

PINO TROGU – SAN FRANCISCO STATE UNIVERSITY, USA

LITTLE MEN, LITTLE BOXES

LIMITATIONS OF NEURATH'S
INTERNATIONAL PICTURE LANGUAGE
AS A TOOL FOR STATISTICAL VISUALIZATION

CIDI 2015 BRASÍLIA
FRIDAY, 4 SEPTEMBER 2015

[go to last slide \(p.68\)](#)



Otto Neurath and Marie Reidemeister

Isotype

Design and contexts

1925–1971



editors: Christopher Burke - Eric Kindel - Sue Walker

Christopher Burke,
Eric Kindel, and Sue Walker

Isotype: Design and Contexts 1925–71
(London: Hyphen Press, 2013)

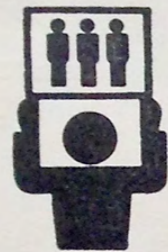
“Can you do Addition?” the White Queen asked. “What’s one and one and one and one and one and one and one and one and one and one and one and one and one and one and one?”

“I don’t know,” said Alice. “I lost count.”

— *Lewis Carroll*

Otto Neurath

International Picture Language, 1936.



ISOTYPE

International
System
Of
TYpographic
Picture
Education

12

THE QUESTION OF AN INTERNATIONAL LANGUAGE

The desire for an international language is an old one, and it is more than ever in men's minds at this time of international connections in business and science. But 'debabelization' is a very hard and complex work. The attempt to make one international language has given us a parcel of new languages. The best way out seems to be the use of instruments which are, or have become, international. For this reason this book is in Basic English, because this international language is part of an old language in general use.

The question of an international language has now become important. There are a number of signs pointing to a great development of international organization in the near future—though we are living in a time of warring interests and broken connections. Any work done on the question of international languages—with a view to making a word language, or

13

3

P. 18

P. 53
PIC. 18

Pictures

FACE-PICTURES

Usage of free reshipment (percentage of 1.000 respondents)

Nearly Always



In Most Cases



Frequently



Rarely



Never Before



No Online Purchases



 Female

 Male

1:3

“Isotype, the automatic isotope-tool” <http://www.isomatic.de/>

I. PSYCHOLOGY

I.I WORDS VS PICTURES OR WORDS AND PICTURES?

**“WORDS MAKE DIVISION,
PICTURES MAKE CONNECTION.”**

(Neurath, 1936, p. 18)

1.2 WHERE DID THE LITTLE MEN COME FROM?

Wealth & Income Inequality in the United States



"Income inequality in the United States is at an all-time high, surpassing even levels seen during the Great Depression"

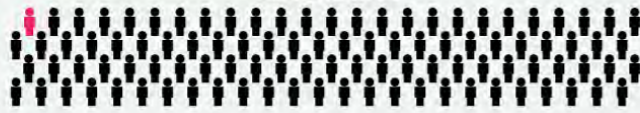
- University of California, Berkeley Professor Emmanuel Saez, 2006

"More than other countries, we have a very unequal income distribution where compensation goes to the top in a winner-takes-all economy."

- HuffingtonPost.com, 9/28/10

U.S. Earners

1% of the highest U.S. earners gained almost



99% of the remaining earners split

75% of the earnings from 2002 - 2006

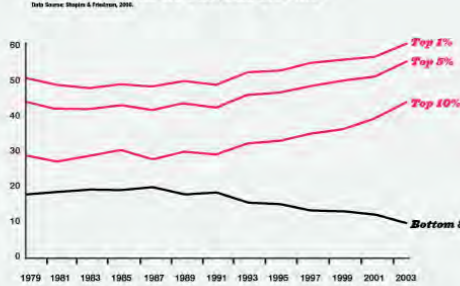


25% of the total earnings

Total U.S. Earnings

www.businessinsider.com

Share of Capital Income Flowing to Households in Various Income

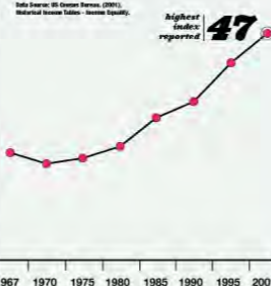


Capital Income

Capital income is income that comes from capital, which is to say, income from assets (land, rather than any specific production of direct work). Examples of capital income are stock dividends or any sort of capital gains, as well as income from rents, royalties, and annuities. It is income that does not come from the work they do from the general labor market. It is income that is not earned through any market that is used for capital production, although this is a common misconception.

It is commonly used as a measure of inequality of income or wealth. Household Gini coefficients for income range from approximately 0.25 (Sweden) to 0.75 (Namibia) although not every country has been assessed.

U.S. Income Gini Indices Over Time



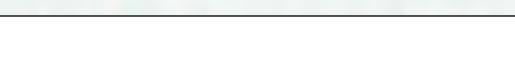
Gini Coefficient

The Gini coefficient is a measure of the inequality of a distribution. Household Gini coefficients for income range from approximately 0.25 (Sweden) to 0.75 (Namibia) although not every country has been assessed.

Unprecedented Income Inequality

Recent studies show that income inequality has increased significantly since the late 1970s. This is due to a combination of factors, including technological change, globalization, and the decline of unions.

Distribution of Family Income Gini Index (most recent) by Country



What's this?

This graph measures the degree of inequality in the distribution of family income in a country. The index is calculated based on the number of families in each income bracket.

Income Inequality in the United States

Income inequality in the United States is the largest in the world. This is due to a combination of factors, including technological change, globalization, and the decline of unions.

Wealth & Income Inequality in the United States

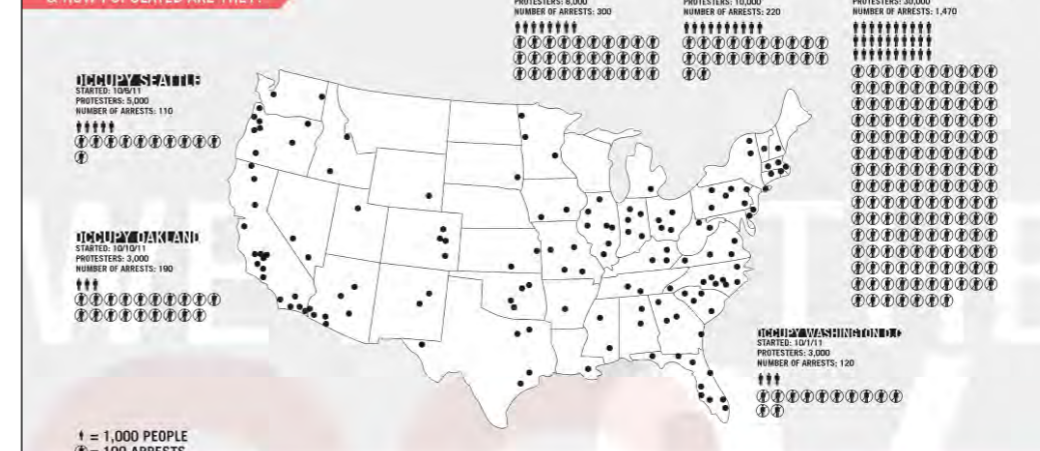
Wealth and income inequality in the United States are closely related. Wealth inequality is even more pronounced than income inequality.

#OCCUPY

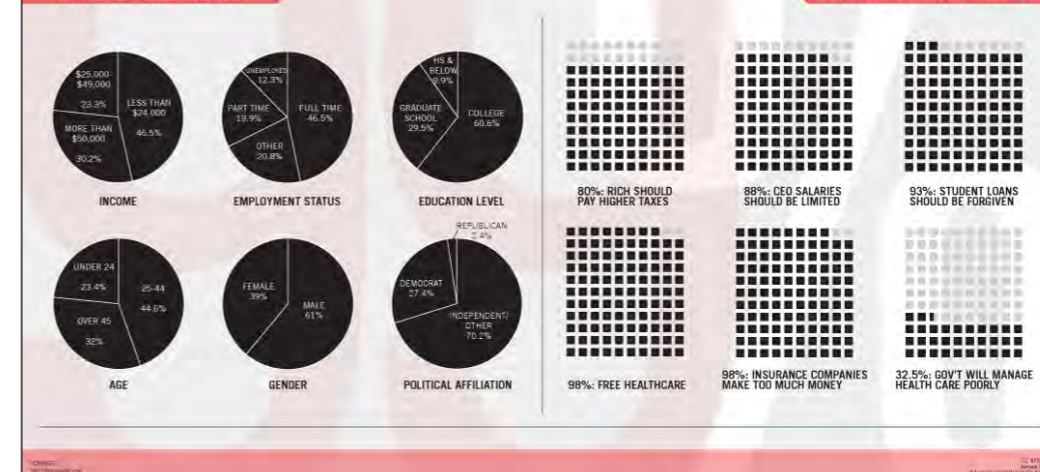
88 DAYS OF PROTESTS & \$13 MILLION SPENT

The Occupy Movement started on September 17, 2011 in Zuccotti Park in New York City. Since then the movement has spread globally as the 99% pushes forward in their aim to make the government realize that they have been treated unfairly. While each different protest has its own specific goals, they seem to be united in their efforts to fuel an organic movement and make their voices heard. It's been known for years that the majority of wealth is controlled by 1% of the country, and now people are taking a stand against that. This infographic takes a look at the protests in the US with the most participants, as well as breaking down who the 99% is and what they believe in.

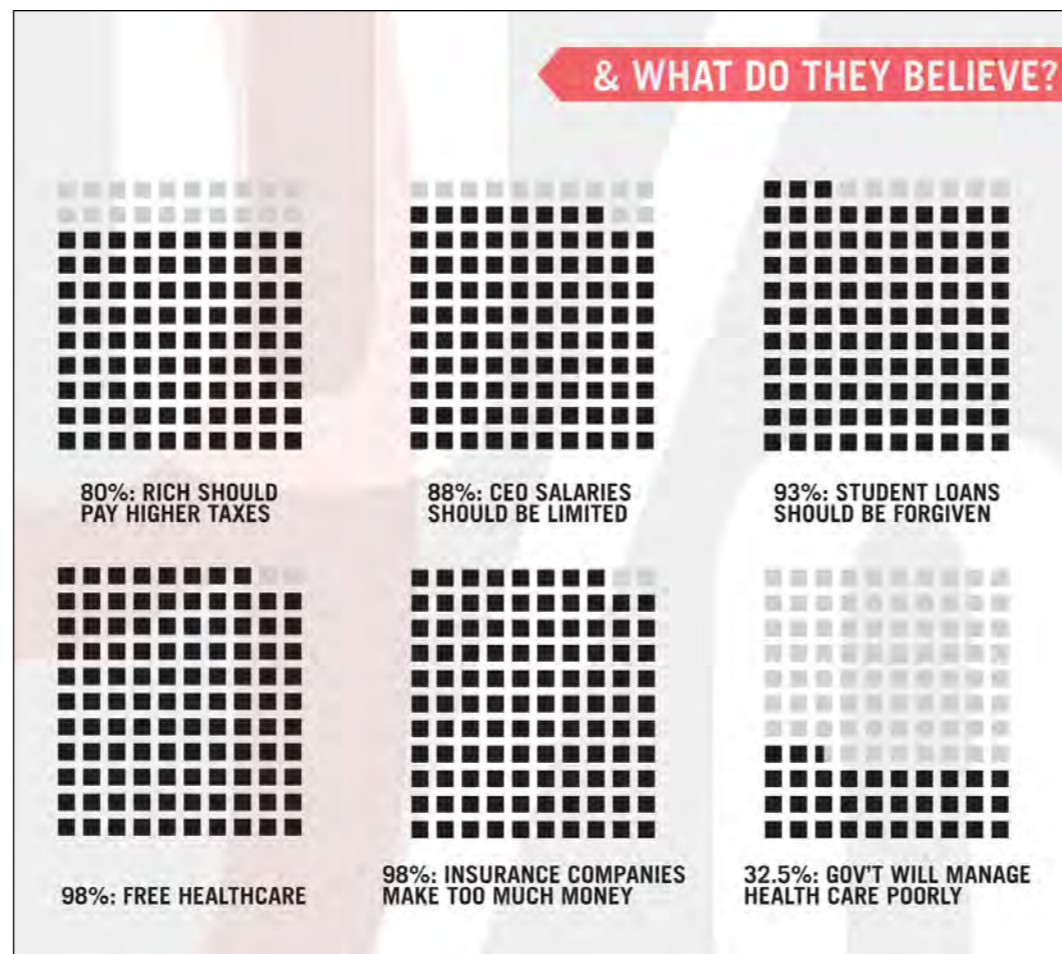
WHERE ARE THE PROTESTS? & HOW POPULATED ARE THEY?



WHO IS THE 99%?



& WHAT DO THEY BELIEVE?





Small Handbook of Information Design: 16 Principles for Better Data Visualizations

http://online.sfsu.edu/trogu/523/fall2012/data_viz_handbook/

09 Do not use little dots for numbers

Do not use little dots for percentages. Do not visualize quantities by the endless repetition of single units like little dots or little squares. We don't use pebbles to count anymore, and we have invented a tool called "place value". It's better to write out the number or to visualize it using a single solid area, not many tiny areas in little rows. Do not use little people as units to show quantities, even if the quantities represent people. Think of those poor little guys whose limbs get mutilated when you have to represent a fraction: arms, legs, even heads get cut off without mercy!

