



The Beautiful Science of Data Visualization

Jeff Pettitross | Senior Manager, User Experience | Tableau Software

September 7, 2017

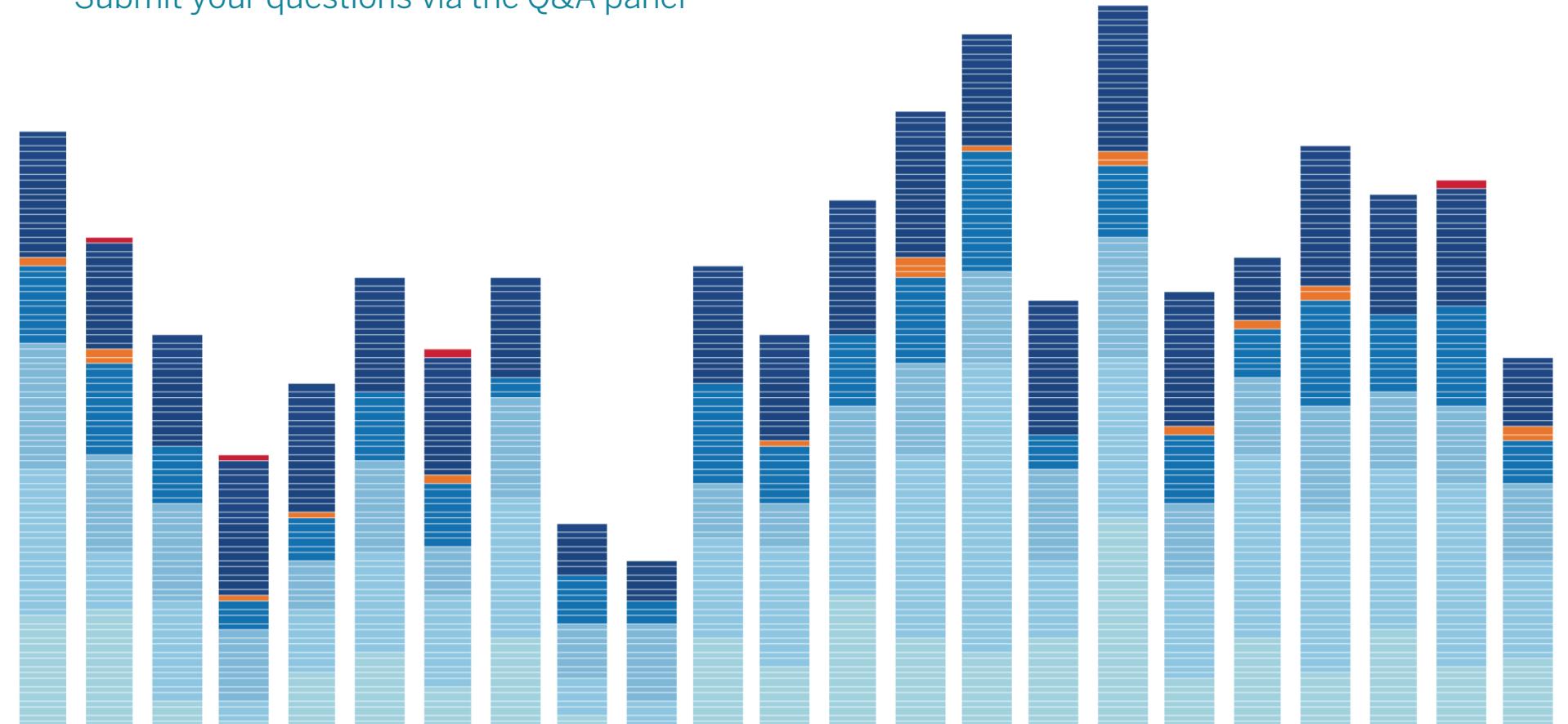
Welcome!

We'll get started in just a few minutes.

- JM: ~40 minute Webinar video is available at: https://www.tableau.com/learn/webinars/beautiful-science-data-visualization-students?utm_campaign=Live%20Web%20Seminar%20-%20TFT%20-%20Beautiful%20Science%20Series%20-%20FUP%20Attended%20-%20en-US%20-%20Registration
- (Registration may be required at Webinar site)

Questions?

Submit your questions via the Q&A panel





The Beautiful Science of Data Visualization



des Balances

échelle de 1:160 000

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

Conçue par M. Minard, Inspecteur Général des Ponts et Chaussées, en octobre

Paris, le 20 Novembre 1869.

Les nombres d'hommes perdus sont représentés par les larges des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en lettres sur ces zones. Le rouge signifie les hommes qui entrent en Russie, le noir ceux qui en sortent. — Les renouvellements qui ont lieu à travers la carte sont indiqués dans les ouvrages de M. M. Ubiens, de Léger, de Féretat, de Chambry &c. Je remercie madame de Sélestat pharmacien de l'Armée depuis le 28 Octobre.

Une autre fois je juge à l'œil la diminution de l'armée; j'ai supposé que les corps de Léna, Néma &c. de Malibol (Douvres) qui avaient été détruits sur le Niémen à Malibol et se rejoignaient avec Orléans & Wilek, avaient toujours marché avec l'armée.

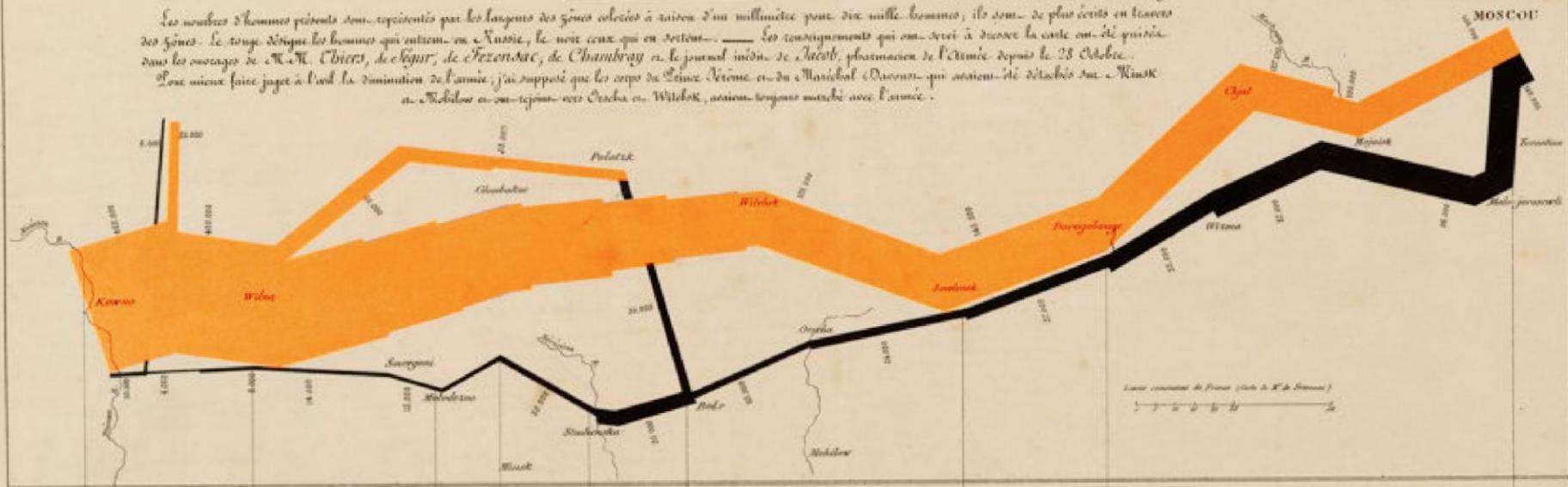


TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

Les Températures passent au gelé
à Nolens gelé.

- 16° le 7 X.^{me}

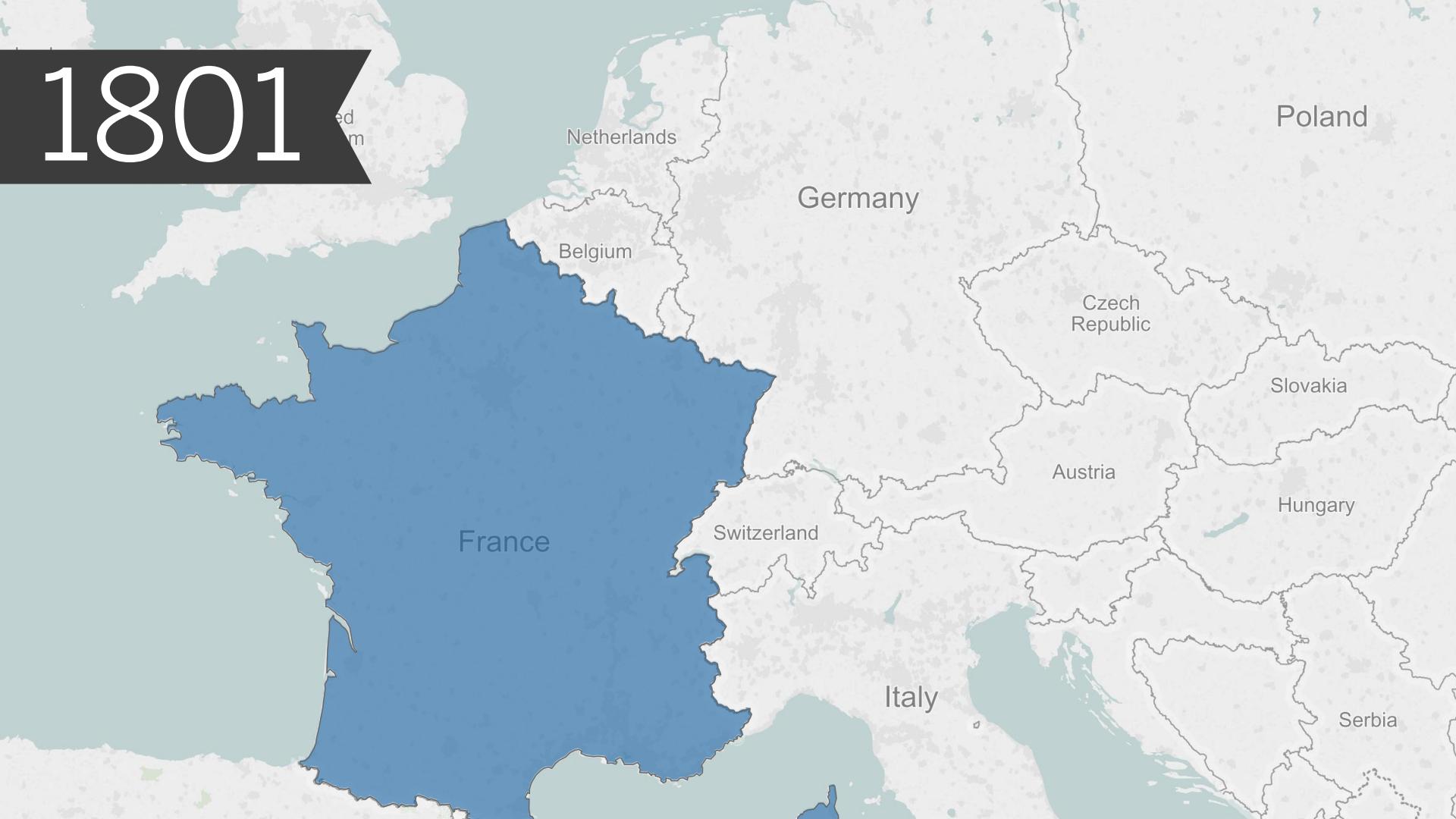
- 24° le 19 X.^{me}
- 20° le 25 X.^{me}
- 26° le 6 X.^{me}

