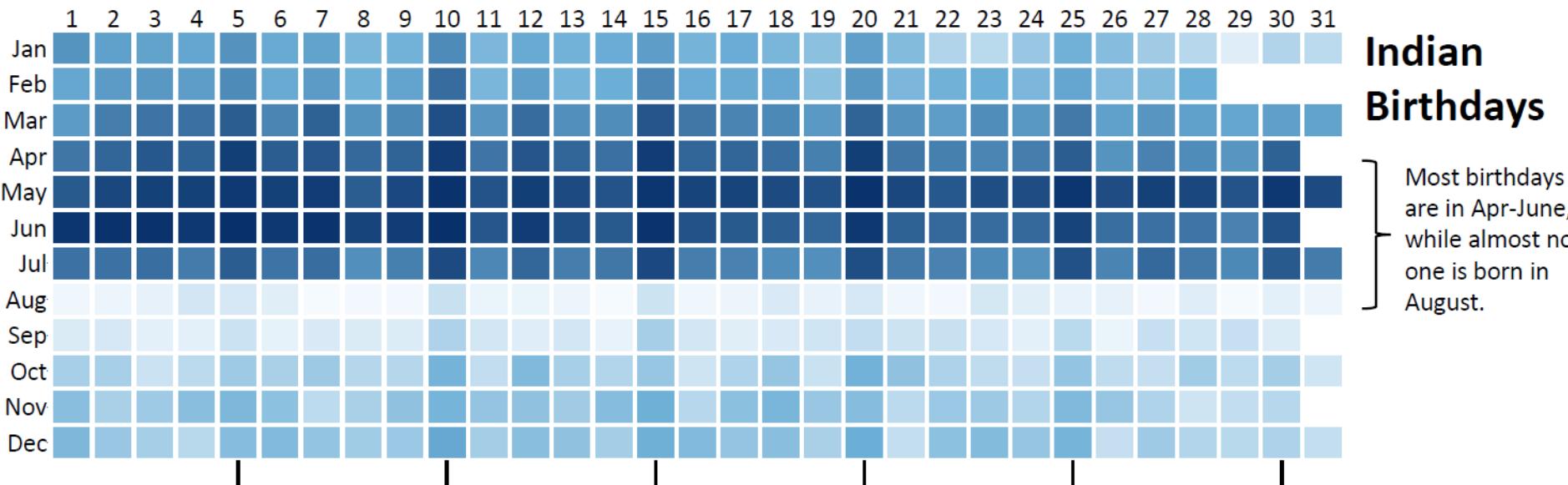
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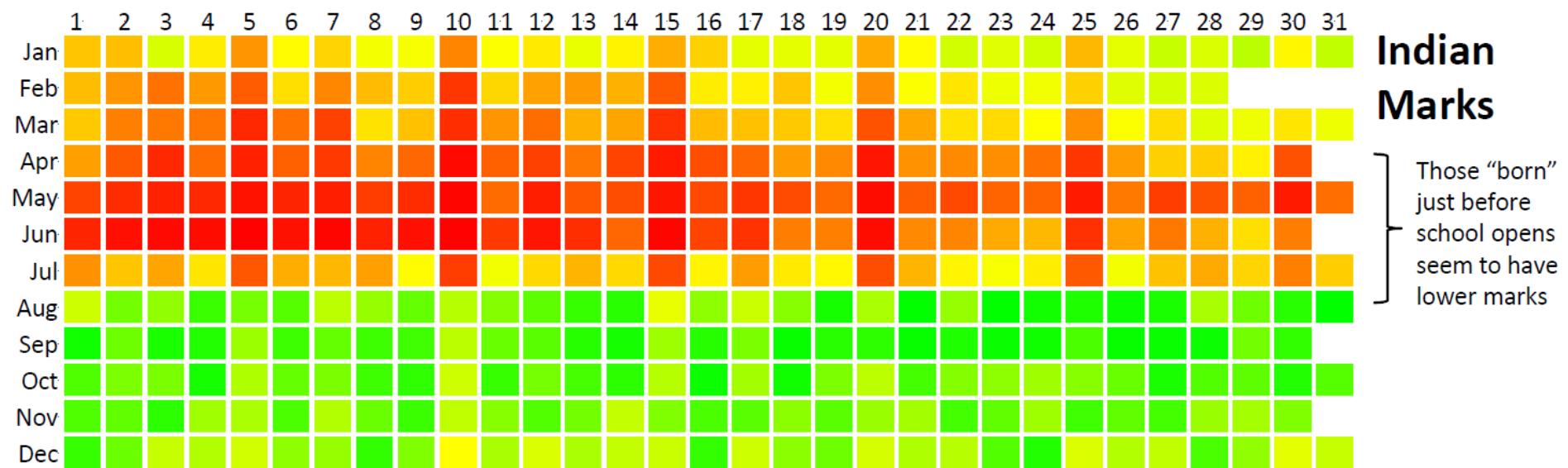
Birthdays in the U.S and in India, Gramener