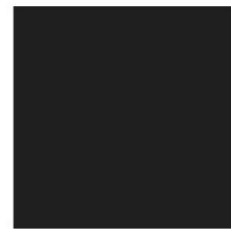
(Trogu, 2013)



VS



VS

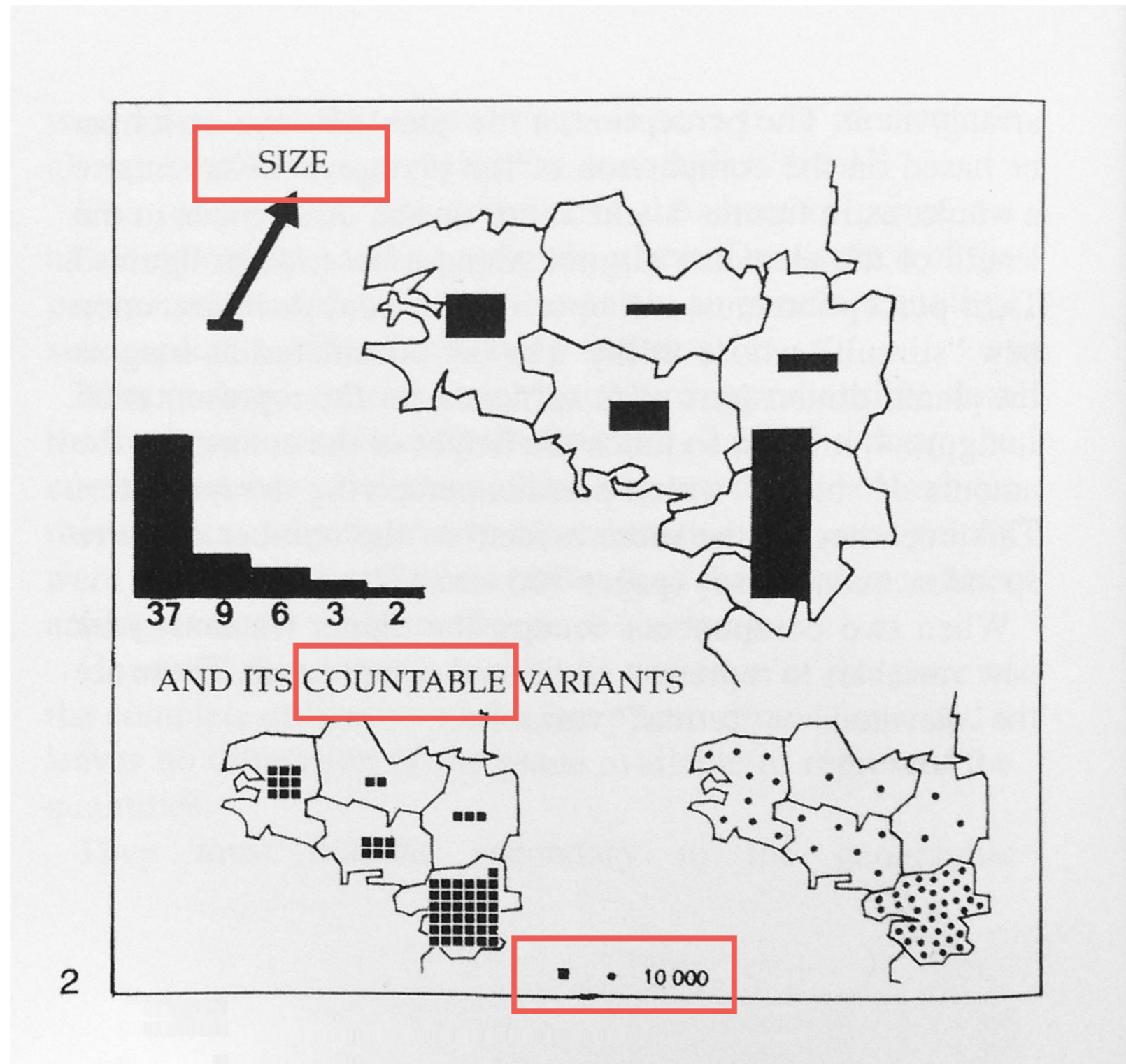


VS



“The retinal variables”

“— categories of SIZE:
height of a column,
area of a sign, number
of equal signs”



Jacques Bertin, *Semiology of Graphics*, 1983, p.60.

“... the square and the circle will have no place in the ISOTYPE system.”

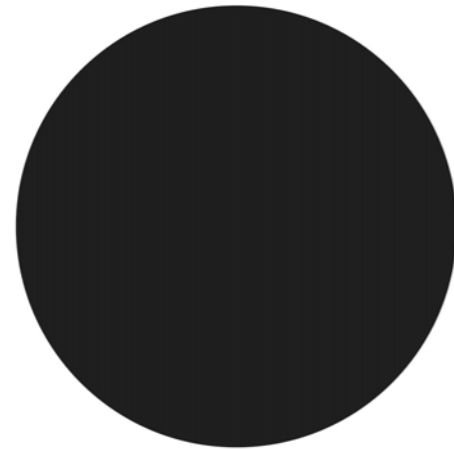
International Picture Language, p. 92.



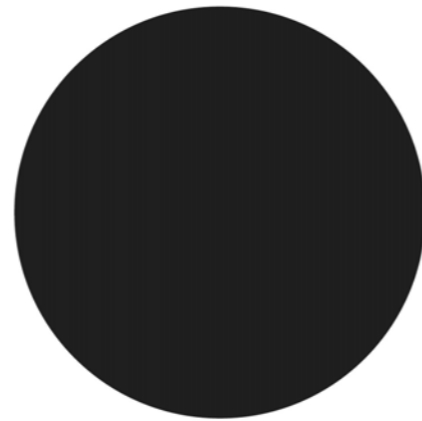
16



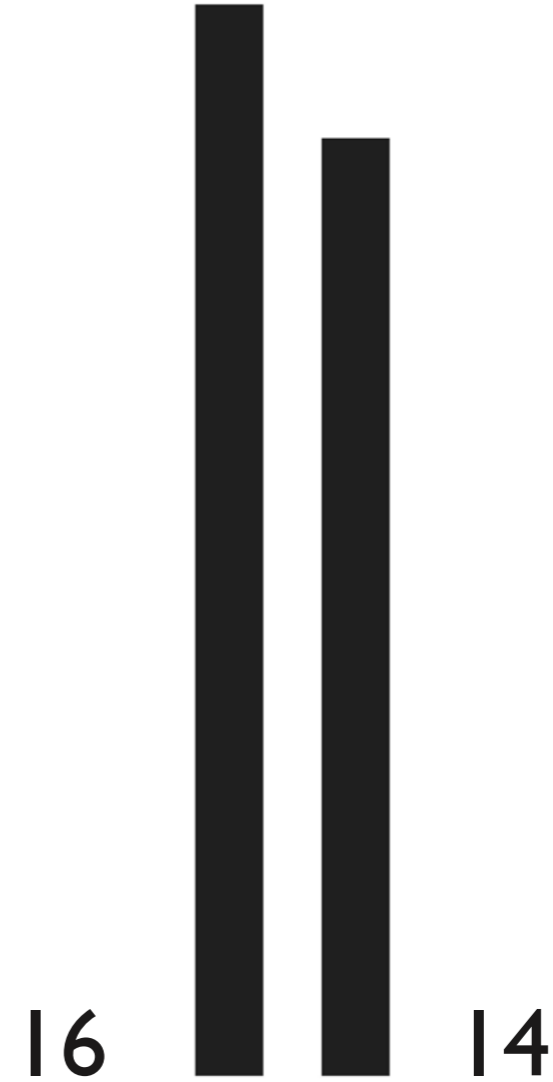
14



16



14

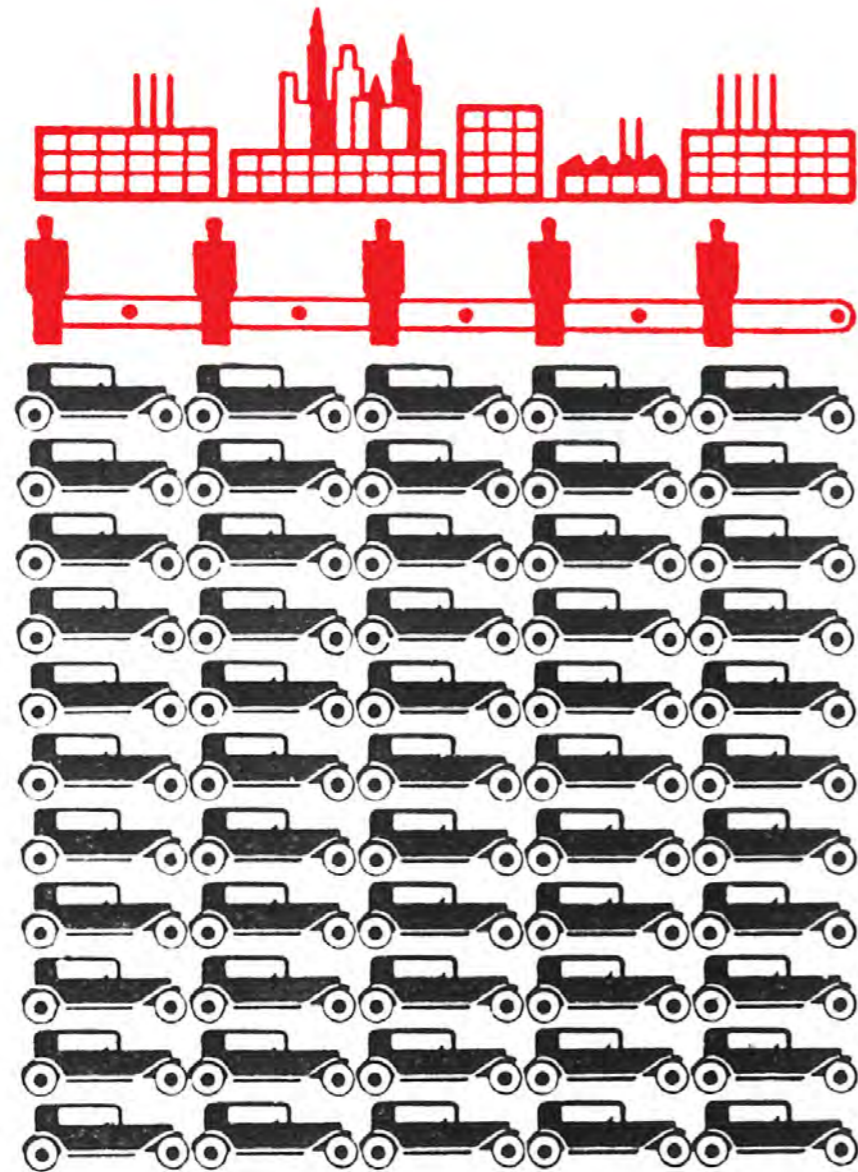


AREA (SIZE)

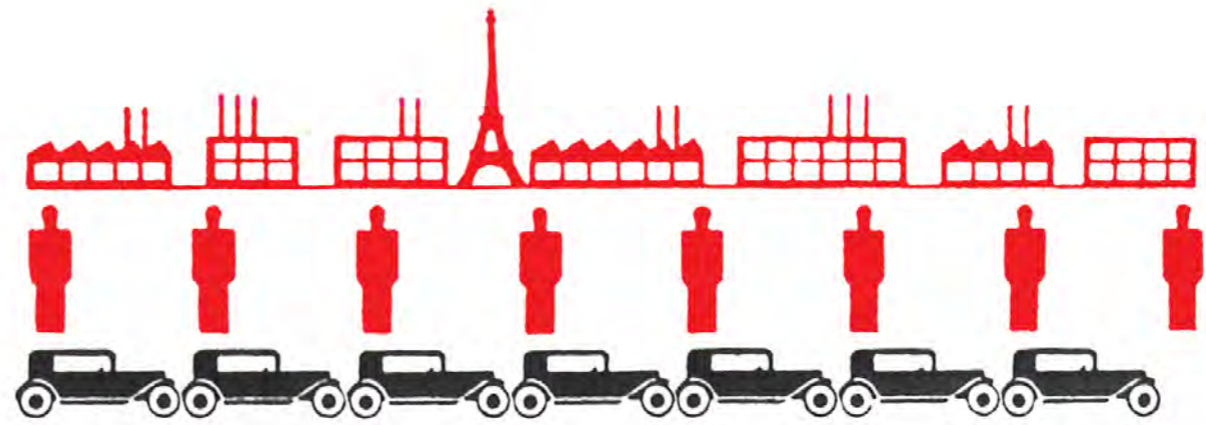
VS

HEIGHT

Automobiles produced in 1929
in America

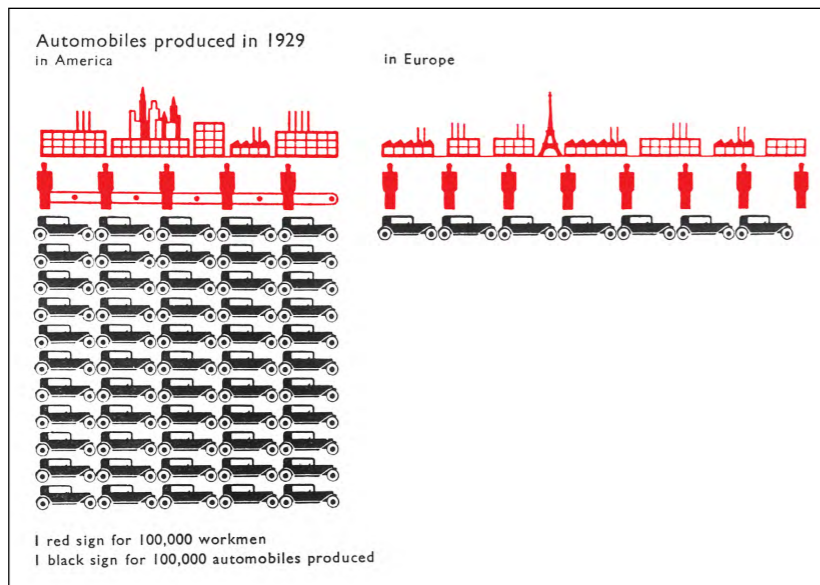


in Europe



| red sign for 100,000 workmen
| black sign for 100,000 automobiles produced

International Picture Language, p. 93, pic. 33.



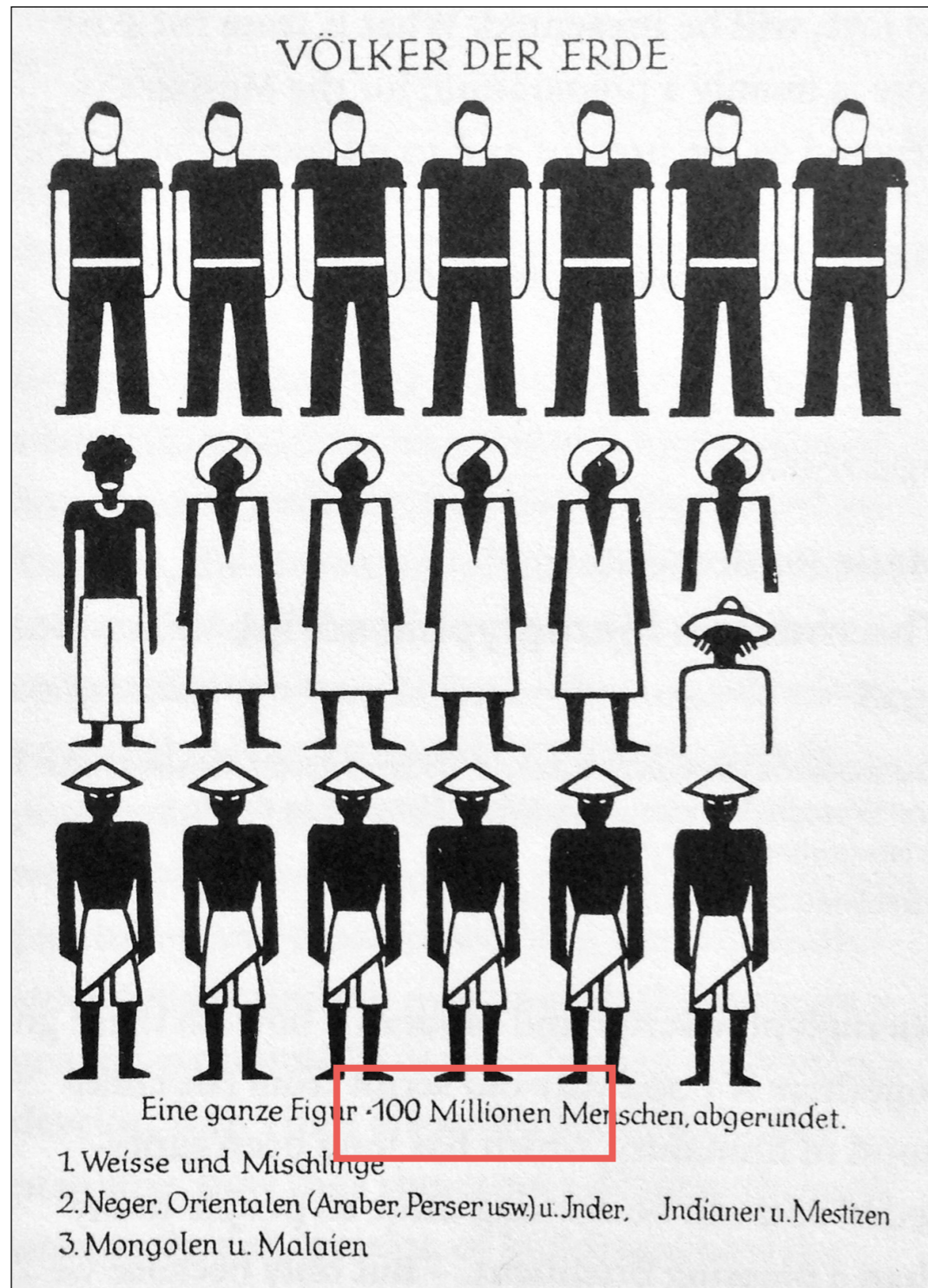
How big is the group of cars on the left compared to the line of cars on the right?