- 21° le 14 D.^{me}

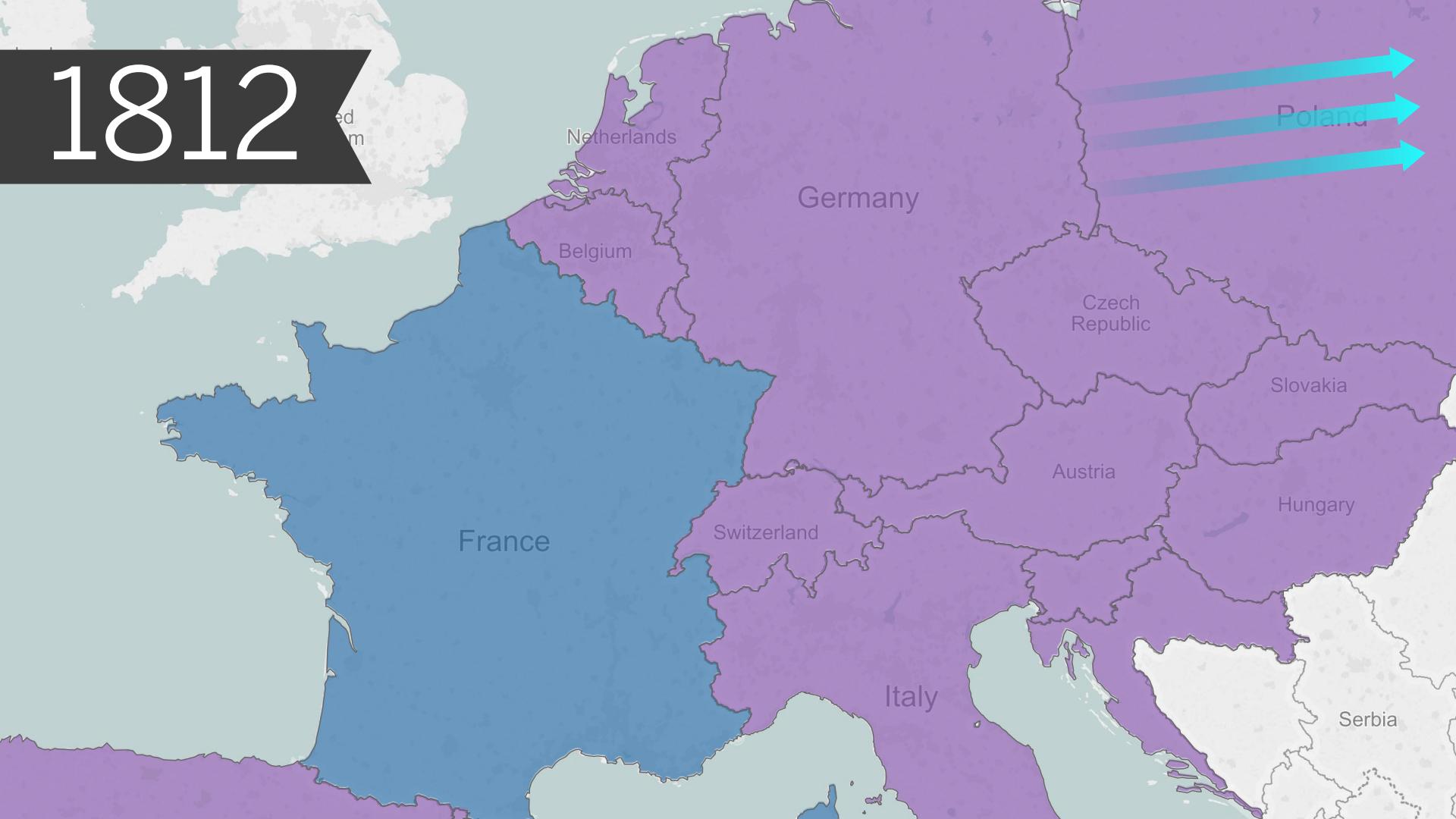
Froid 24 D.^{me}

Gelé 10 D.^{me}
12
14
16
18
20
22
24

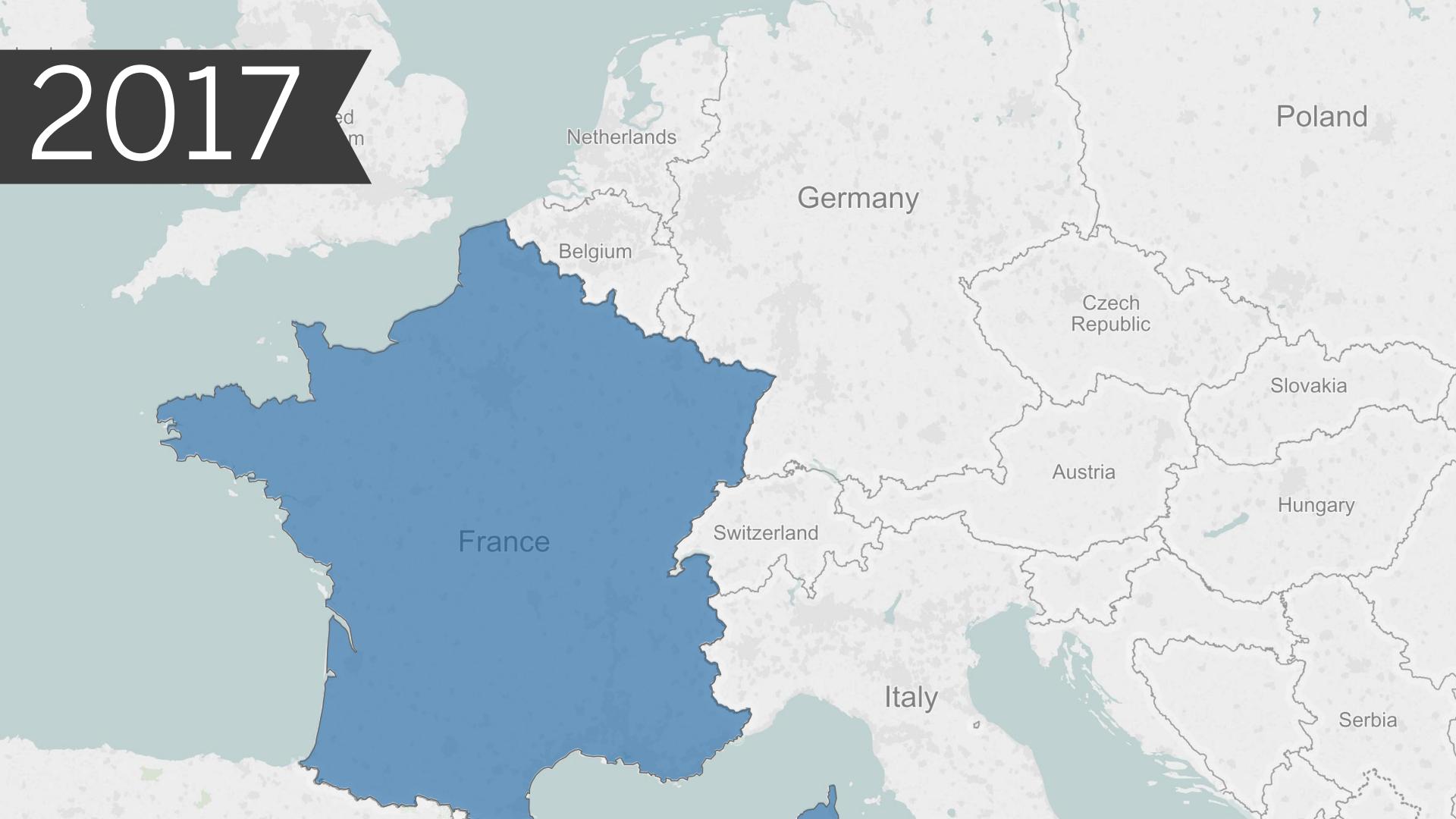
1801



1812



2017



des Balances

échelle de 1:100⁰⁰⁰

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

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Les nombres d'hommes perdus sont représentés par les larges des zones colorées à raison d'un millimètre pour six mille hommes; ils sont de plus écrits en lettres sur ces zones. Le rouge signifie les hommes qui meurent en Russie, le noir ceux qui en reviennent. — Les renouvellements qui ont lieu à droite ou à gauche dans les courbes de Moscou, de Vitebsk, de Légov, de Chambry et le journal indien de André, pharmacien de l'Armée depuis le 28 Octobre.

Qui n'a pas fait juger à l'œil la domination de l'armée; j'ai rappelé que les corps de l'Armée Napoléon et du Maréchal Davout qui avaient été détruits sur le Niémen et à Malibor et au régime vers Orsha et Wileïka, avaient toujours marché avec l'armée.

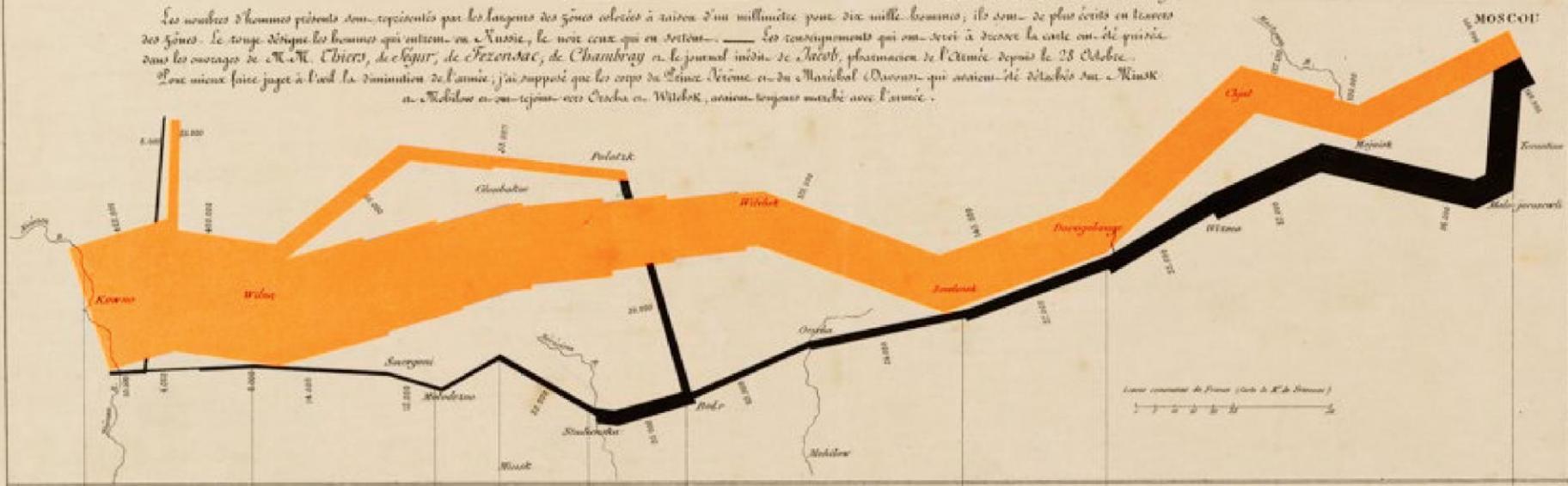


TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

Les Campagnes passent au gelé
la Négresse gèle.