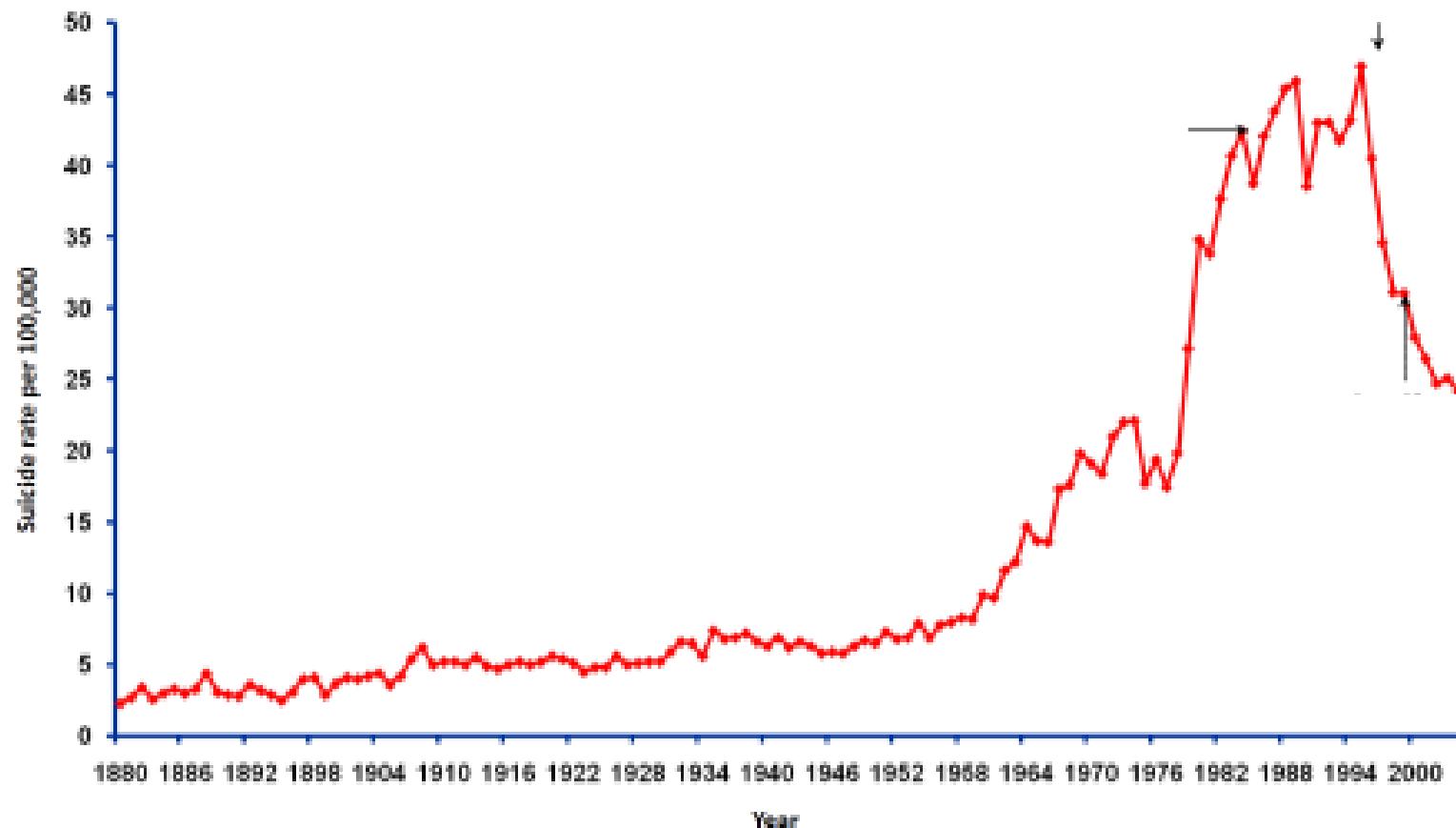
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