By counting?

At left, 5 cars times 11 rows = 55 cars or 5,500,000 car production in America.

At right, 7 cars = 700,000 car production in Europe.

Thus, US production was about eight times Europe's in 1929.



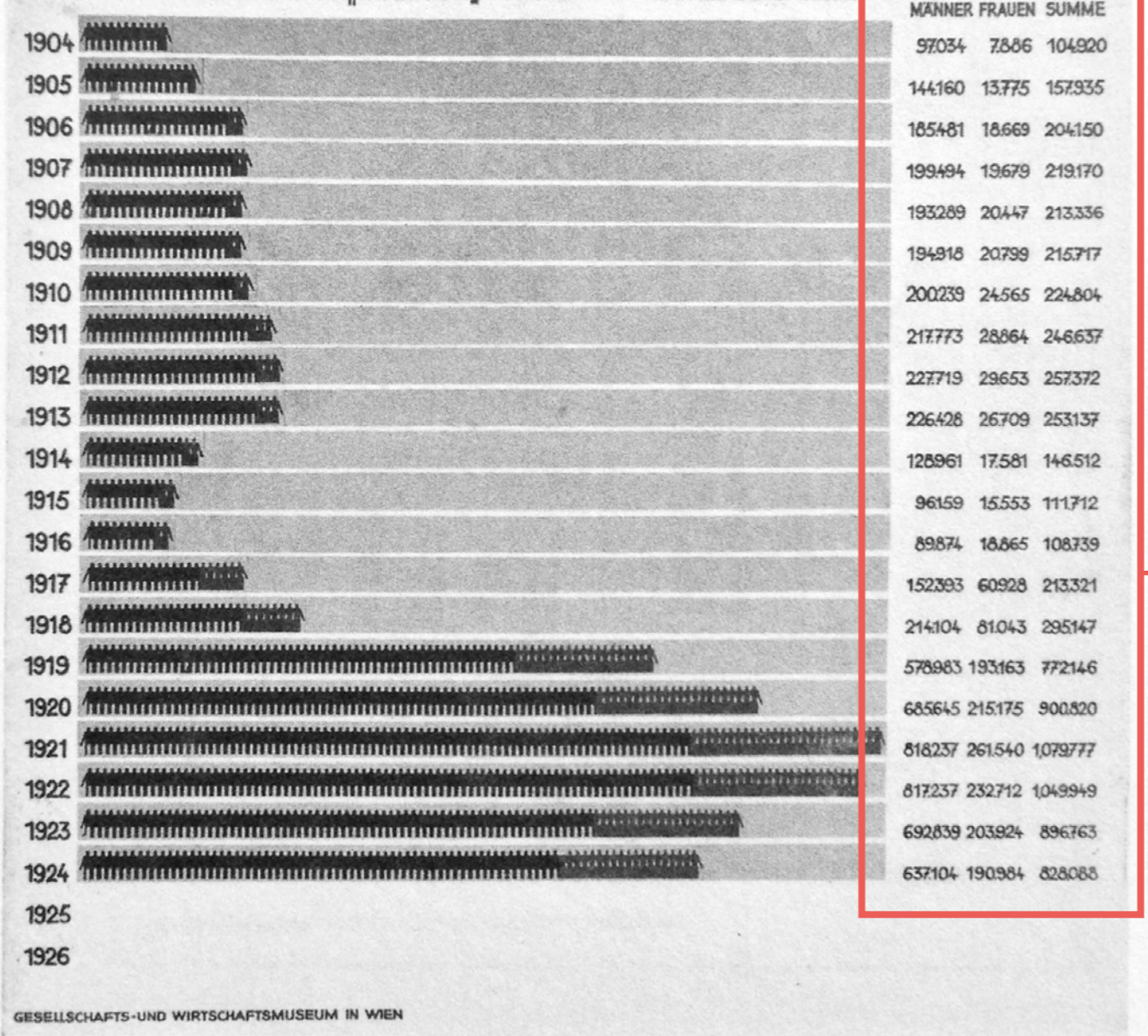
“... how many they represent is stated alongside: [one figure =] 100 million. So each person can count how large the individual groups are, and do it faster than if they had a numerical table in front of them.”

(Marie Reidemeister, 1928)
in Burke et al, 2013, pp. 526.

FREIE GEWERKSCHAFTEN IN ÖSTERREICH SEIT 1904

EINE FIGUR = 10.000 PERSONEN ♂=MÄNNER ♀=FRAUEN

DI E ANSABEN VON 1904-1918 BEZIEHEN SICH AUF DAS GEBIET DES HEUTIGEN ÖSTERREICHS



Membership of free trade unions in Austria

Detailed numerical table

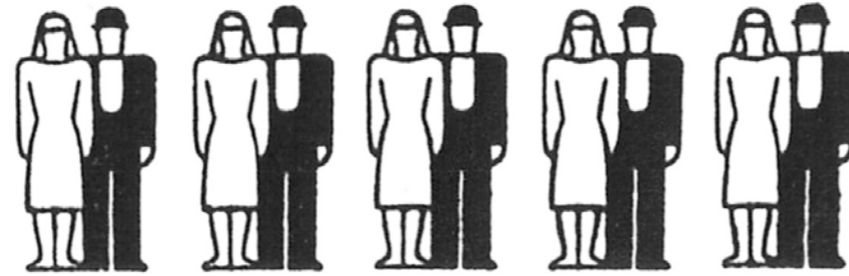
T5p Free trade unions in Austria since 1904 1925

Each figure = 10,000 people
(men | women)

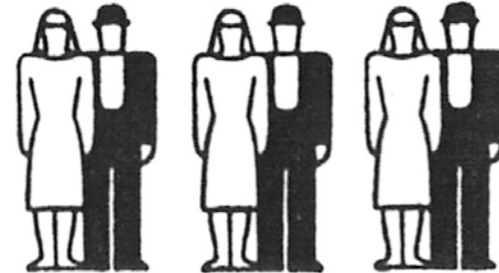
(in Burke et al, 2013, p. 170)

Men Getting Married in Germany in a Year

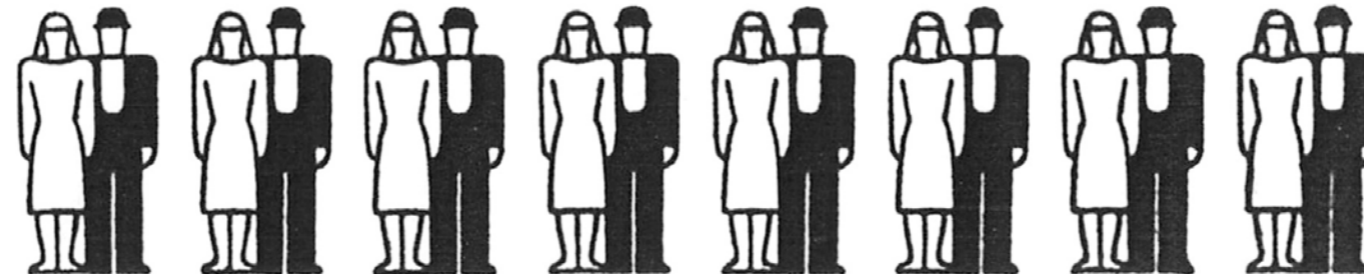
1911 - 14



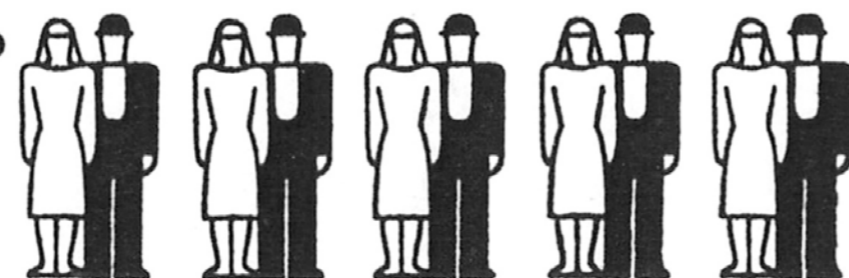
1915 - 18



1919 - 22



1923 - 26



I sign for 100,000 a year

(Neurath, 1936
p. 77, pic. 27)

1.3 CHUNKING AND THE BOTTLENECK OF WORKING MEMORY

*“My problem is that
I have been persecuted
by an integer.”*

GEORGE A. MILLER



(Miller, *The Magical Number Seven*, 1956)

4-3-4-6-5-9-6-2-3

“chunks”

434-65-9623

(Trogu, 2013, 2015)

“iiiiiiiiiiii”

(un-chunked)

“ ”

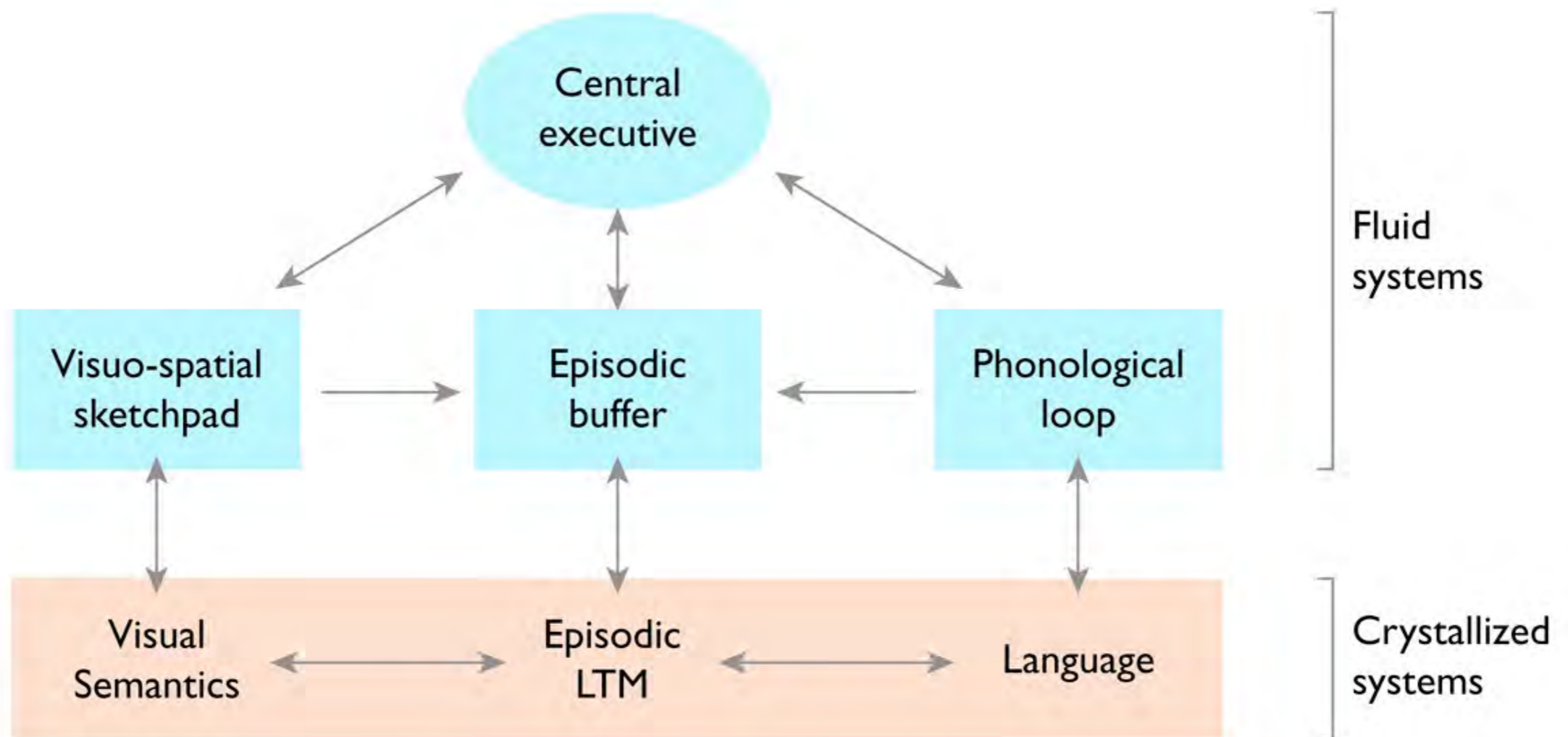
(chunked)

1.4 SUBVOCALIZATION AND LABELLING

ALAN D. BADDELEY
WORKING MEMORY



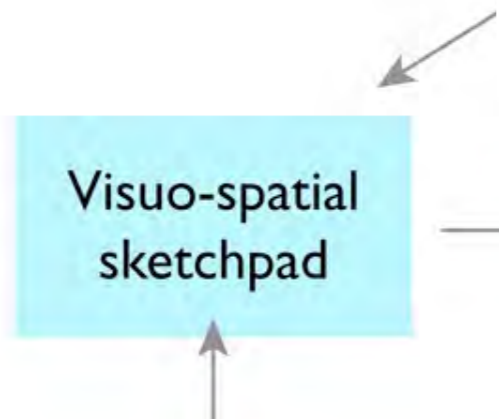
(Baddeley and Hitch, 1974)



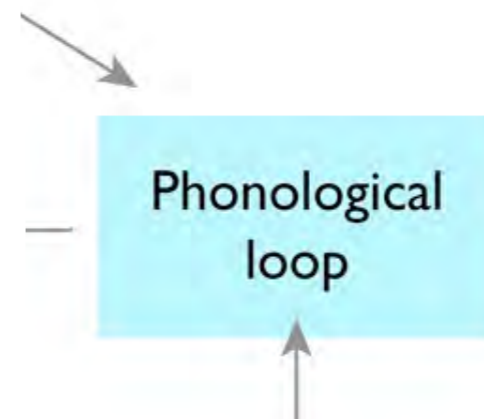
MULTI-COMPONENT WORKING MEMORY MODEL

(Baddeley et al, 2009)