— 16° le 7 X.^{me}

— 24° le 17 X.^{me} — 26° le 18 X.^{me}
— 30° le 9 X.^{me}

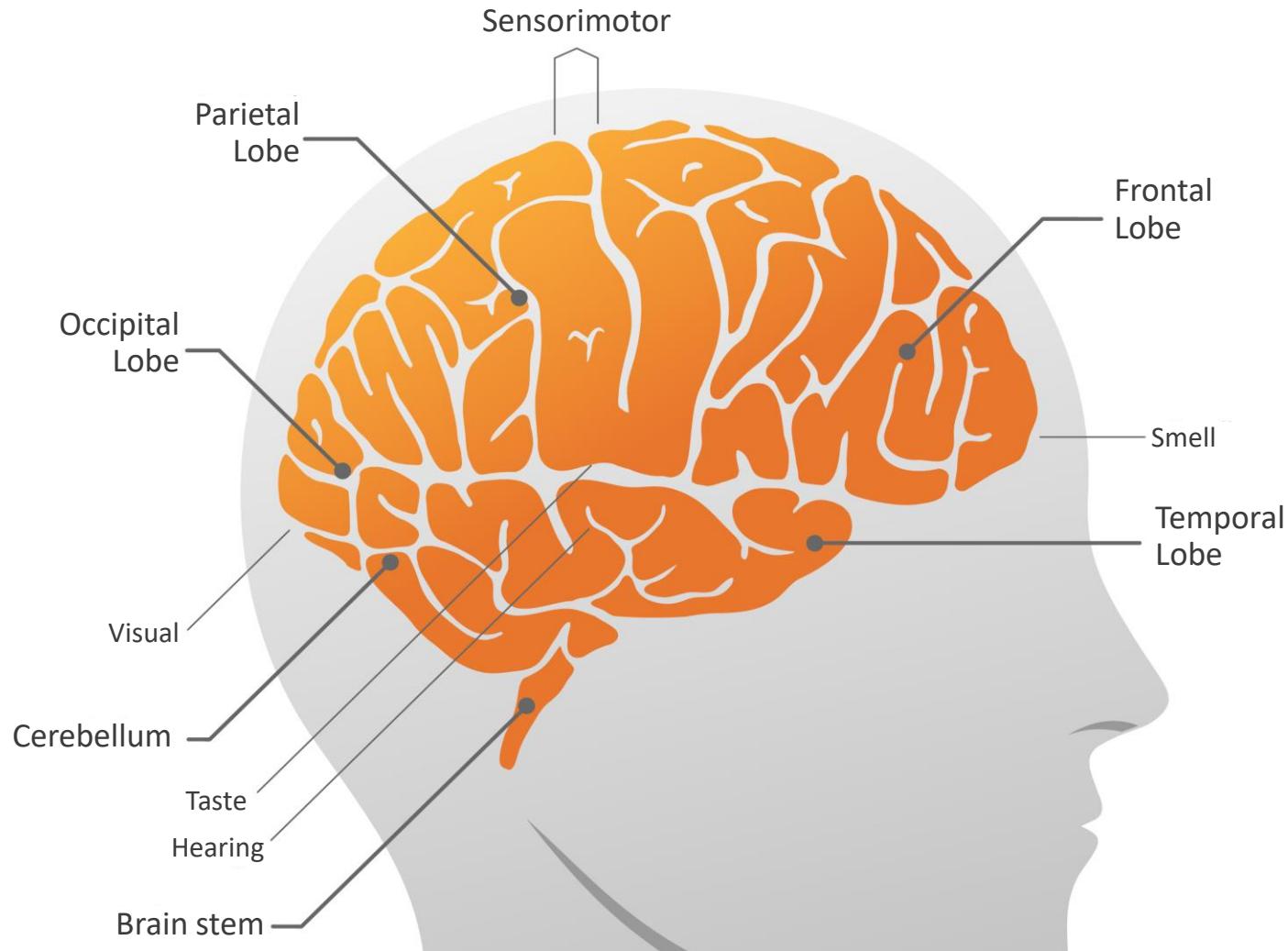
— 11° — 21° le 14 D.^{me}

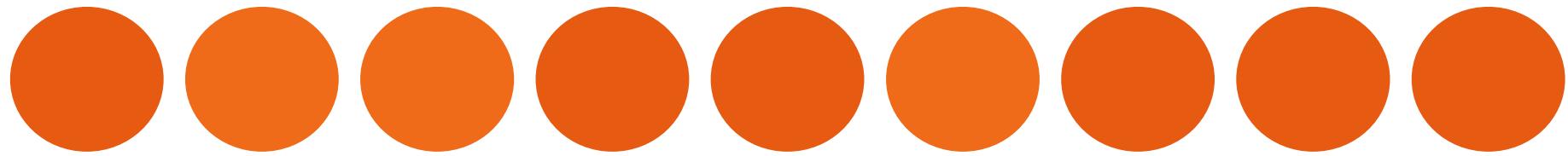
Plus 25 D.^{me}

Zéro le 15 D.^{me}
10
20
30
40
50
60 degrés



The Beautiful Science of Data Visualization





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Military Spending as % of Economy

Each number is one country

Europe

European Union 113322223142122211222322123

Independent 22430712246144

Americas

North America 15

Central America 111211

South America 1224441222

Caribbean 421

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Military Spending as % of Economy

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Europe

European Union 111111122222222222233334

Independent 01122223444467

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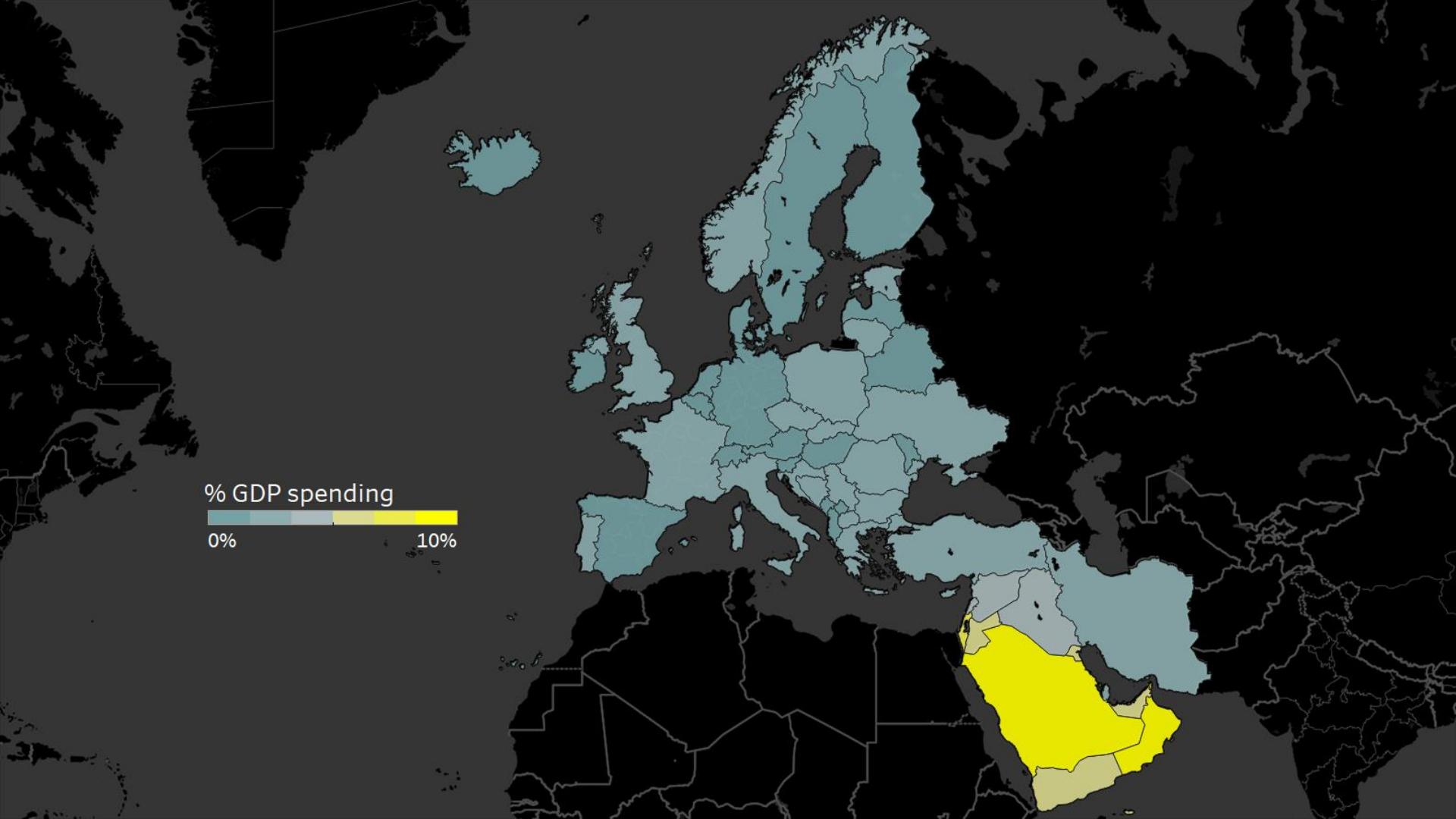
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Middle East 455566667891112