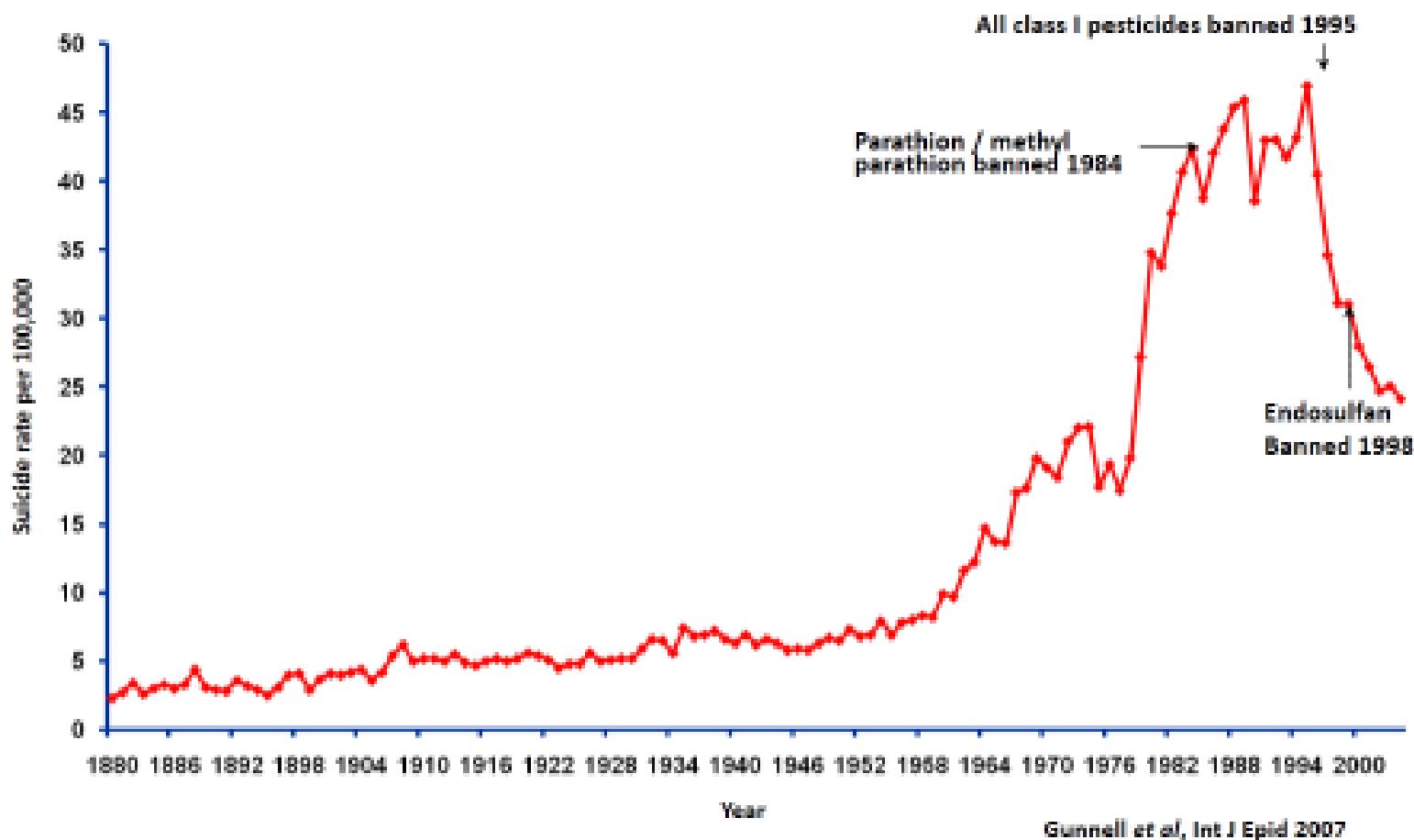