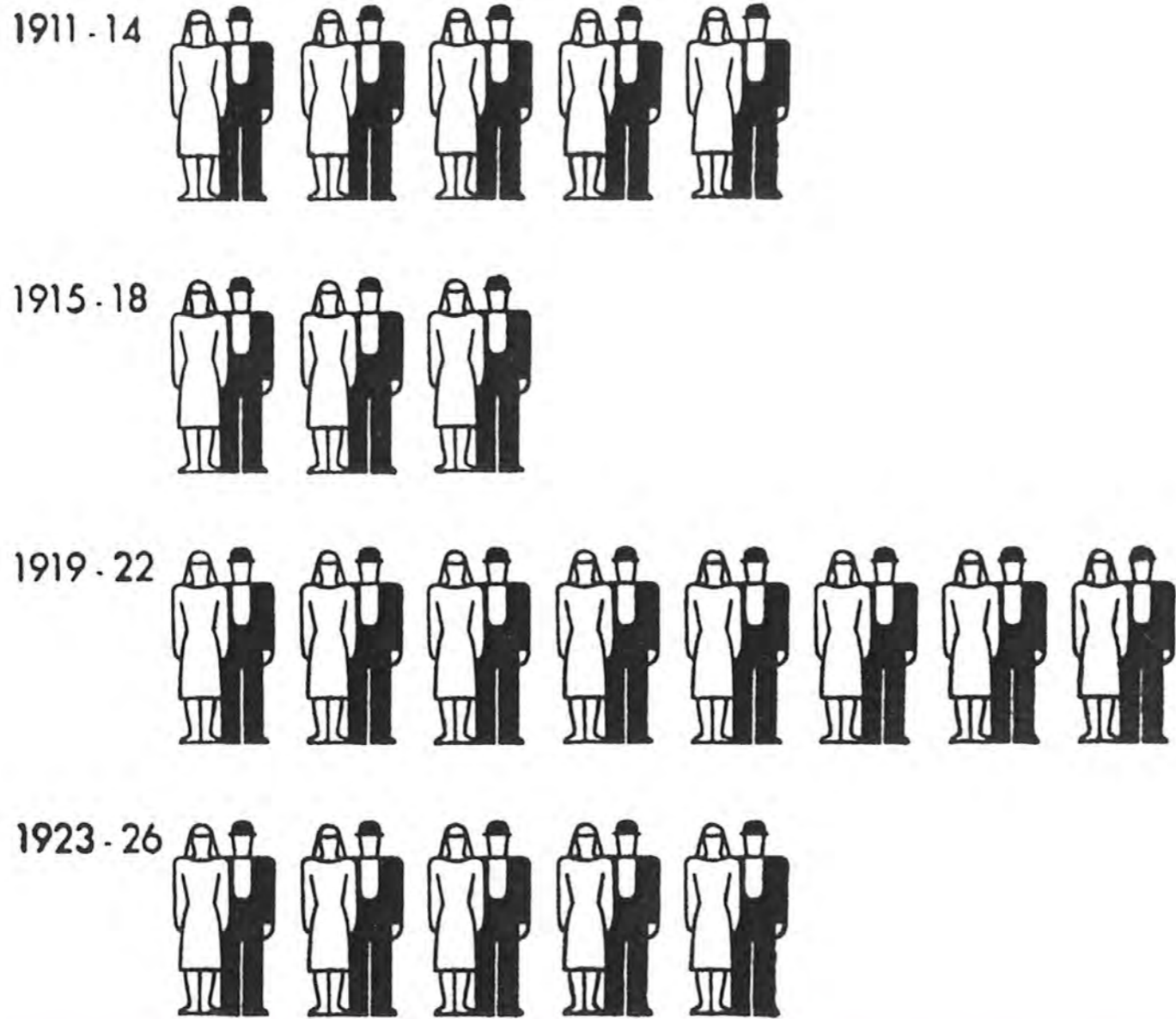
visual / spatial



verbal / aural



Men Getting Married in Germany in a Year



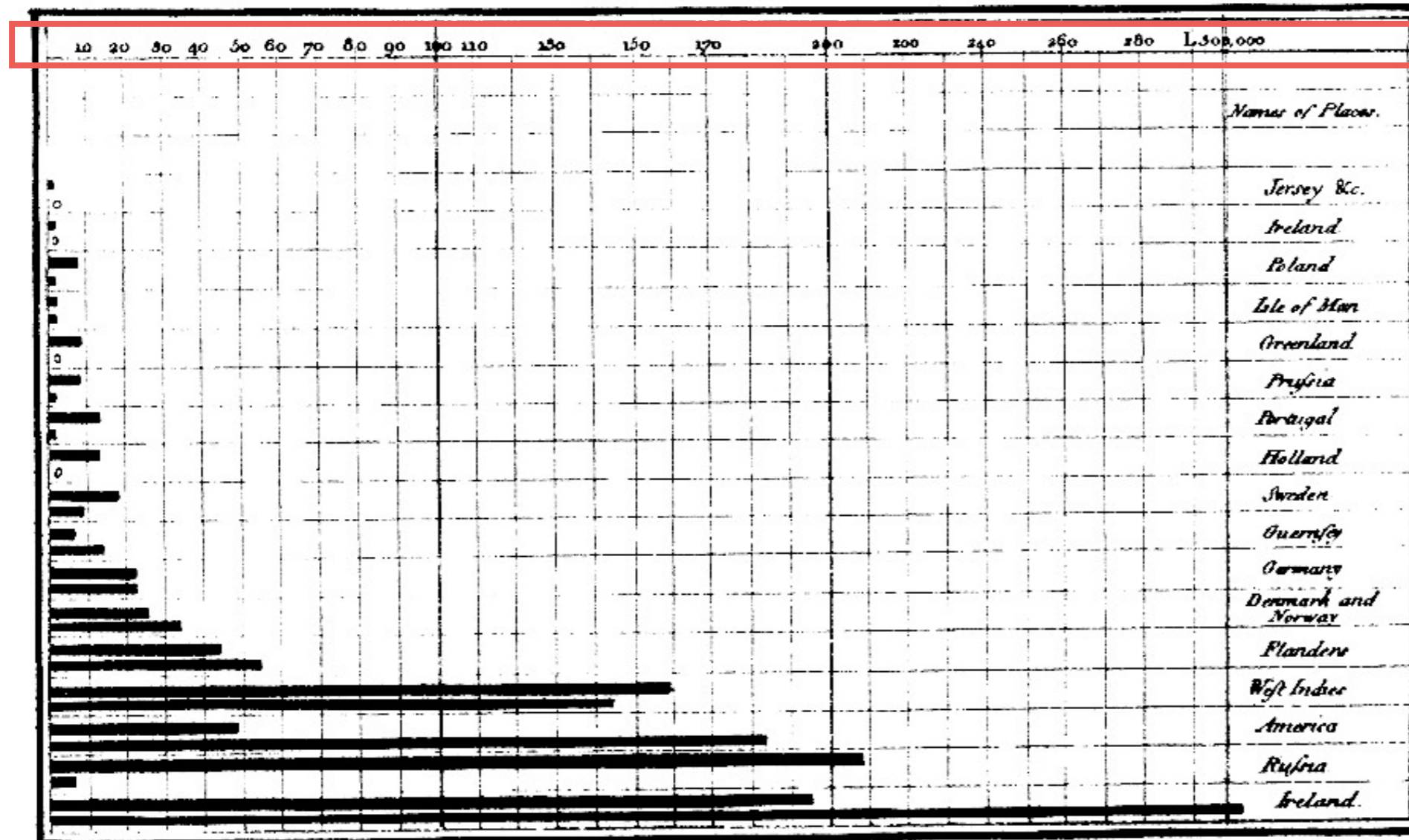
100 200 300 400 500 600 700 800 (thousands)

Labels

Legend

1 sign for 100,000 a year

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



Labels

The Upright divisions are Ten Thousand Pounds each. The Black Lines are Exports the Ribbed Lines Imports.

Published in the Act done June 7th 1786 by W^m Playfair

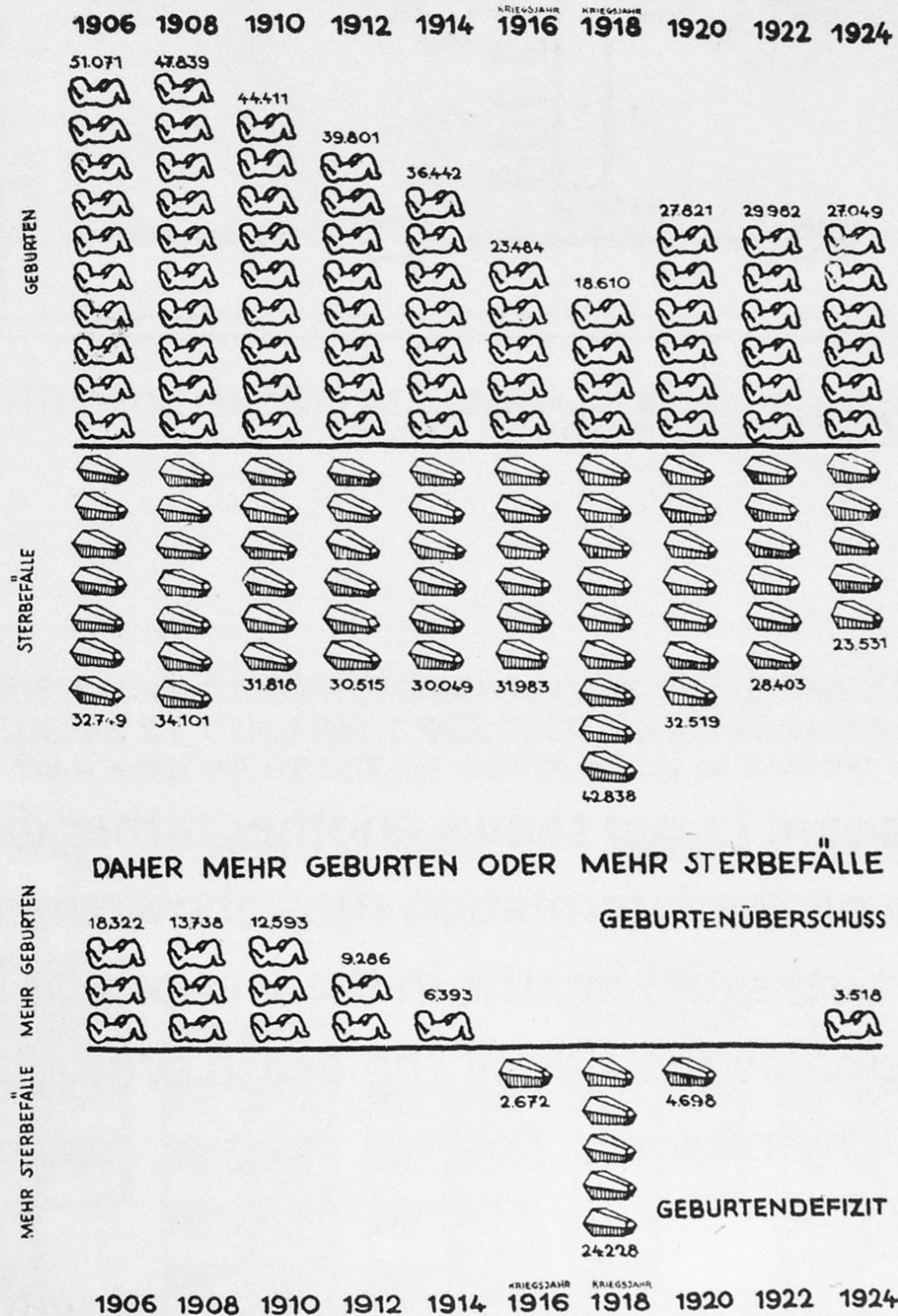
Printed by J. Smith, Strand, London.

(the first bar chart)

(Playfair, 1786)

GEBURTEN UND STERBEFÄLLE IN WIEN

1.5000 LEBENDGEBURTEN 1.5000 STERBEFÄLLE

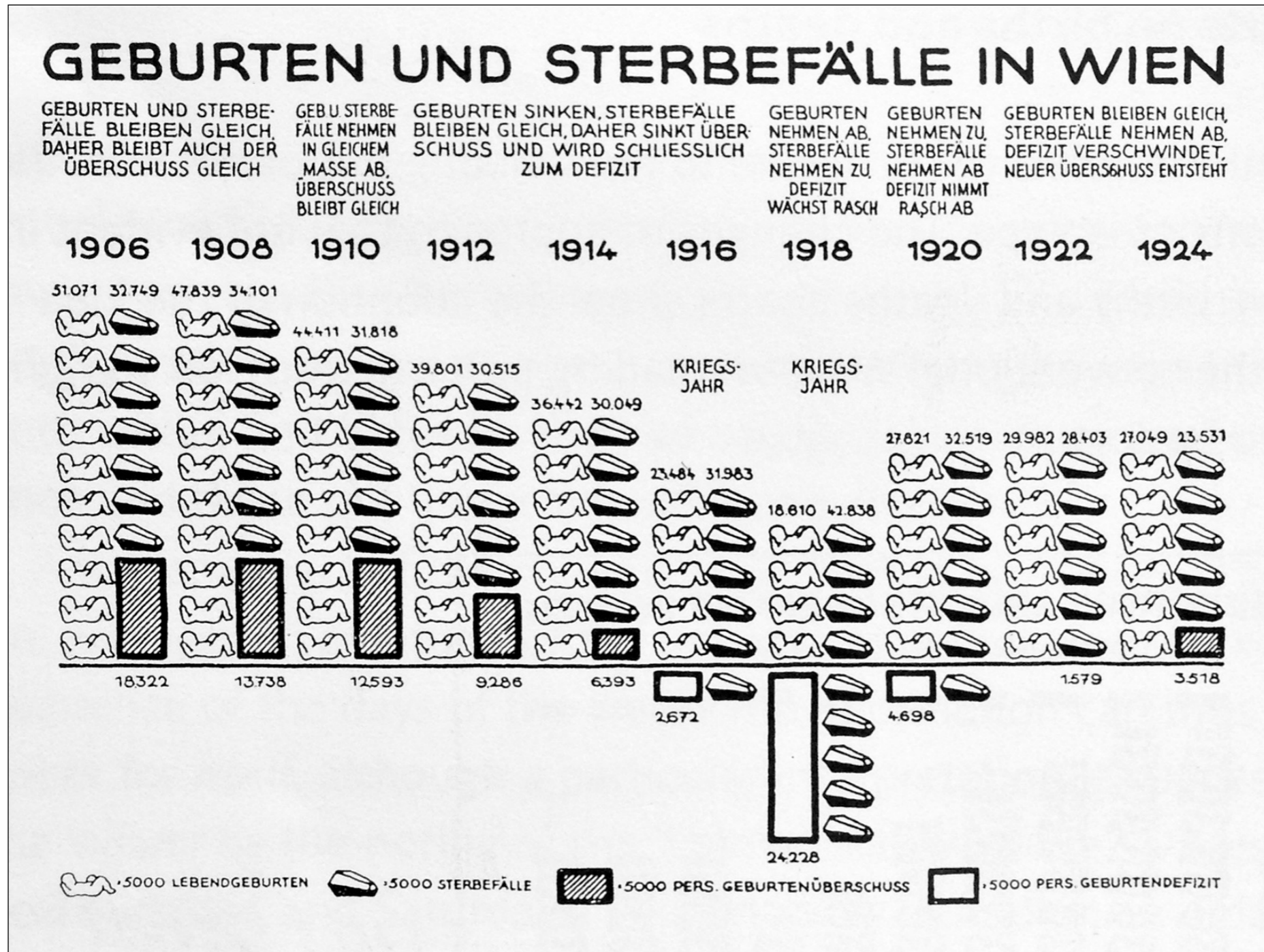


I. Births and deaths in Vienna

...moving the verbal elements to the “periphery”