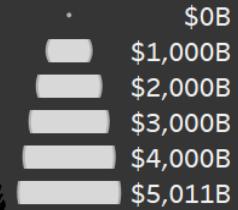
% GDP spending

0%

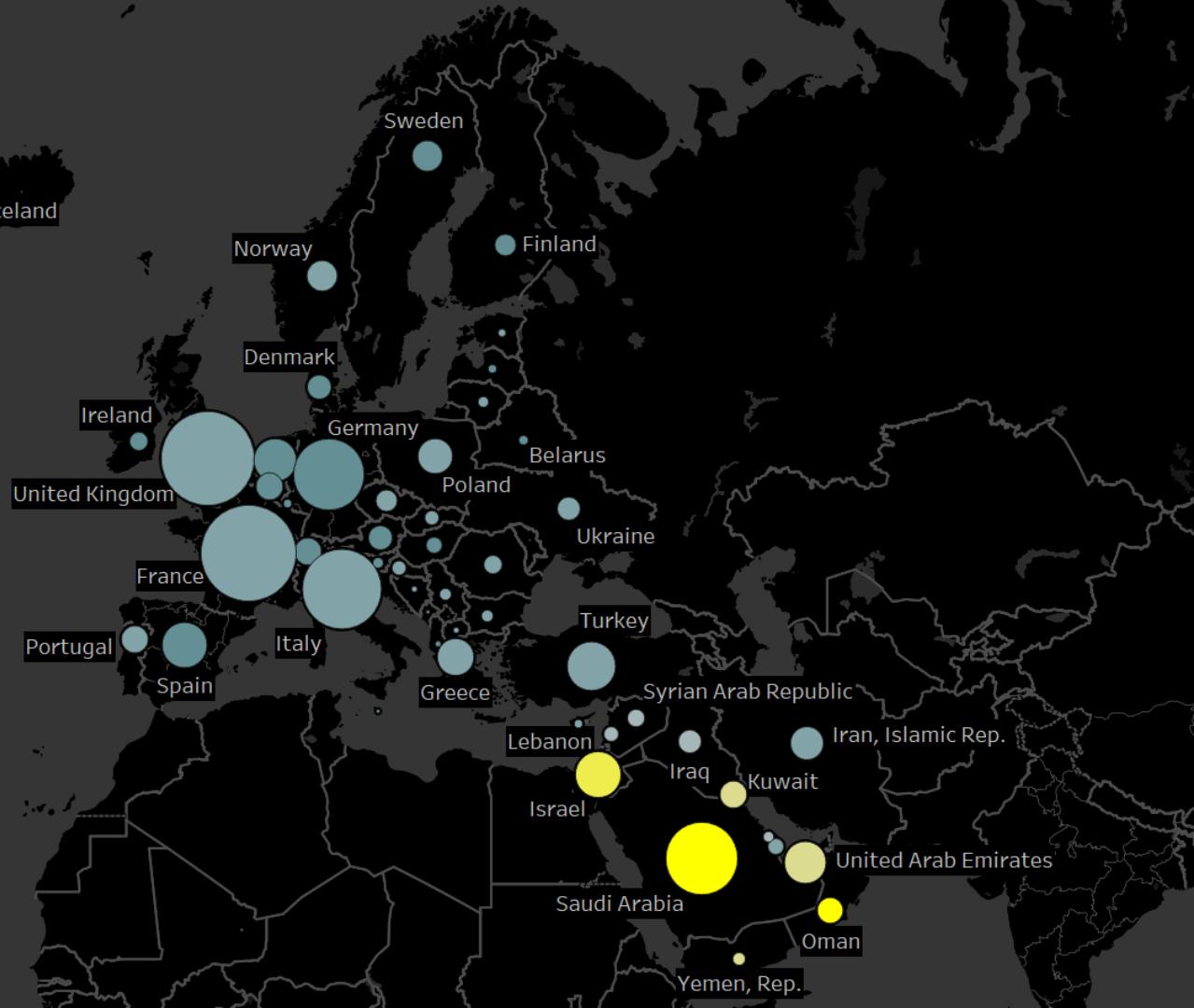
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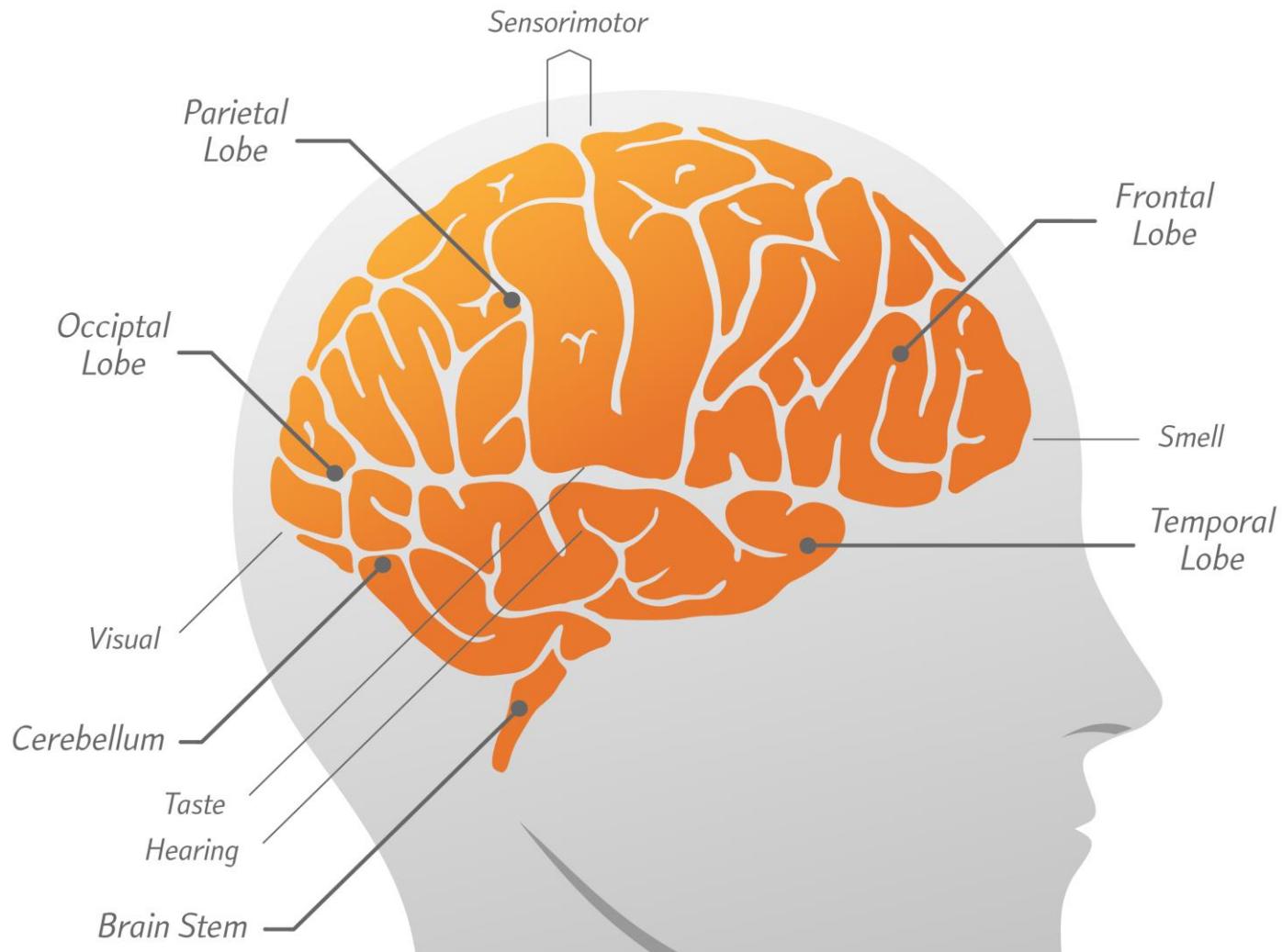


Spending (US\$)

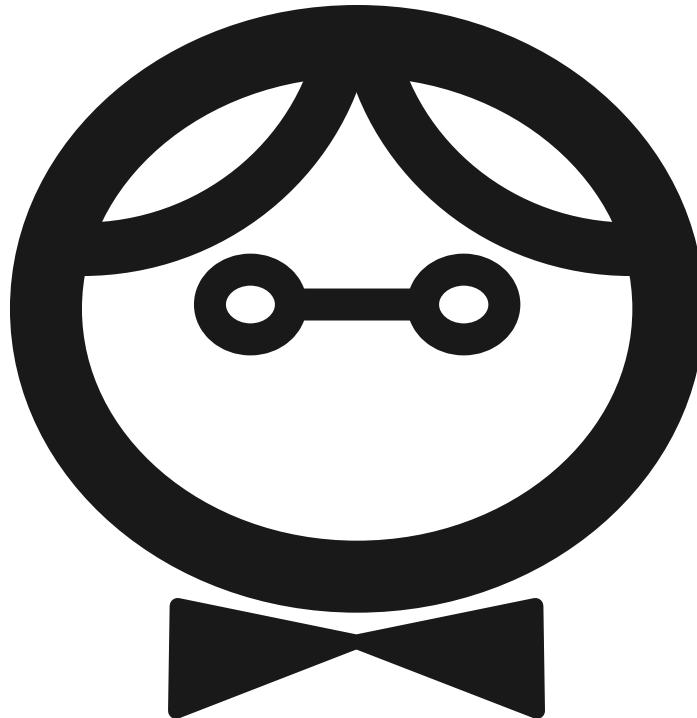


% GDP spending

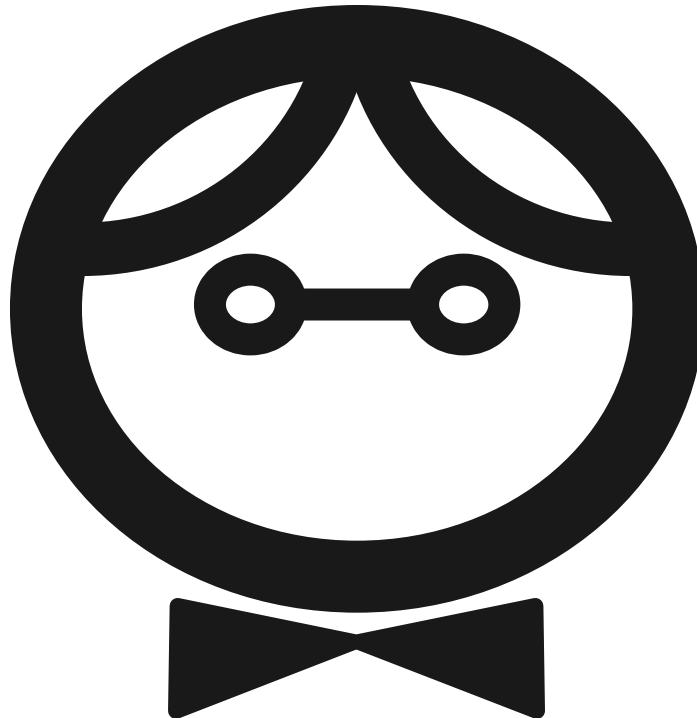




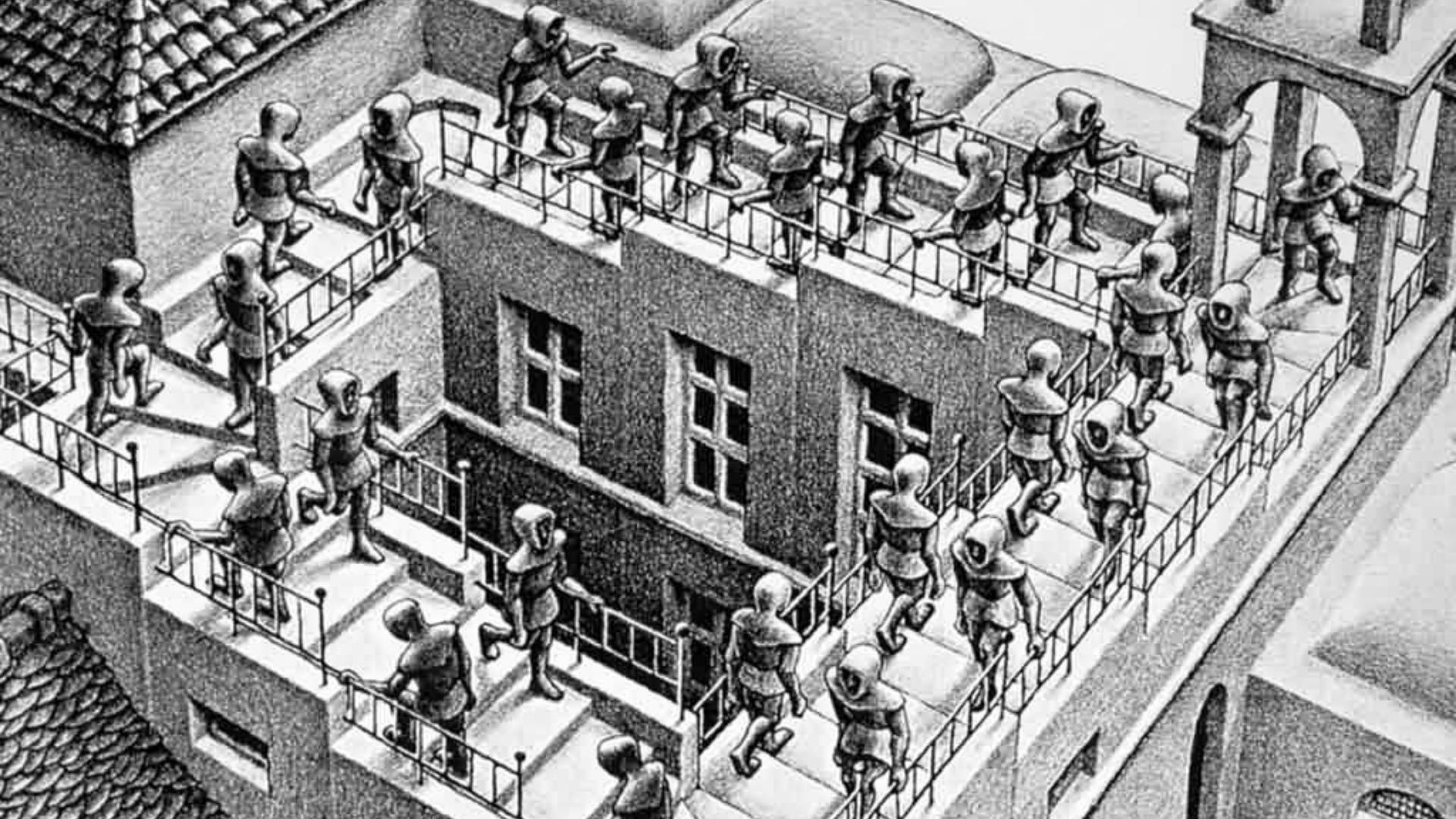


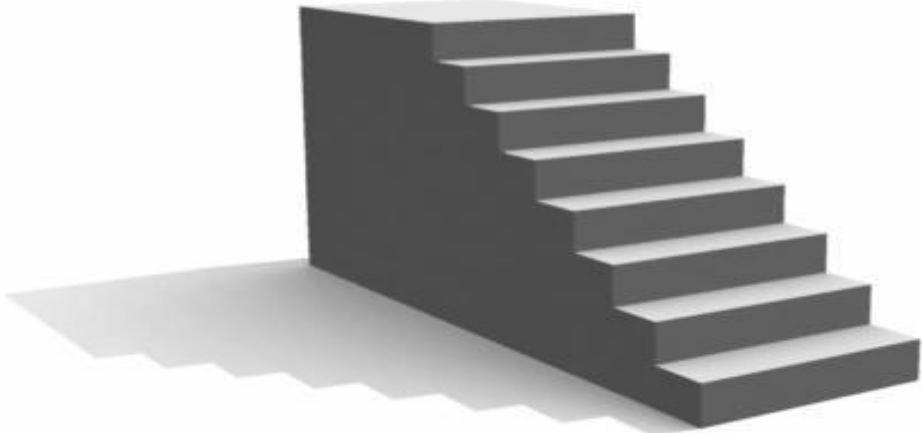


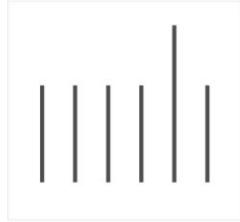
Barney



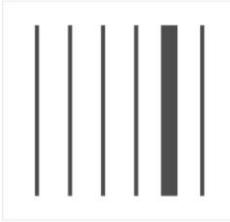
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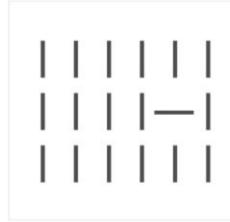