Suicide rates in Sri Lanka 1880-2005



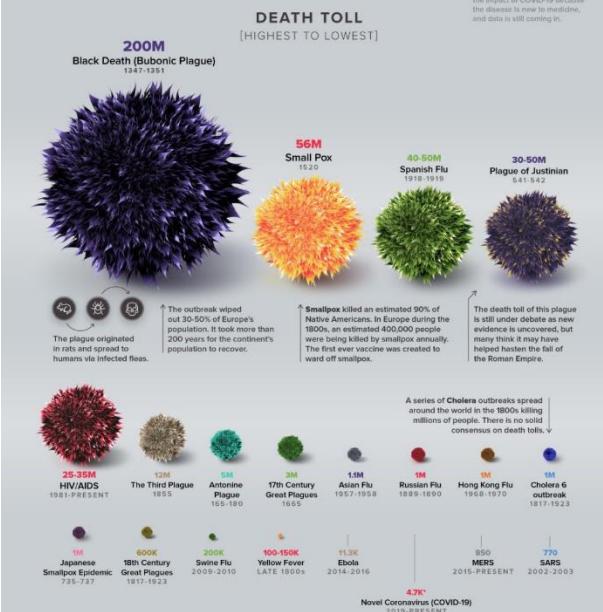
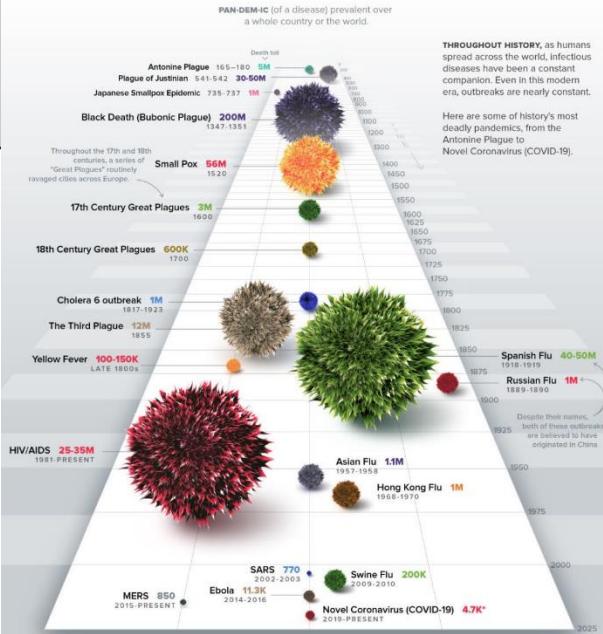
Gunnell et al, Int J Epid 2007

Suicide rates in Sri Lanka 1880-2005



Assignment 1

HISTORY OF PANDEMICS



<https://www.visualcapitalist.com/history-of-pandemics-deadliest/>

Assignment 1

- Comparison of length, area, or volume?
- Fuzzy edges
- Colour coding?
- Shape coding?
- Semantic coding?
- *Ponzo illusion* (linear perspective - unless blobs are created inside some strictly observed three-dimensioned model of space)
- Annotations?
- Should it be relative to time? How does 1 million in 6 years compare with half a million in 6 weeks?
- Should it be adjusted for era? (5 million deaths from 165 to 180 AD would be something like 180 million today)
- 7 of them are caused by bacteria, not viruses

HISTORY OF PANDEMICS