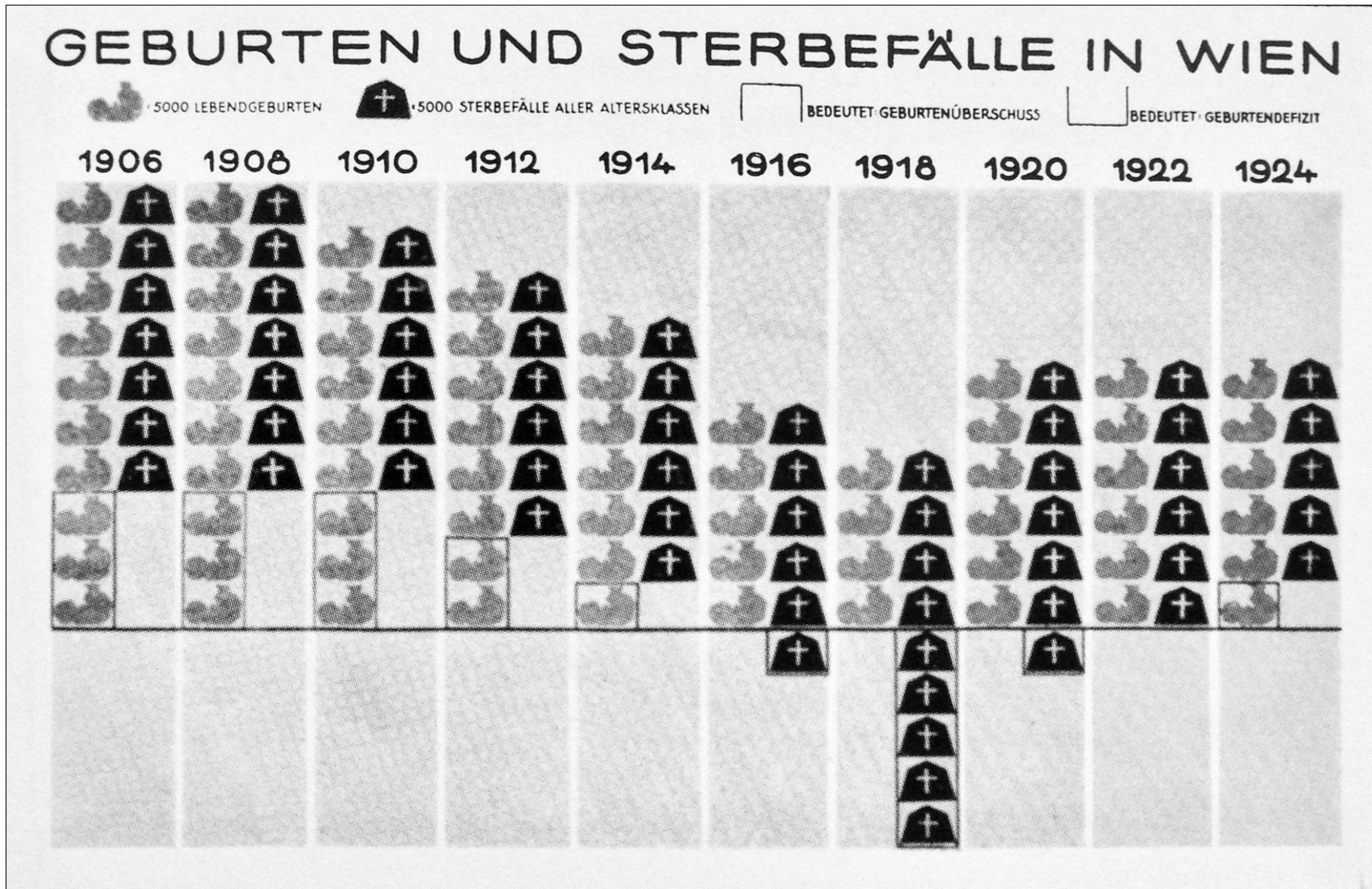
(Neurath & Kinross, 2009, p. 81–84)

2. Births and deaths in Vienna



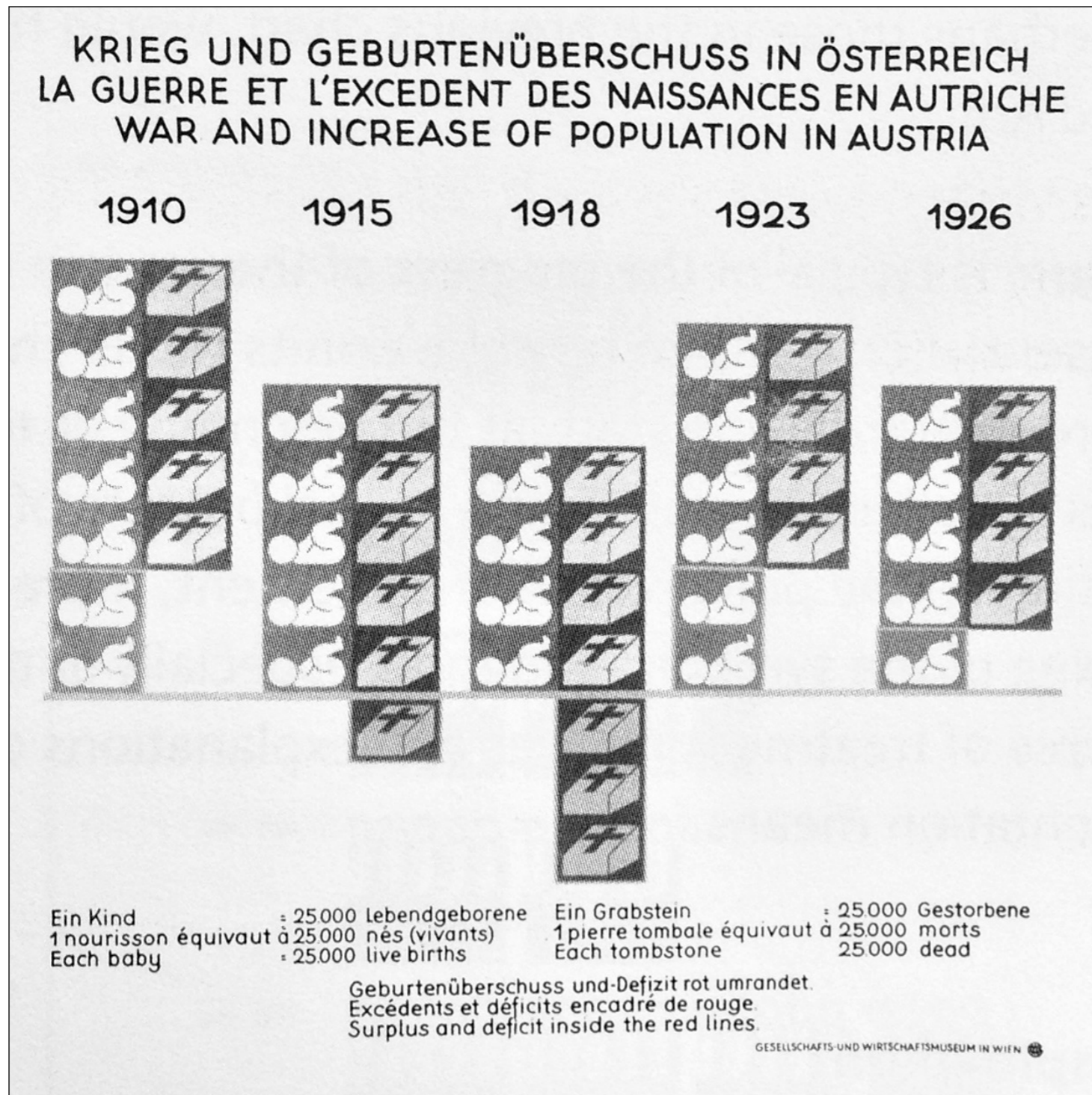
(Neurath & Kinross, 2009, p. 82)

3. Births and deaths in Vienna



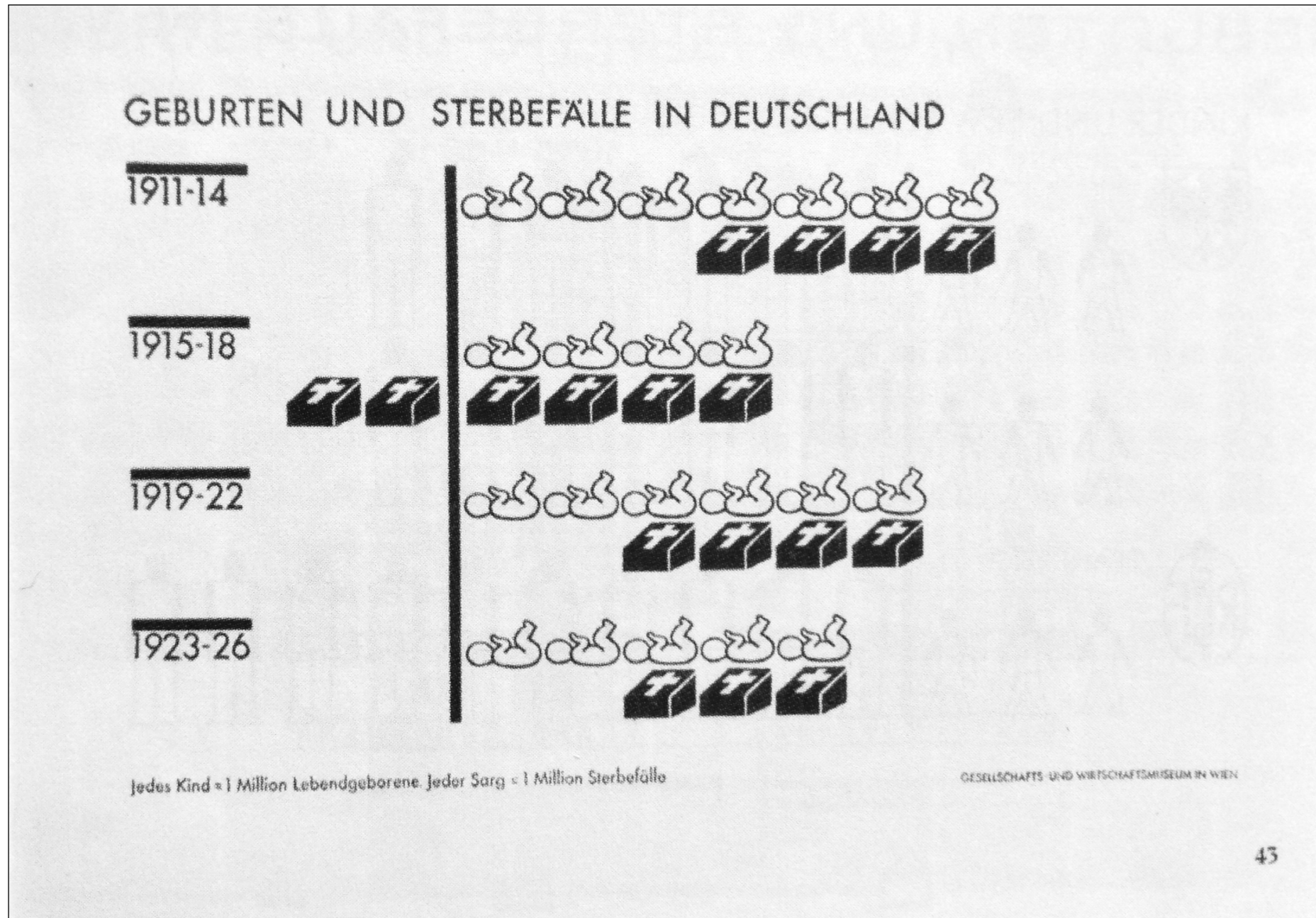
(Neurath & Kinross, 2009, p. 83)

4. War and population increase in Austria



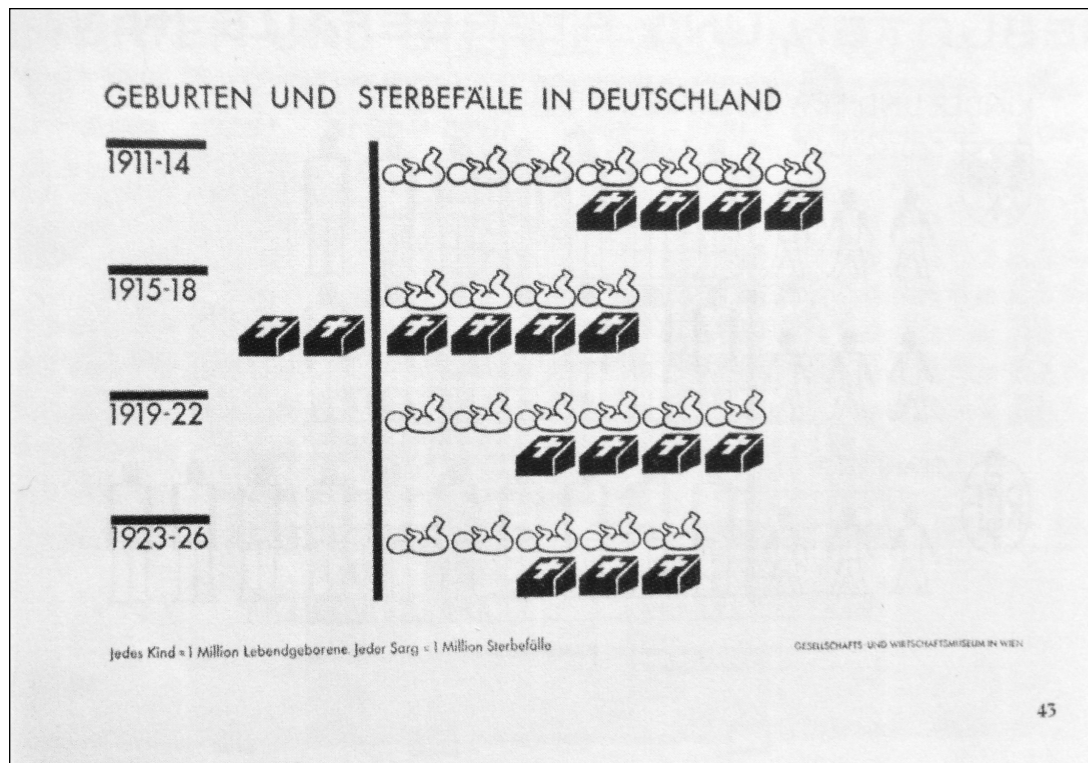
(Neurath & Kinross, 2009, p. 83)

5. Birth and deaths in Germany



(Neurath & Kinross, 2009, p. 84)

5. Birth and deaths in Germany



one symbol = 1 million
(requires counting)

(Neurath & Kinross, 2009, p. 84)

[But...]

“The brain does not like to think.”