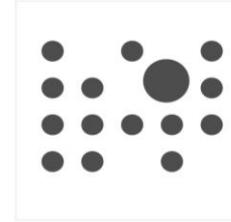
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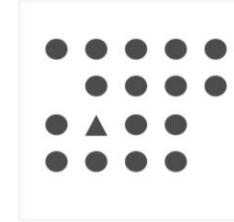
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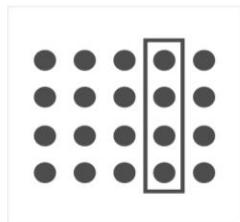
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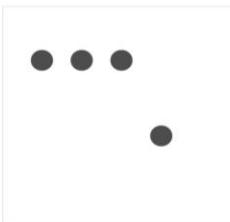
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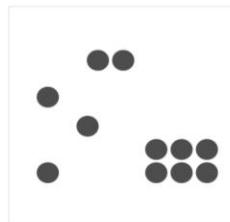
Shape



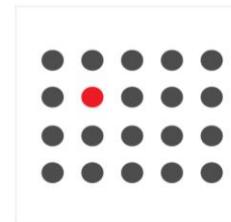
Enclosure



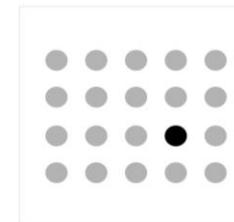
Position



Grouping



Color Hue



Color Intensity

Types of data

CATEGORICAL

Asia
Europe
North America

Alice
Robert
Chris

Water
Coffee
Tea

ORDINAL

Gold
Silver
Bronze

Solid
Liquid
Gas

January
February
March

QUANTITATIVE

Weight
10 kg, 35 kg, 100 kg

Cost
\$500, \$2.5 million, \$4 billion

Discount
0%, 2.5%, 5%

Date
14 March 2015 14:02

Visual features for data

CATEGORICAL	ORDINAL	QUANTITATIVE
Position	Position	Position
Color hues	Size	Length
Shape	Color intensity	Size
Clusters	Color hues	Color intensity
Boundaries	Shapes	Up to 2 color hues Orientation (Change)

des Balances

échelle de 1:100⁰⁰⁰

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

Dessiné par M. Minard, Inspecteur Général des Ponts et Chaussées, ex-soldat.

Paris, le 20 Novembre 1869.

Les nombres d'hommes perdus sont représentés par les larges des zones colorées à raison d'un millimètre pour six mille hommes; ils sont de plus écrits en lettres sur ces zones. Le rouge signifie les hommes qui meurent en Russie, le noir ceux qui en reviennent. — Les renouvellements qui ont lieu à droite ou à gauche dans les courbes de Moscou, de Smolensk, de Chambry et de Malibol, pharmaceutique de l'Armée depuis le 28 Octobre.

Qui n'a pas fait juger à l'œil la domination de l'armée; j'ai rappelé que les corps de l'Armée Napoléon et du Maréchal Davout qui avaient été détruits sur le Niémen et à Malibol et au régime vers Orsha et Wileïk, avaient toujours marché avec l'armée.