(Willingham, 2009, pp. 3–23)

1.5 CLOSURE WITH PICTURES AND WITH WORDS

clause: a short sentence

the clause, rather than single words, should be considered the “primary perceptual unit of all languages.”

Ernst Cassirer, *The Philosophy of Symbolic Forms*, 1953, 304–305.

E. D. Hirsch, Jr., *The Philosophy of Composition*, 1977, 108–109.

“chunking” helps to achieve fast closure, whether reading a text or a chart.

1.6 BROAD OVERVIEW AND DETAILED READING

0 | 9 = 900 feet

Stem-and-leaf displays:
heights of 218 volcanoes, unit 100 feet.

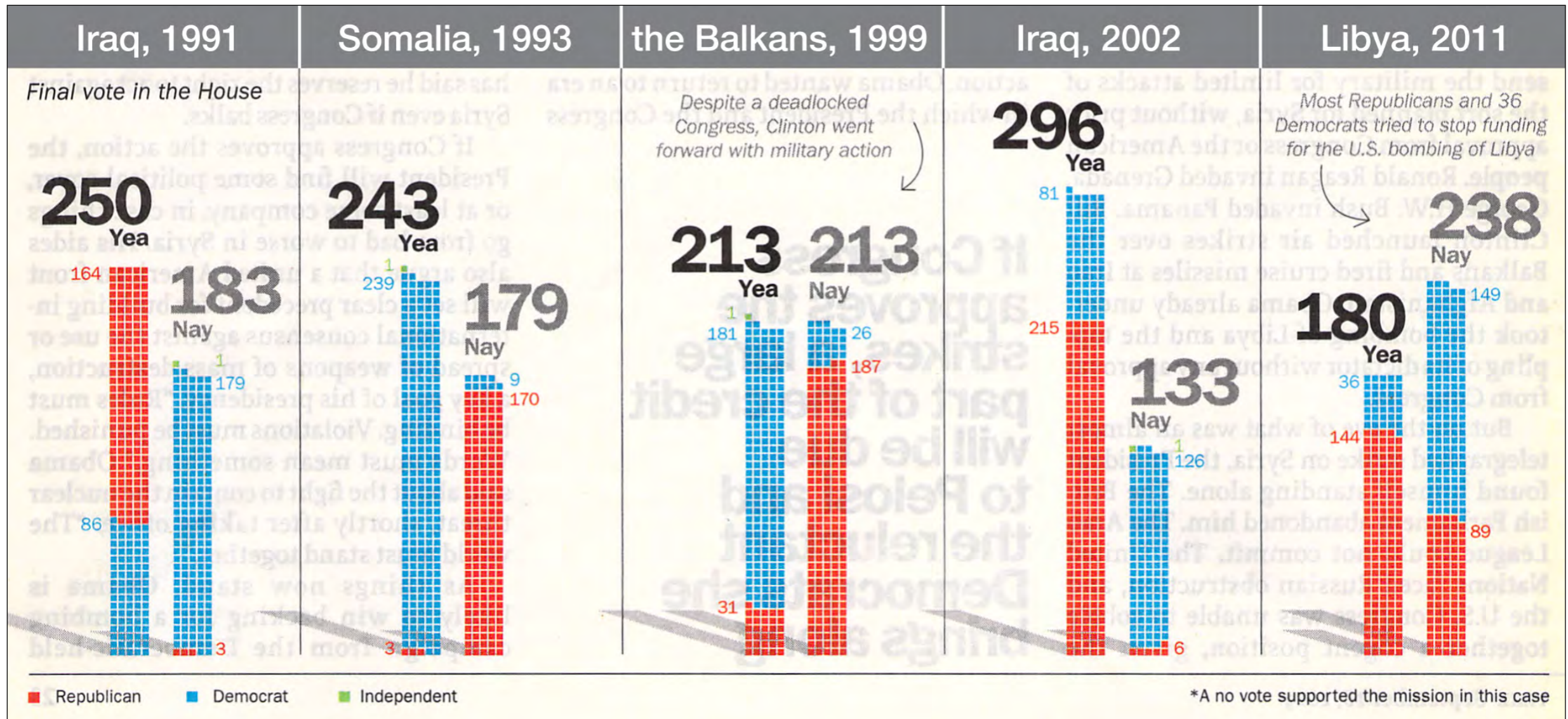
19 | 3 = 19,300 feet

0	98766562
1	97719630
2	69987766544422211009850
3	876655412099551426
4	9998844331929433361107
5	97666666554422210097731
6	898665441077761065
7	98855431100652108073
8	653322122937
9	377655421000493
10	0984433165212
11	4963201631
12	45421164
13	47830
14	00
15	676
16	52
17	92
18	5
19	39730

Stem-and-leaf display: heights of 218 volcanoes.

(Tukey, 1972, p. 296)

(Tufte, 2001, p. 140 – redrawn from Tukey)



“How congress voted on past military strikes”, detail.

TIME, 13 September 2013, p. 16.

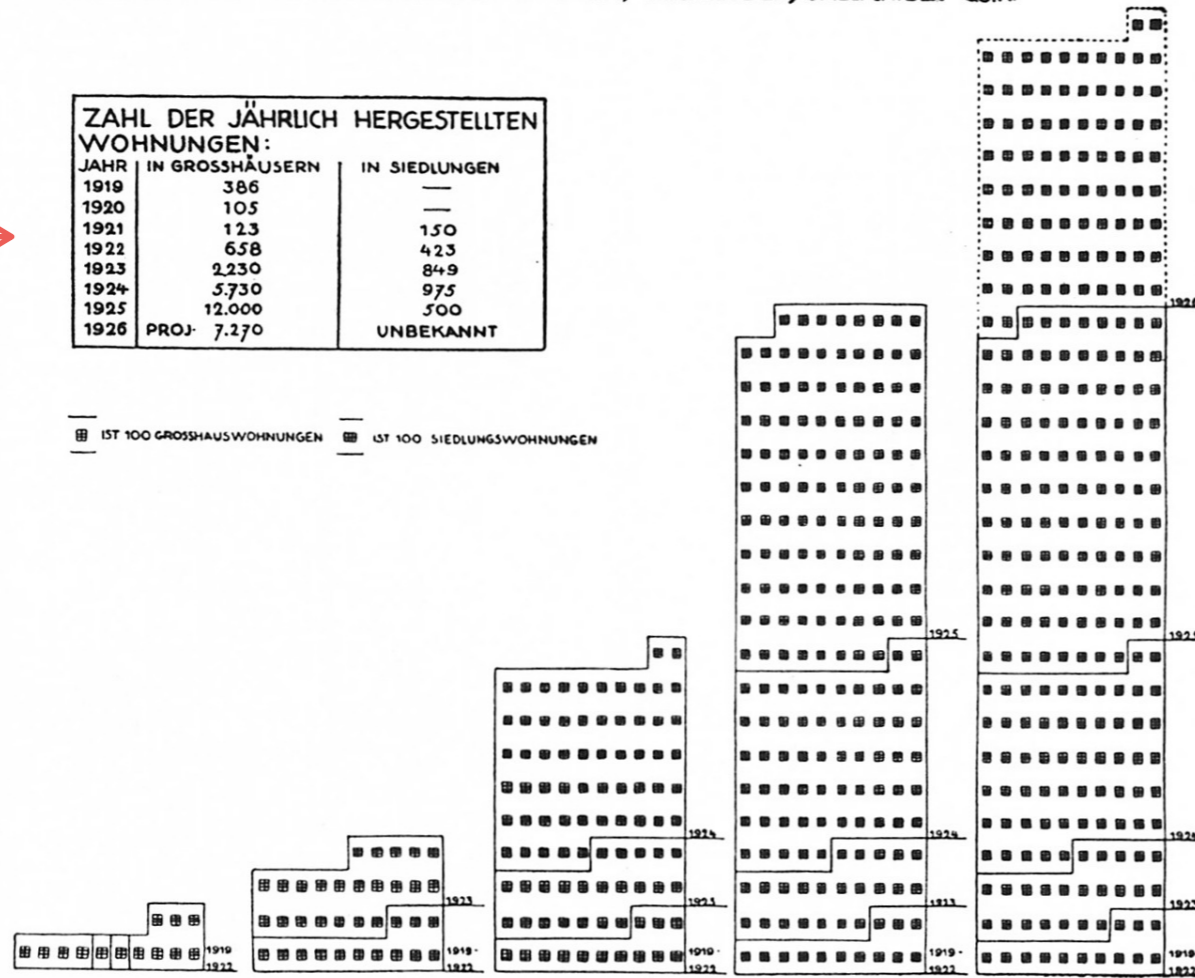
GEMEINDE WIEN WOHNHAUSBAUTEN

GROSSHÄUSER

STOCKWERKSBAUTEN MIT GEMEINSAMEN EINRICHTUNGEN, WÄSCHEREIEN, SPIELPLÄTZEN U.S.W

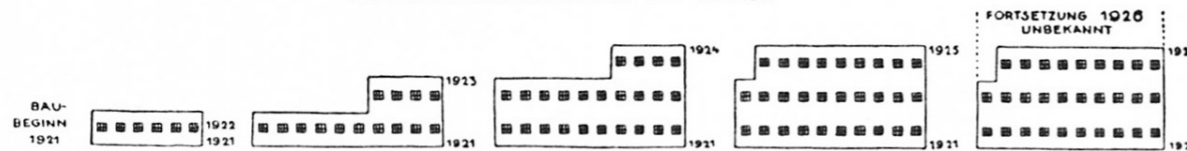
Zahl der jährlich hergestellten Wohnungen:

Jahr	in Grosshäusern	in Siedlungen
1919	386	—
1920	105	—
1921	123	150
1922	658	423
1923	2.230	849
1924	5.730	975
1925	12.000	500
1926	PROJ. 7.270	UNBEKANNT



SIEDLUNGSHÄUSER

EINFAMILIENREIHENHÄUSER MIT GÄRTEN



ZUM TEIL GENOSSENSCHAFTSBAUTEN MIT GEMEINDEKREDITEN

GESELLSCHAFTS- UND WIRTSCHAFTSMUSEUM IN WIEN

Table →

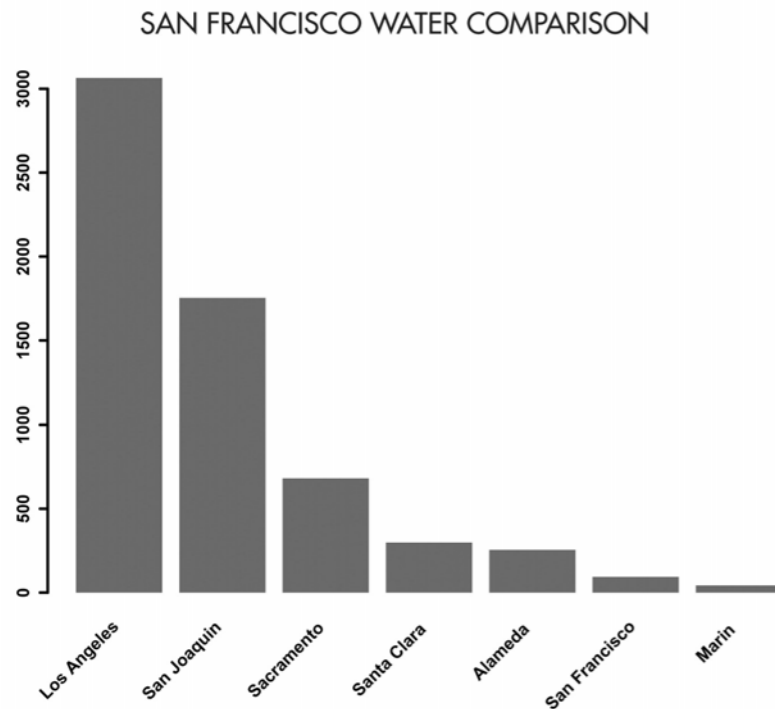
Housing units built by the Vienna municipality between 1919 and 1925.

(in Burke et al 2013, p. 28).

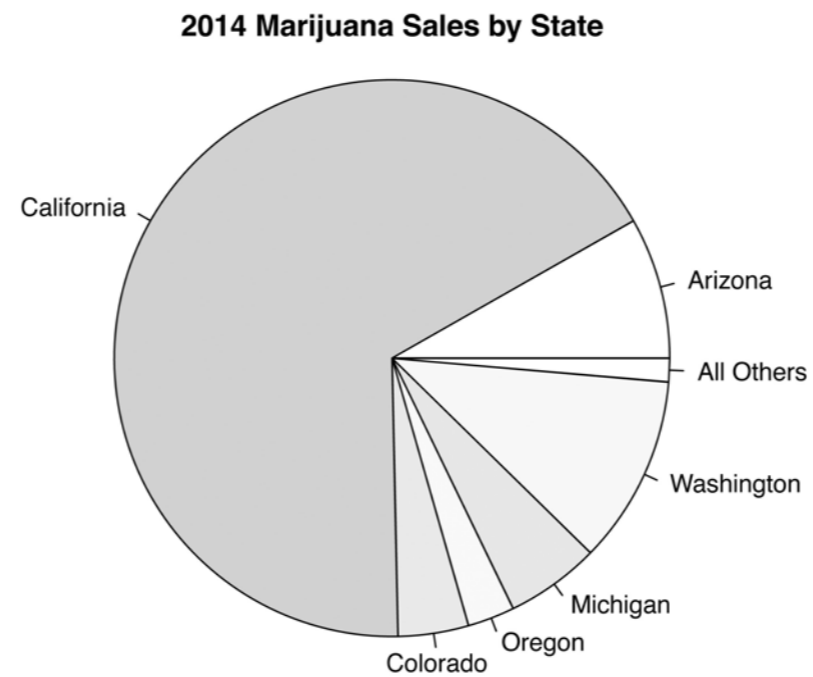
2. CULTURE

2.1 AREAS AS PICTURES FOR NUMBERS

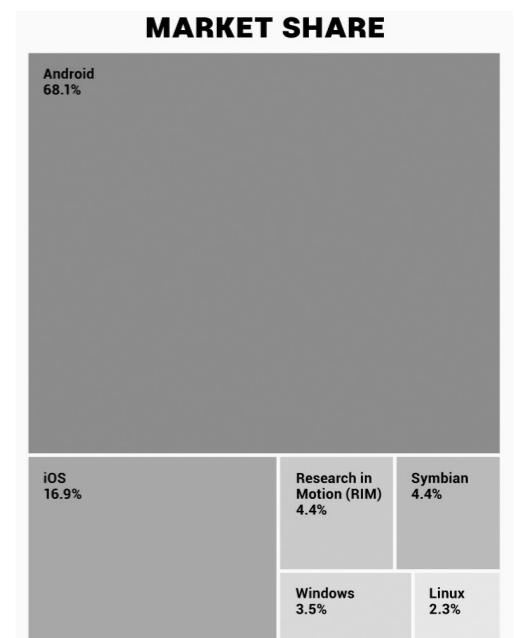
AREA GRAPHS



BAR CHART

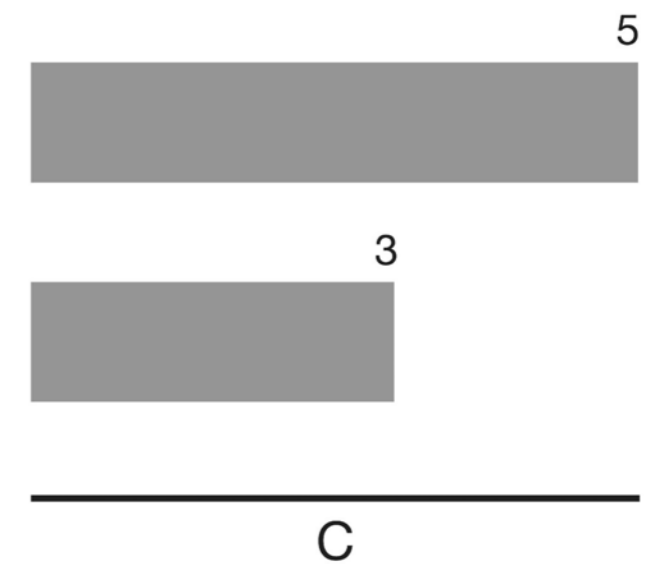
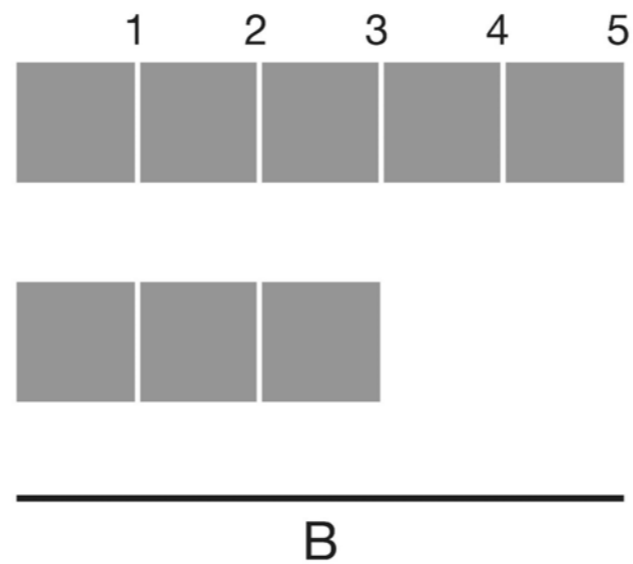
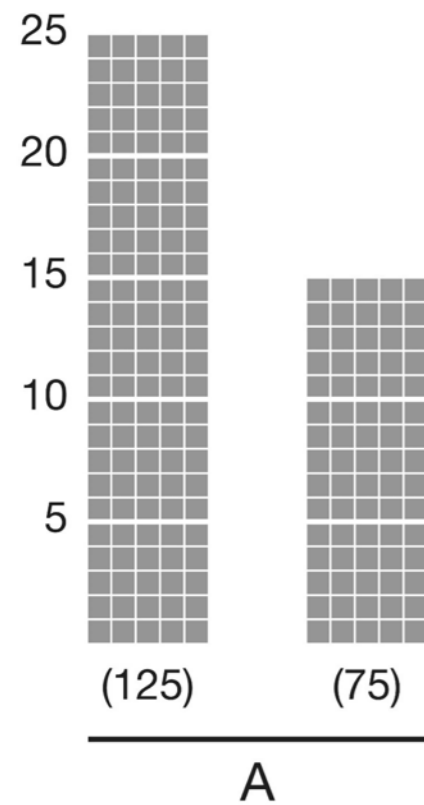


PIE CHART

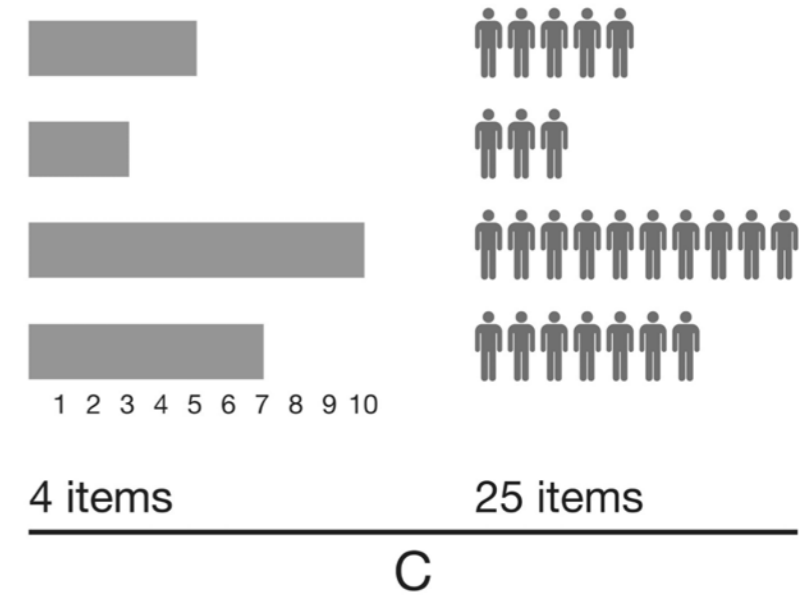
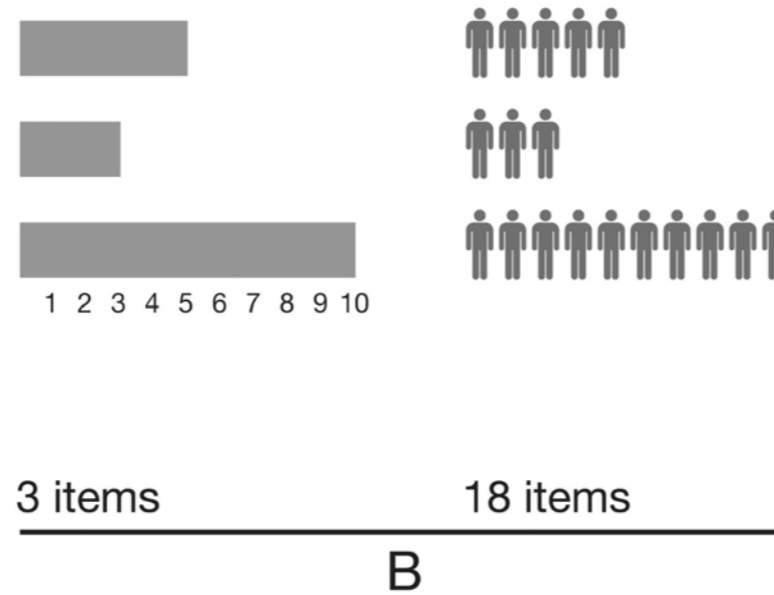


TREEMAP

AREA: the size, the number

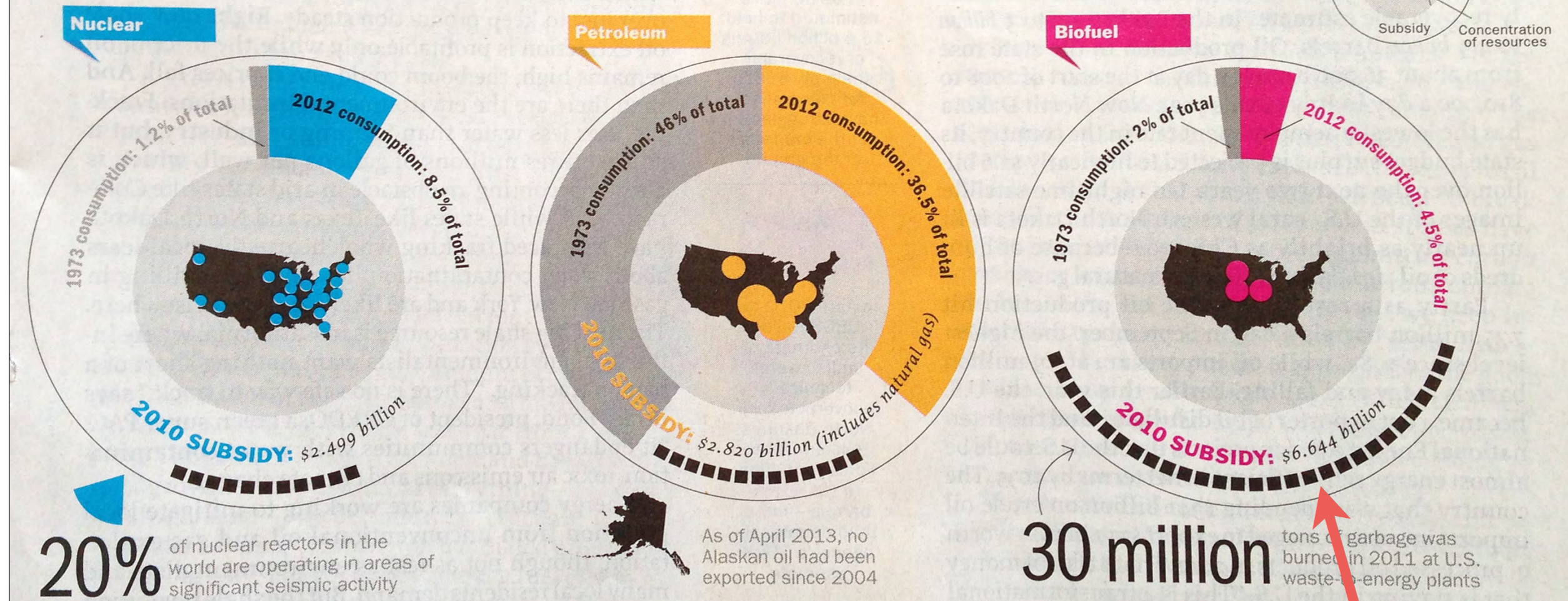


BARS VS PICTOGRAMS



2.2 PICTURES OR (NUMBER) WORDS?

of energy options to choose from



TIME October 7, 2013

37

“Power revolution” infographic, TIME magazine, detail.

(TIME, 7 October 2013, pp. 36–37)

\$6.6 billion
(one dot = \$220 million)

$1/3$

Or



Which symbol better represents “one third”?
A numerical fraction or a series of dots?

(Trogu, 2015)

1/3

Or



>> “ONE THIRD”
“UN TERZO”
“EIN DRITTEL”

>> “???”

Culturally, through literacy, number words have acquired very precise meanings. Unlike dots, written numerals are quickly named with their corresponding number words.



Test your language when reading the numerals in this window sign.



**NO
DUMPING**
**MINIMUM
FINE
\$1000**

严重警告
严禁在外丢垃圾
圾什物. 违者
追究. 根据三
藩市工务局规
定. 罚款1000
美元, 法办!



PLACE VALUE

一百三十四

vs

134

one
hundred
three
ten
four

(Edwards, 2015)

2.3 AT THE BEGINNING, EVERY PICTURE IS A WORD

“[while]...visualization may provide more impressive pictures than a formula [...], on the other hand, one is much more limited by visual representation than by algebraic.”

Otto Neurath

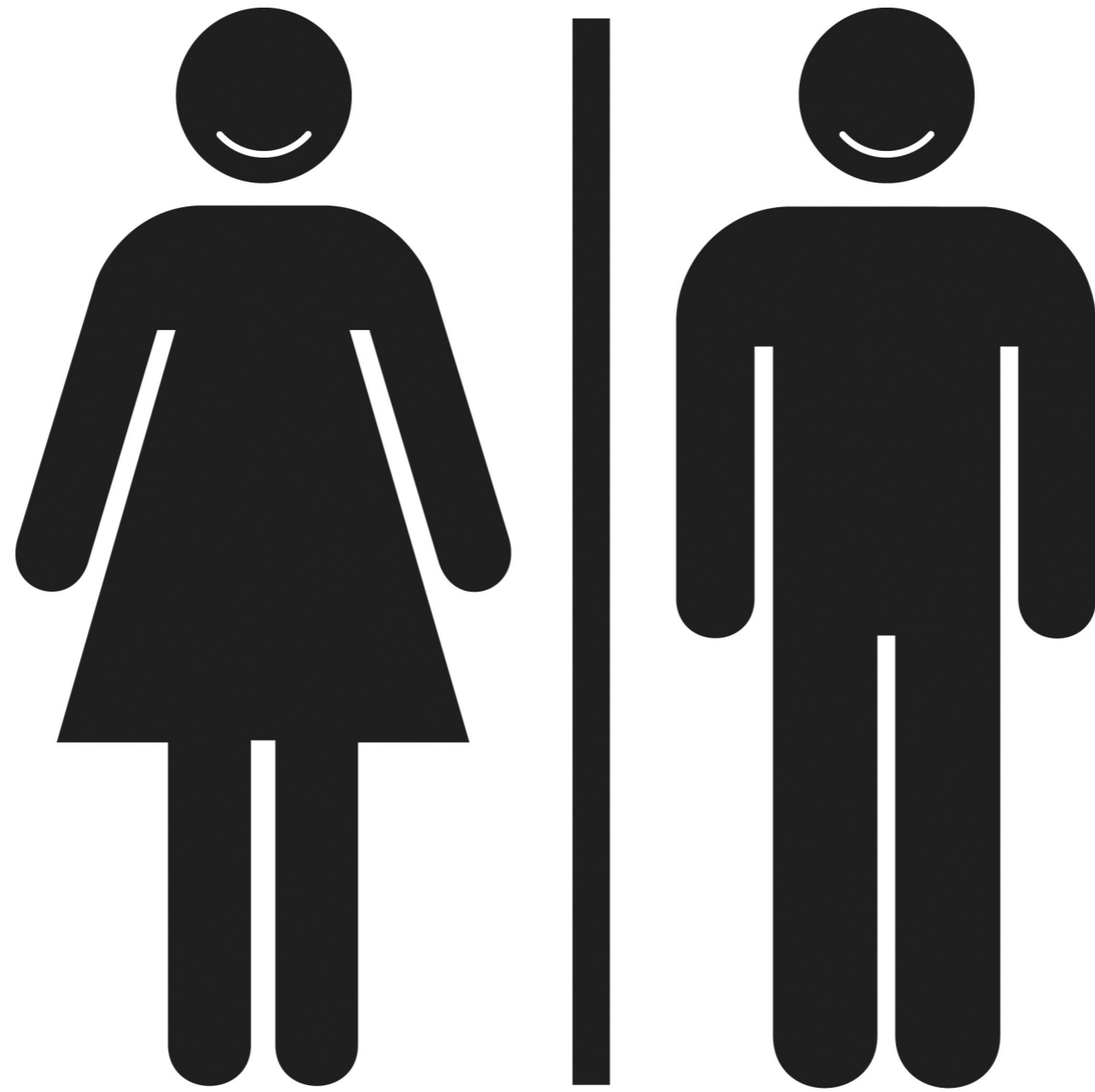
From Hieroglyphics to Isotype: A Visual Autobiography, 2010, p. 95.

3. CONCLUSION

“Like sailors are we, who have to rebuild their ship on the open sea, without its ever being able to be laid up in dry dock and be newly rebuilt from the best materials.”

Neurath, “Protokollsätze,” in *Erkenntnis*, Vol. 3, pp. 204–214.

Quoted by Willard Van Orman Quine in Word and Object, 1960.