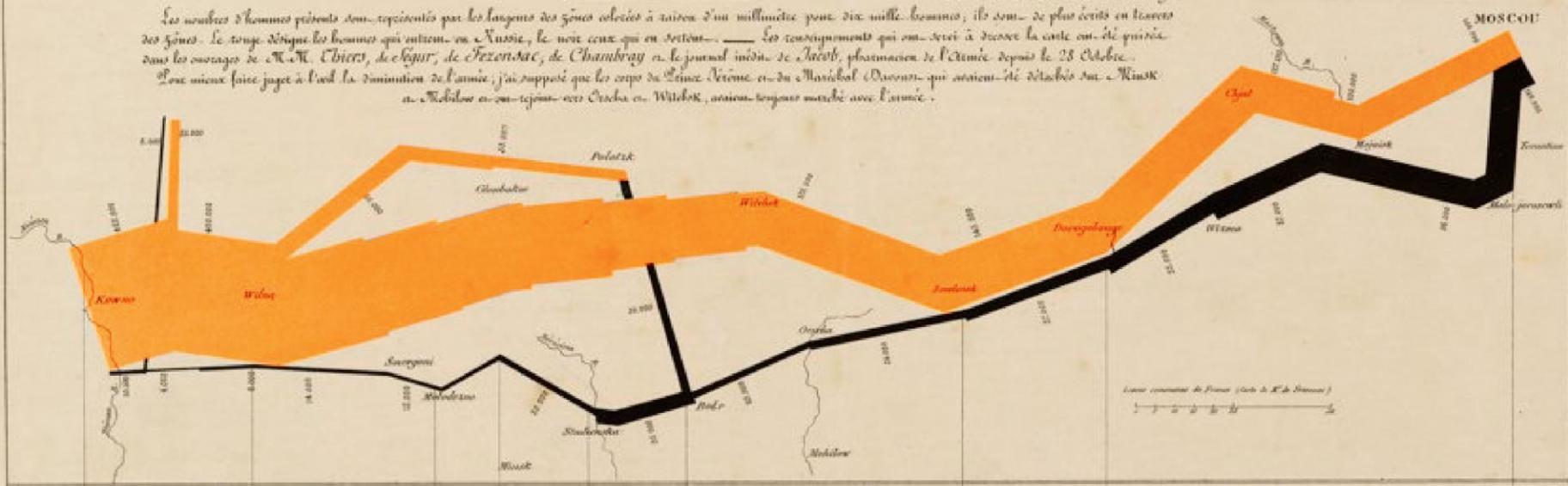


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— 16° le 7 X.^{me}

— 30° le 9 X.^{me}

— 24° le 11 X.^{me}

— 20° le 15 D.^{me}

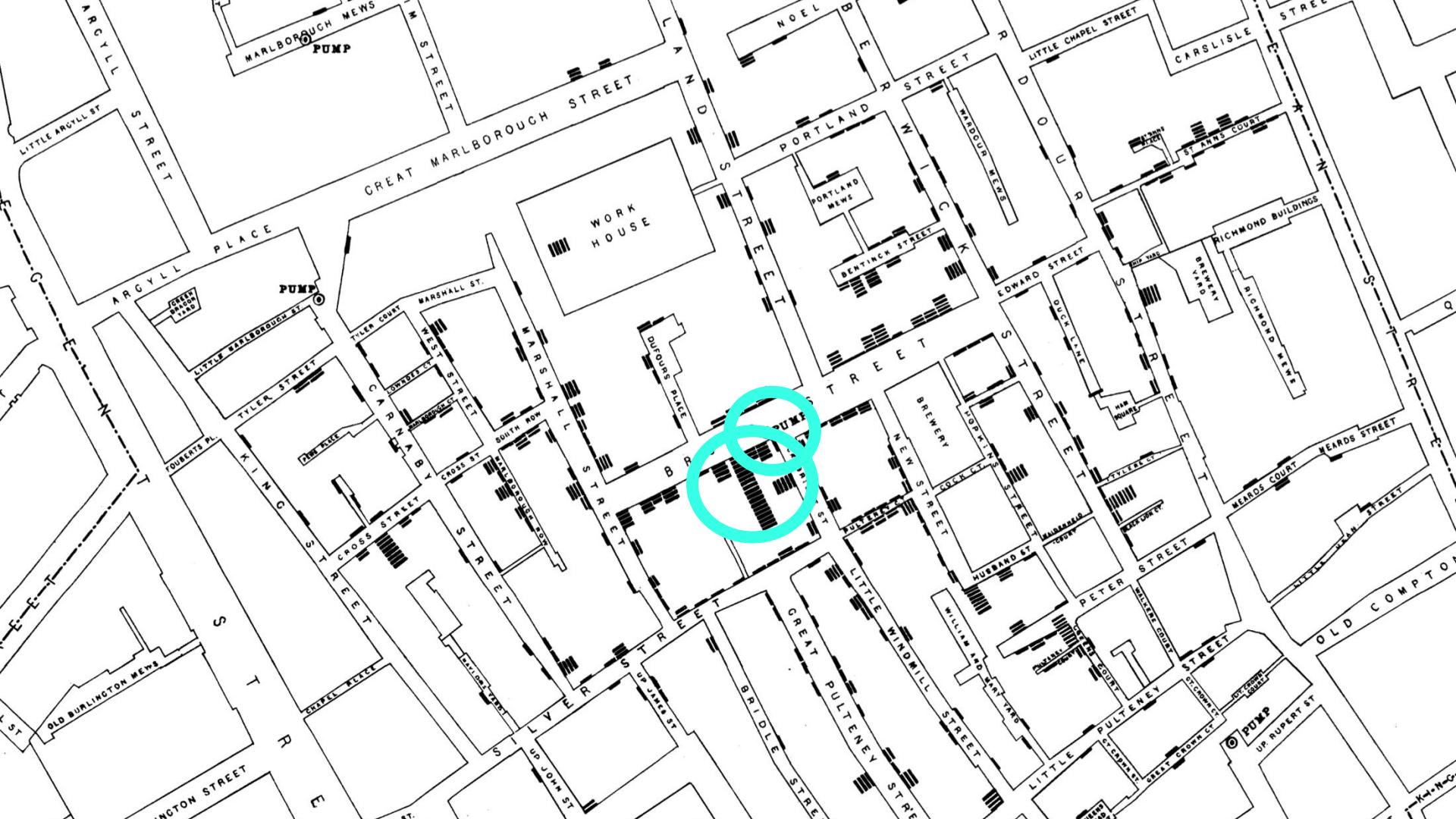
— 11°

— 21° le 14 D.^{me}

— 8° le 2 D.^{me}

Paris 25 D.^{me}

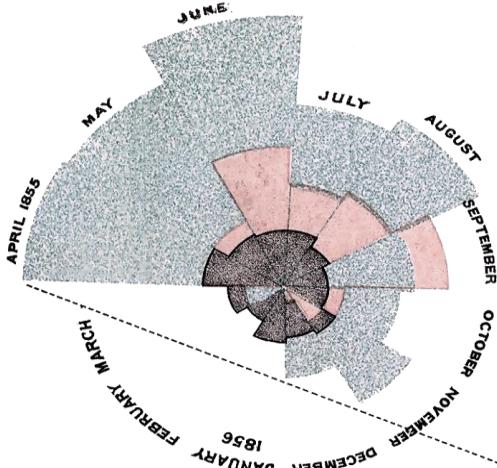
Zéro le 10 D.
10
20
30
40
50
60 degrés



2.
APRIL 1855 TO MARCH 1856.

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

1.
APRIL 1854 TO MARCH 1855.



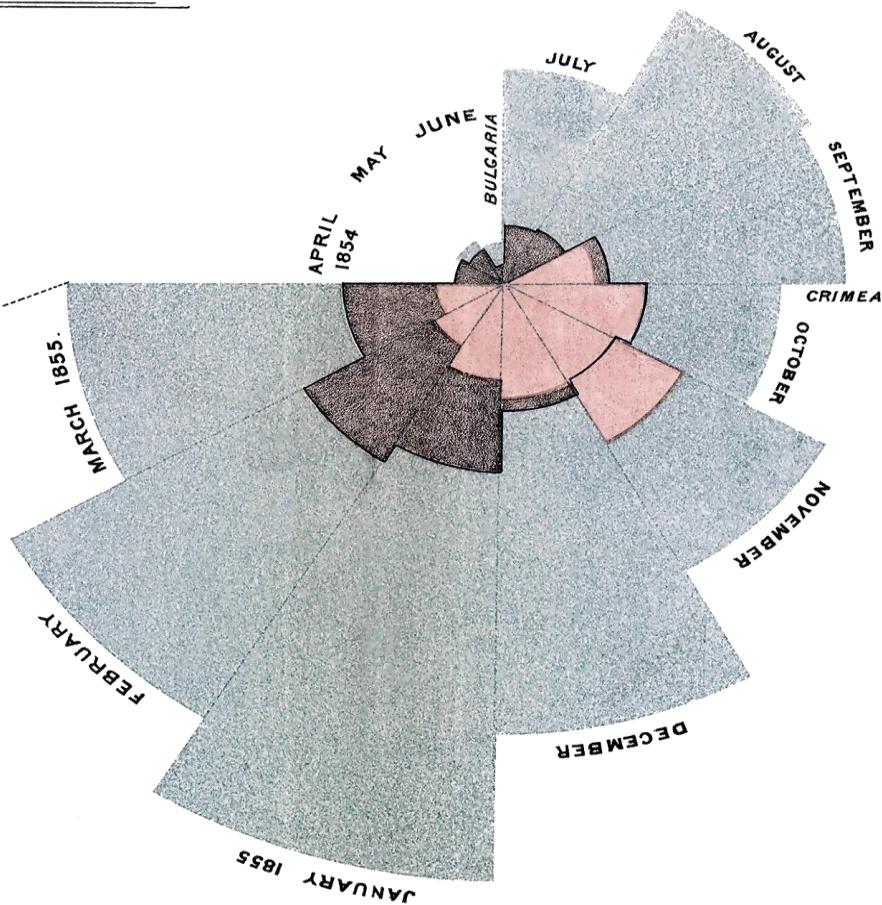
The areas of the blue, red, & black wedges are each measured from the centre as the common vertex.

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.

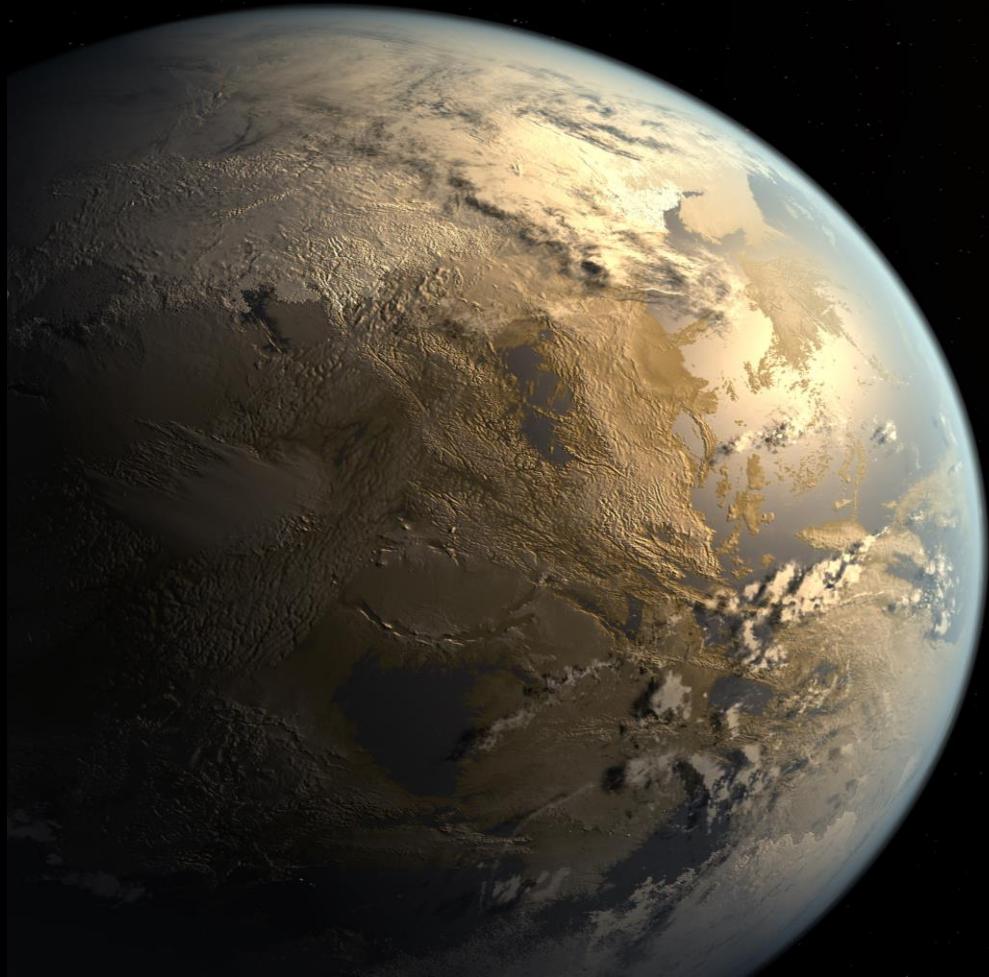
In October 1854, & April 1855, the black area coincides with the red; in January & February 1856, the blue coincides with the black.

The entire areas may be compared by following the blue, the red & the black lines enclosing them.

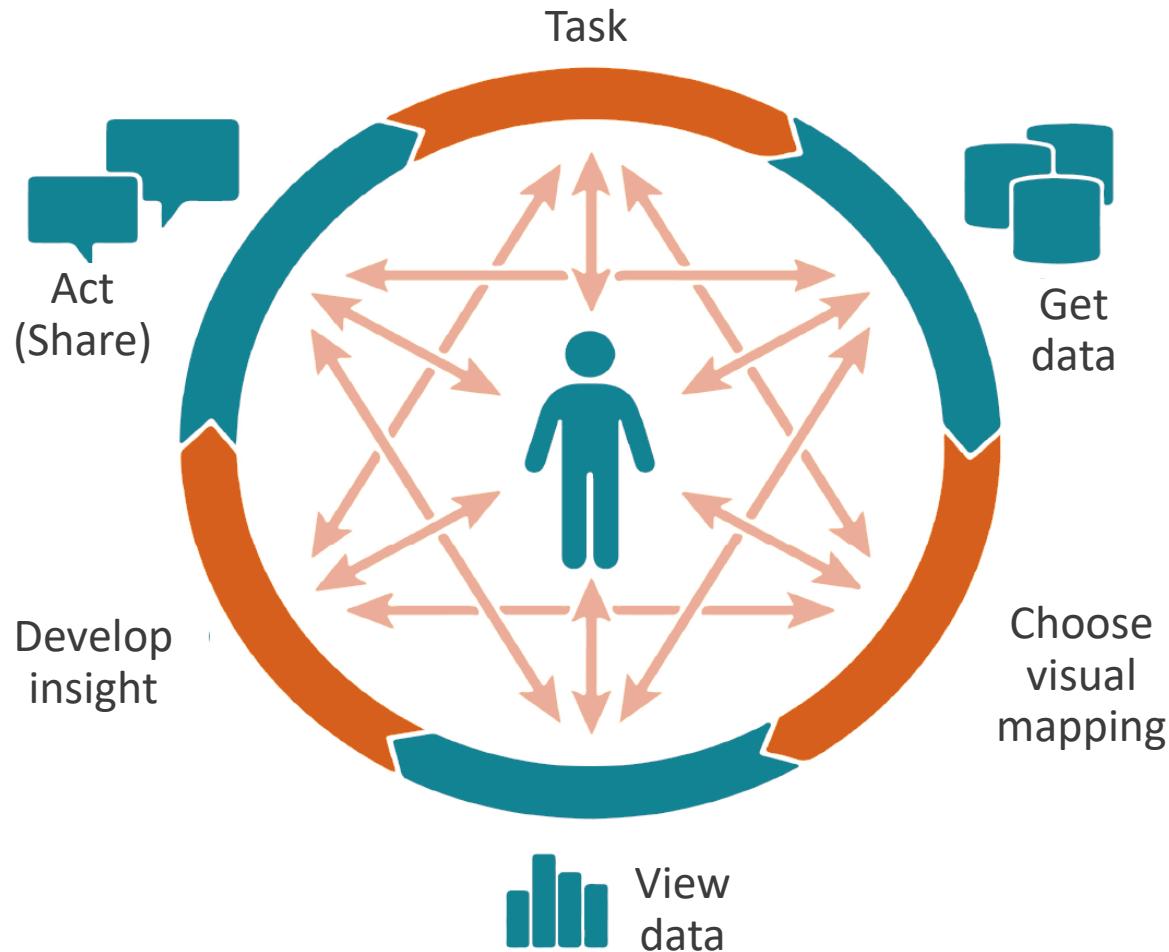


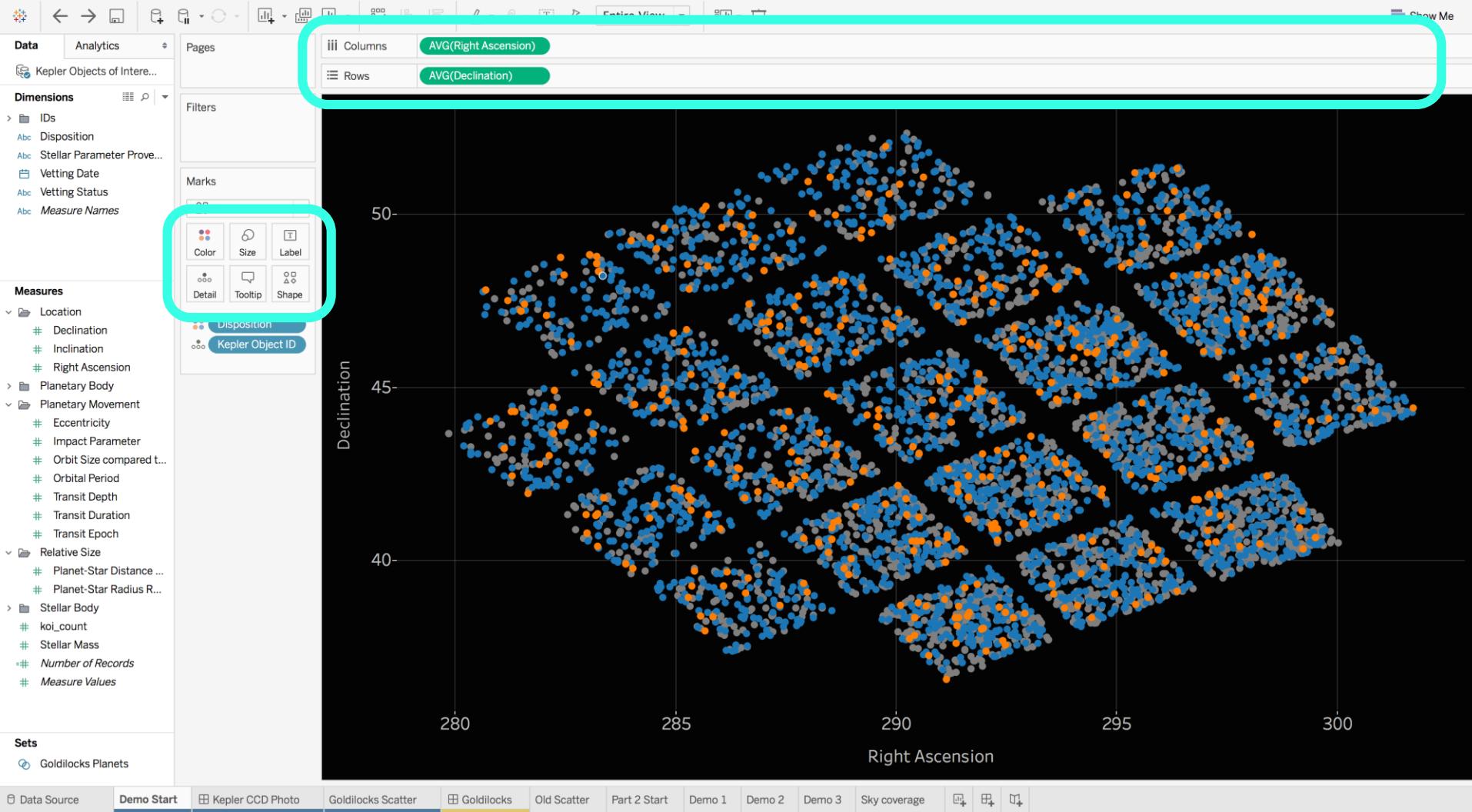
反相屬也。七度於辰在丑為星。記者言統已方
也。

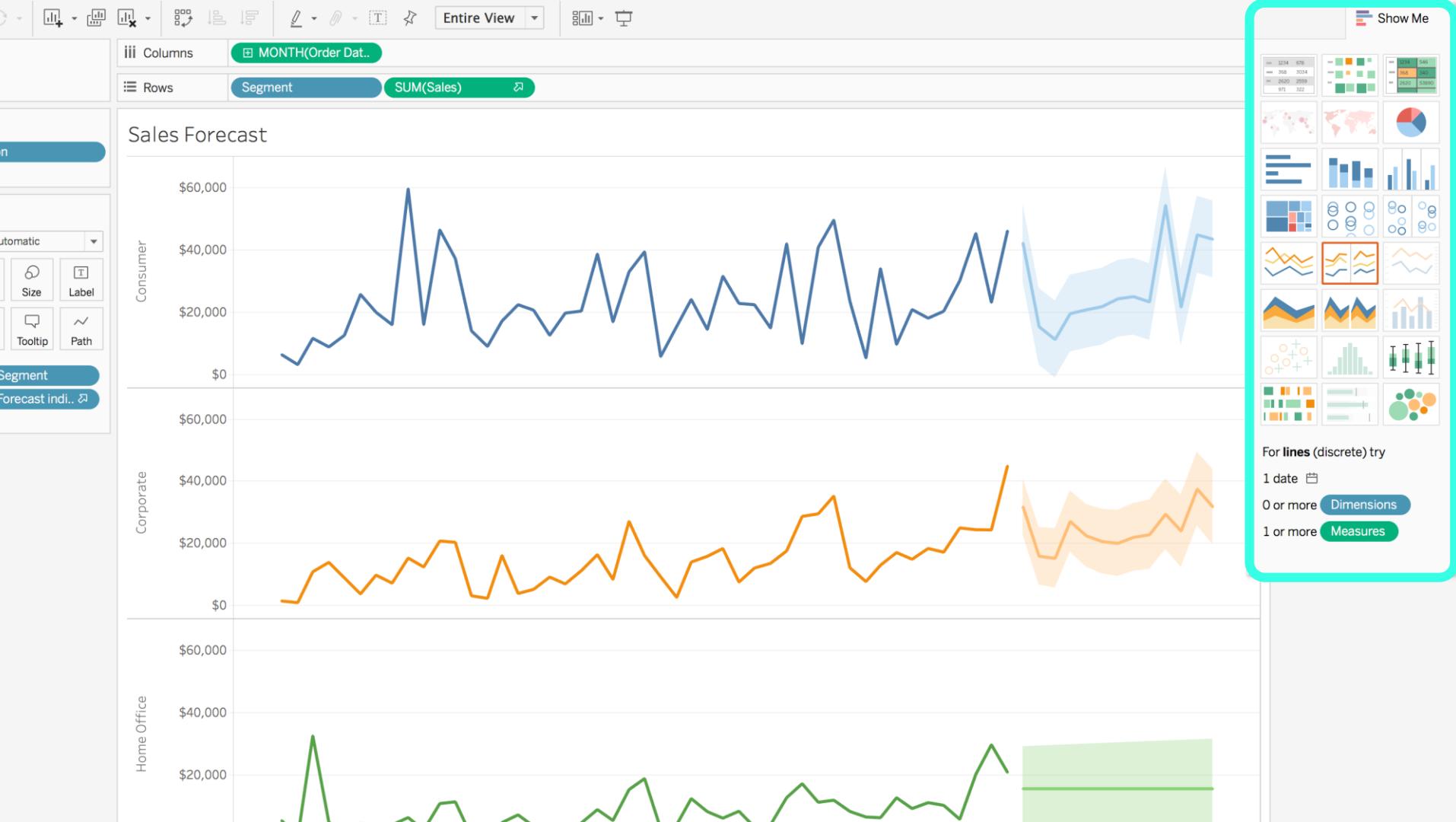


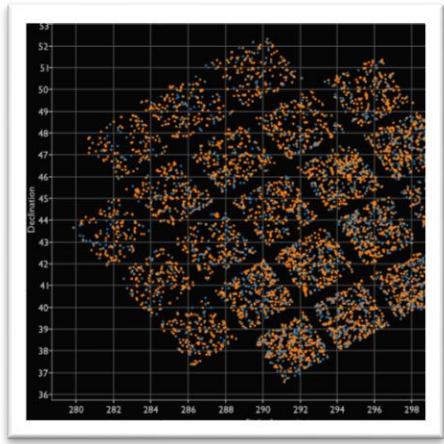
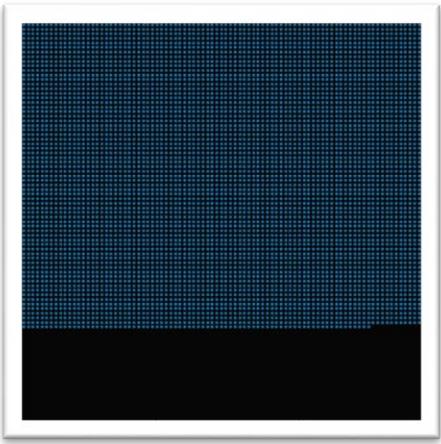










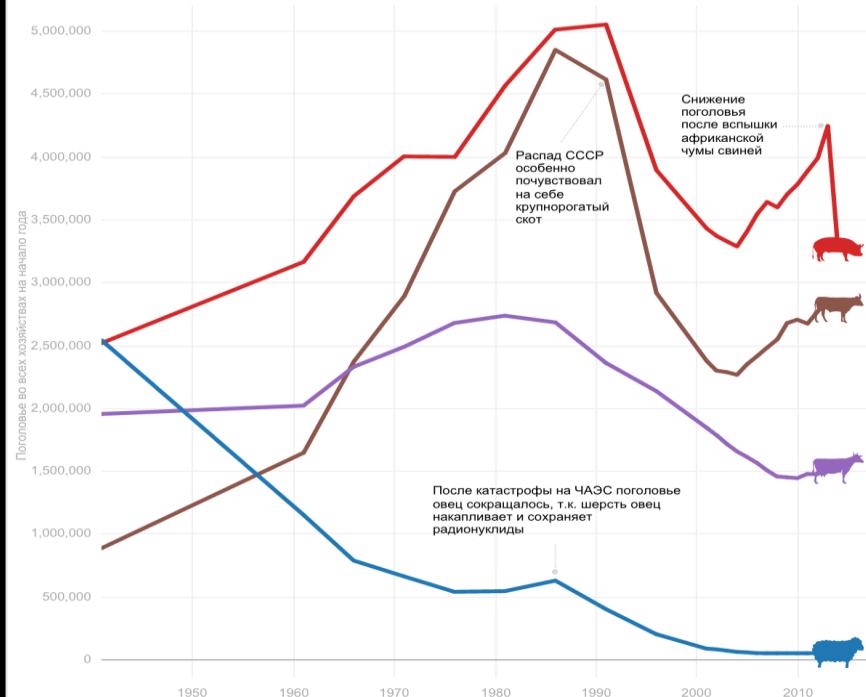
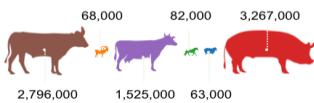


Молчание ягнят

С 1941 года поголовье овец в Беларуси сократилось в 40 раз. А кому повезло больше?

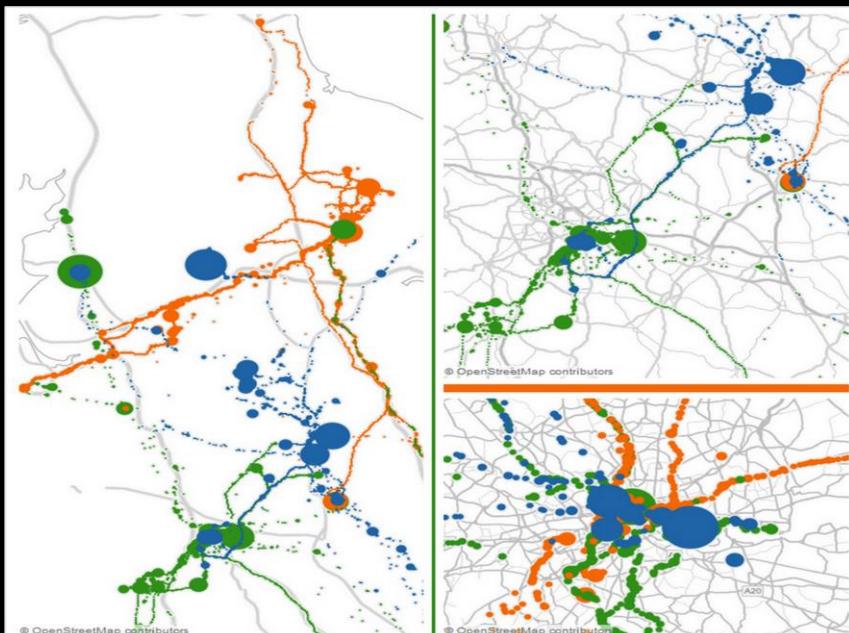
- Другой крупнорогатый скот
- Козы
- Коровы
- Лошади
- Овцы
- Свиньи

2014



BALLCODE: 2013-14 NBA REGULAR SEASON

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Connect

To a File

Excel

Text file

Statistical file

More...

To a Server

Tableau Server

Microsoft SQL Server

MySQL

Oracle

Amazon Redshift

More

Tableau Server

Amazon Aurora

Amazon EMR

Amazon Redshift

Cloudera Hadoop

EXASolution

Firebird

Google Analytics

Google BigQuery

Google Cloud SQL

Google Sheets

Hortonworks Hadoop Hive

HP Vertica

Microsoft SQL Server

MySQL

OData

Oracle

Pivotal Greenplum Database

PostgreSQL

Presto

QuickBooks Online

Salesforce

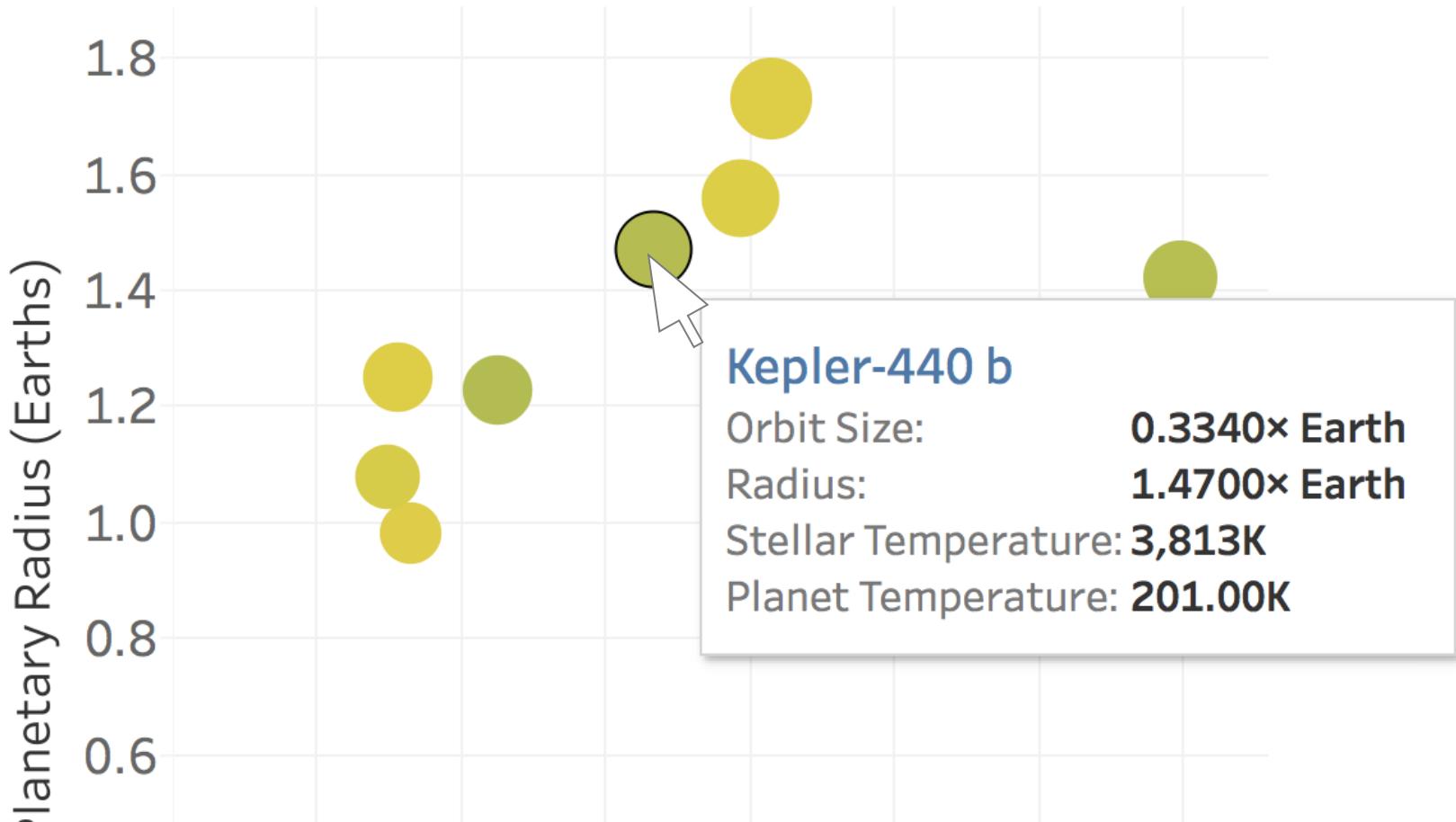
SAP HANA

Snowflake

Spark SQL

Teradata

Where could we live among the stars?





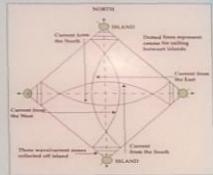
The Beautiful Science of Data Visualization



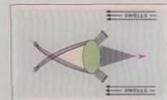
Sticking to the Waves

A Pattern Map

This "stick map" is a reproduction of a *wappope* navigation map of the Marshall Islands. It was used by master sailors to teach students general principles of navigation by using wave patterns formed by currents and islands. Students memorized these stick maps, but did not take them on voyages.



- The four shells represent islands.
- The four arcing strips represent ocean currents from east, west, north, and south.
- The straight sticks represent courses between pairs of islands.
- The intersections of the curved current sticks show where opposite currents collide, and where especially choppy waters can be expected.



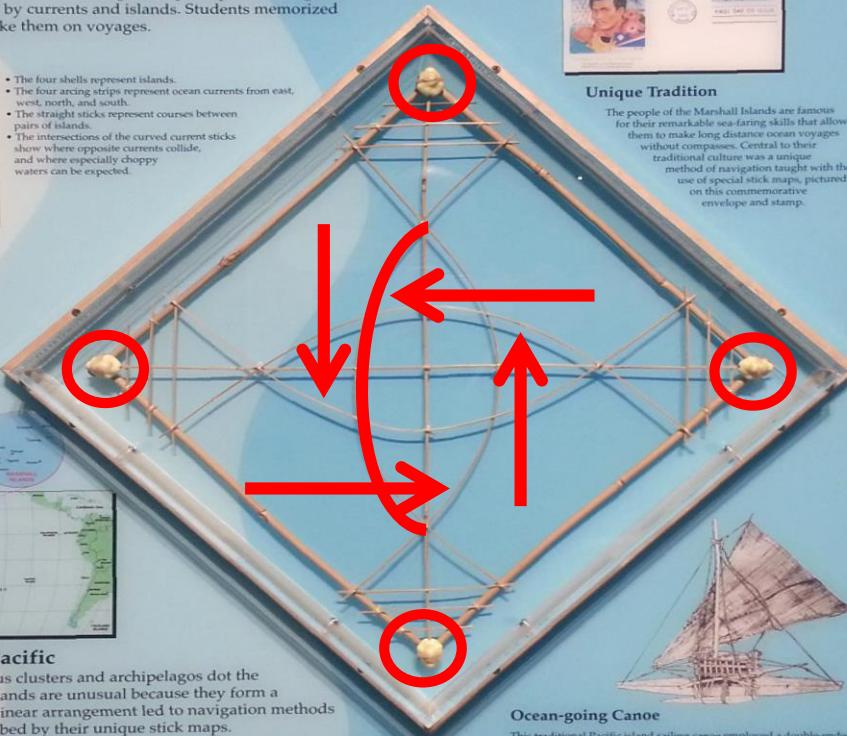
The three short straight strips of increasing length in front of each "shell-island" represent three zones of currents or waves caused by ocean currents breaking off and reflecting back in the opposite direction. Immediately behind the island are calm areas, beyond which refracted waves collide.



Islands of the South Pacific

Thousands of islands in various clusters and archipelagos dot the South Pacific. The Marshall Islands are unusual because they form a relatively straight chain. This linear arrangement led to navigation methods based on wave patterns described by their unique stick maps.

Marshall Islanders faced a navigational dilemma shared by other sailors of the South Pacific; they had no compass and they lacked the North Star (Polaris), the critical fixed point in the night sky that sailors of the northern hemisphere used to navigate. Instead, South Pacific islanders had to observe a wide range of phenomena such as the rising and setting of certain constellations to find direction; the color and smell of the ocean along certain courses, the presence of certain sea weeds and the flocking of certain sea birds to predict landfall.



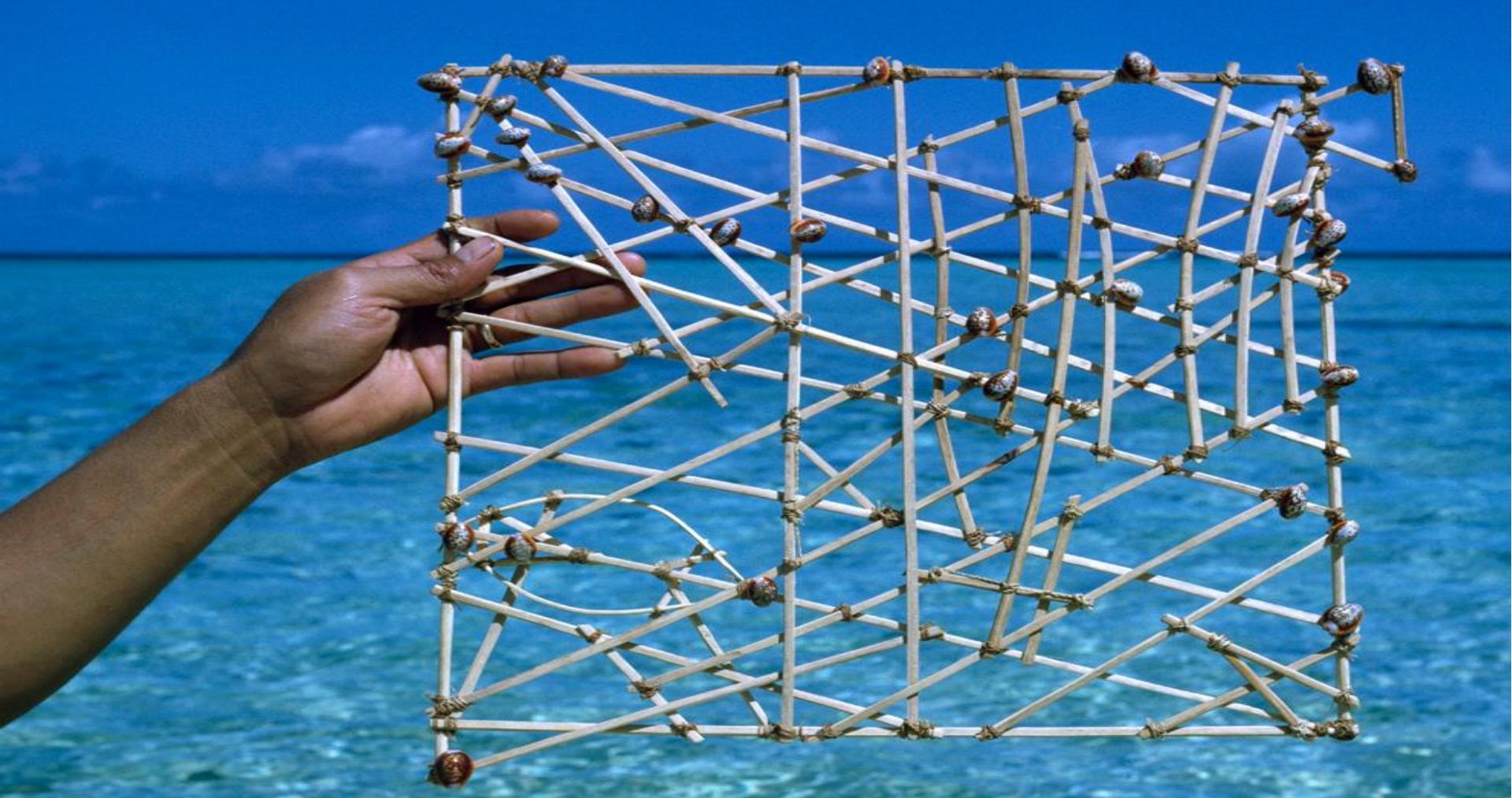
Unique Tradition

The people of the Marshall Islands are famous for their remarkable sea-faring skills that allow them to make long distance ocean voyages without compasses. Central to their traditional way of wayfinding is a method of navigation taught with the use of special stick maps, pictured on this commemorative envelope and stamp.

Ocean-going Canoe

This traditional Pacific island sailing canoe employed a double-ended hull, a triangular sail, accessory booms, and an outrigger with platform. The island peoples of Micronesia, Polynesia, and Melanesia are superb sailors and navigators who made open ocean voyages across the Pacific in similar sailing canoes hundreds of years before Westerners ventured across the Atlantic.





Photograph by Walter Meayers Edwards, http://education.nationalgeographic.com/education/media/micronesian-stick-chart/?ar_a=1