DEPARTING FLIGHTS

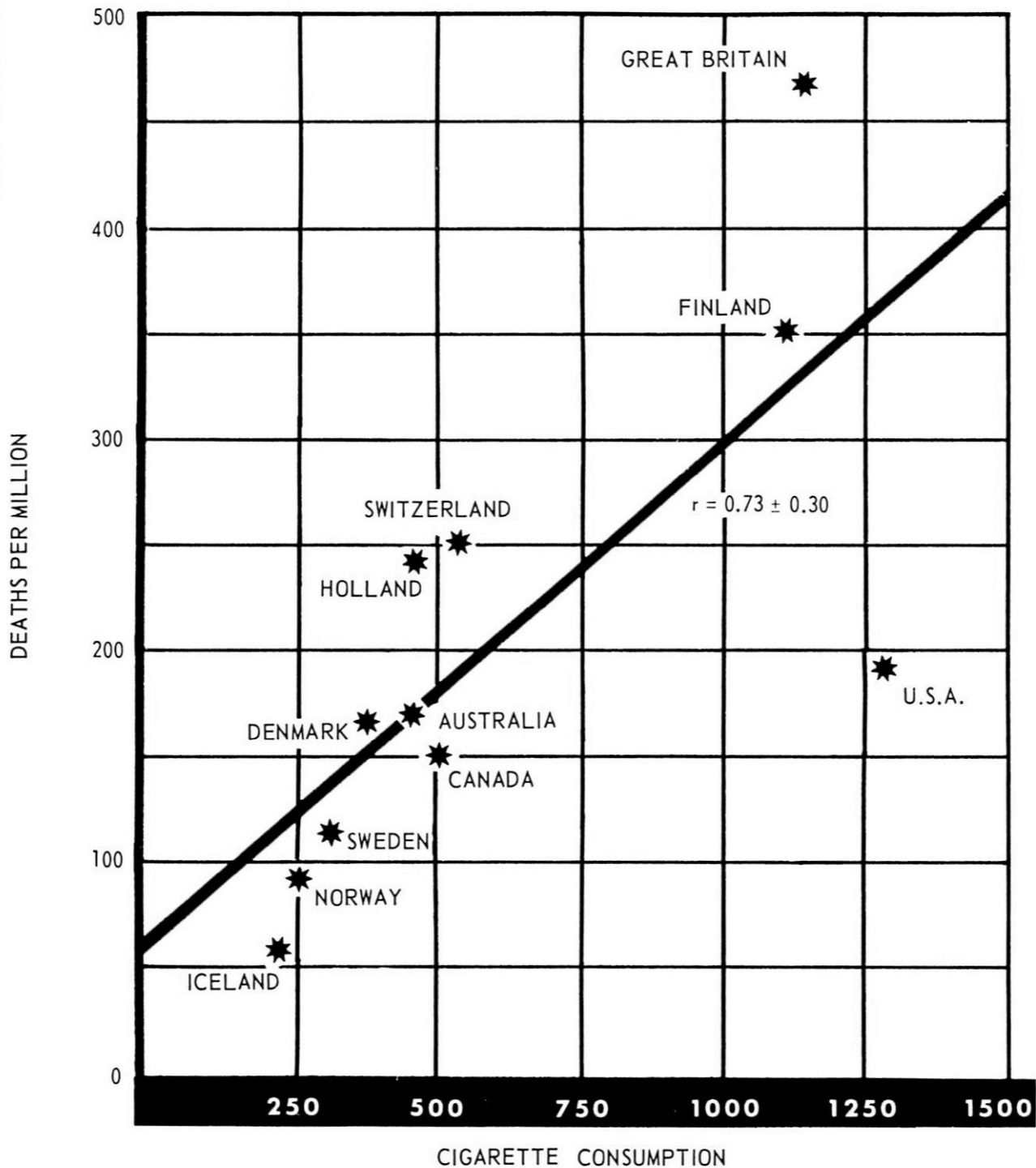


BAGGAGE CLAIM



TAXI

**CRUDE MALE DEATH RATE FOR LUNG CANCER
IN 1950 AND PER CAPITA CONSUMPTION OF
CIGARETTES IN 1930 IN VARIOUS COUNTRIES.**



(Tufte, 2001, p. 27)



“The Fallen of World War II”

(Halloran, 2015)

THANK YOU!

PINO TROGU – SAN FRANCISCO STATE UNIVERSITY, USA

LITTLE MEN, LITTLE BOXES

LIMITATIONS OF NEURATH'S INTERNATIONAL PICTURE LANGUAGE
AS A TOOL FOR STATISTICAL VISUALIZATION

APPENDIX (HANDBOOK), ABSTRACT, AND REFERENCES FOLLOW —>>

PDF of slides, handout, and references

http://www.trogu.com/Documents/conference/2015_CIDI_brasilia

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APPENDIX

SMALL HANDBOOK OF INFORMATION DESIGN: 16 PRINCIPLES FOR BETTER DATA VISUALIZATIONS

http://online.sfsu.edu/trogu/523/fall2012/data_viz_handbook/

Pino Trogu

**Small Handbook of Information Design:
16 Principles for Better Data Visualizations.**

Every graphic is an ad hoc construction, therefore these rules can be broken depending on the context. However you should try to do the graphic by following these rules first and break them later if necessary.

San Francisco State University
College of Liberal and Creative Arts
Department of Design and Industry

DAI 523 Information Design 1: Data Visualization
Fall 2013

Notes:

01 Use pencil and paper.



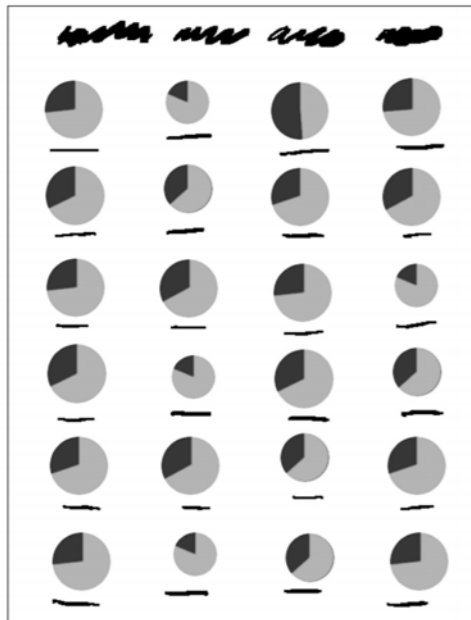
In the early and later phases of a project, simply use pencil and paper as your design tools, use graph paper if needed, to sketch ideas, try out designs, and work out your proposal. Work on your ideas and your concepts by sketching your visualizations. Solve problems through sketching by hand, not by staring at a computer screen.



02 Content is first.

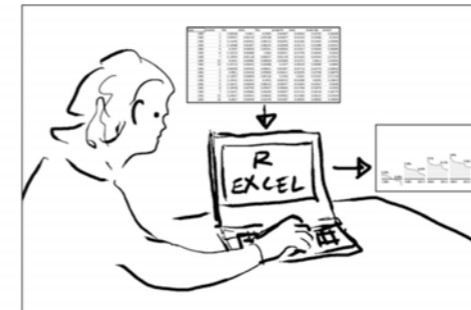
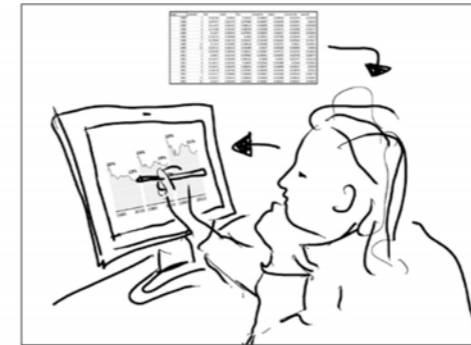
year	bracket	fed
1980	1	0.02306

year	bracket	fed	state	fica	property	sales	corporate	overall
1980	1	0.02306	0.0041	0.0535	0.04467	0.04923	0.02754	0.20209
1980	2	0.07927	0.01276	0.07368	0.03457	0.03149	0.03084	0.2626
1980	3	0.14445	0.01925	0.08113	0.02995	0.02506	0.03103	0.30488
1980	4	0.13588	0.02287	0.08294	0.02908	0.02172	0.03288	0.32537
1980	5	0.1597	0.02654	0.07491	0.03004	0.01917	0.03649	0.34685
1980	6	0.18233	0.02898	0.064	0.02951	0.01799	0.04049	0.3632
1980	7	0.19944	0.03128	0.05037	0.03149	0.01624	0.04544	0.37827
1980	12	0.2324	0.02985	0.03618	0.04056	0.01072	0.0812	0.43091
1980	15	0.29113	0.02653	0.01098	0.0557	0.00529	0.09999	0.4896
1981	1	0.02909	0.00493	0.05851	0.04387	0.04713	0.02476	0.20829
1981	2	0.0851	0.01346	0.07865	0.03441	0.03055	0.02758	0.26975
1981	3	0.12037	0.02009	0.09156	0.0296	0.0241	0.02747	0.31318
1981	4	0.14412	0.02362	0.0905	0.02932	0.02088	0.0296	0.33803
1981	5	0.16341	0.02646	0.08242	0.03047	0.01846	0.03337	0.3546
1981	6	0.18578	0.02785	0.07007	0.03065	0.01704	0.03879	0.3702
1981	7	0.21417	0.02886	0.05839	0.02967	0.01536	0.04134	0.38779
1981	12	0.24037	0.03015	0.03826	0.04005	0.01089	0.06632	0.42604
1981	15	0.2817	0.01948	0.01349	0.04287	0.00553	0.08502	0.44809



Content is first, form is second. Select interesting content. Content-less stuff produces form-less, uninformative visualizations. This means that you need one or more data sets that are rich with data. Many columns and many rows (lots of data points) are better than just two data points. For example, two percentages: 25 and 75 are in themselves not very interesting and it would be hard to pull off an interesting visualization based on just those two numbers.

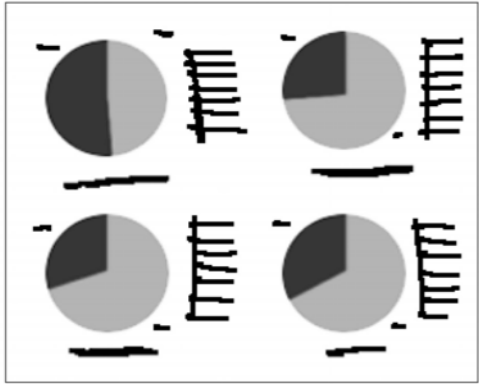
03 Do not draw graphs by hand.



Do not take a numerical table or spreadsheet and then render the shapes (the columns, the lines) by hand, even if you're using Illustrator. Rather, take the data set and process it through a data visualization program, such as R, Excel, or other. Then bring the file into Illustrator to clean up and fine-tune line weights, typography, color, etc.

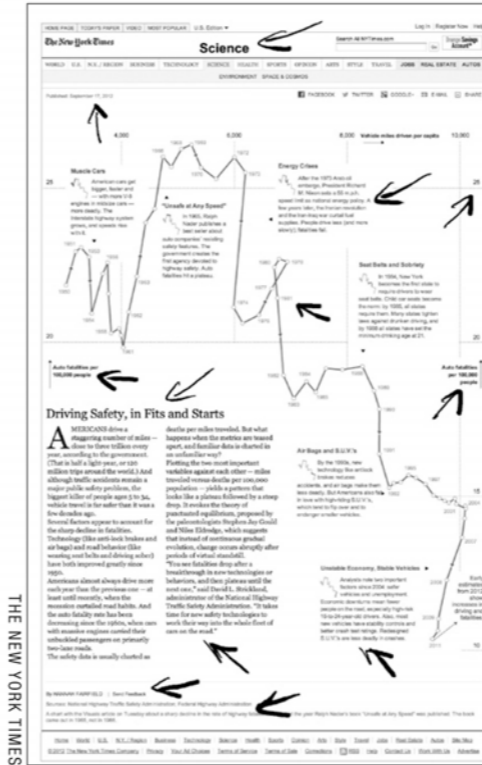
04 Do not enlarge numbers.

55% BLA BLA BLA
27% BLA BLA BLA
30% BLA BLA BLA
35% BLA BLA BLA



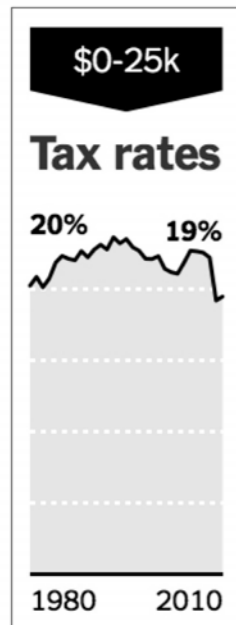
Do not turn data points into stand-alone enlarged numbers with a percentage sign next to them to make them look important. Filling up your visualization with such “visuals” is not any better, and might in fact be worse, than just having plain text, with no “visualizations” at all. An infographic is not a PowerPoint template. The best thing to do is to combine words and images together.

05 Use words, not just images.



Use sentences: subject, verb, object. Close your clauses. Set up an introduction and follow through with visualizations. Use a title, a subtitle, an introduction, main text if needed, labels, captions, credits (for pictures) call-outs, footnotes, sources (for data sets), and a signature (colophon). This is called “the annotation layer”. Plus, you can include numerical tables, if needed and appropriate, within the visualization.

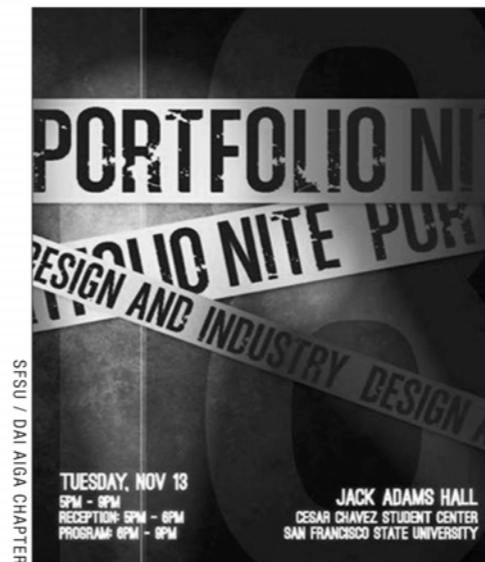
06 Use small multiples.



Content is king. One single blown-up graphic is not so good, especially if it's just showing very few data points. Don't be stingy. For example, a pie chart showing 25 and 75 percent and filling up a whole poster is not so good. It's much better to have a high number of elements even if they're small, like in a geographic map. Twenty little pies are better than one giant pie. Ten little line graphs are better than a single giant line graph.

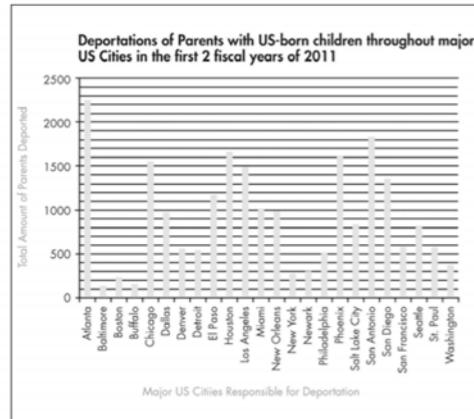


07 Do not bungle the meaning.

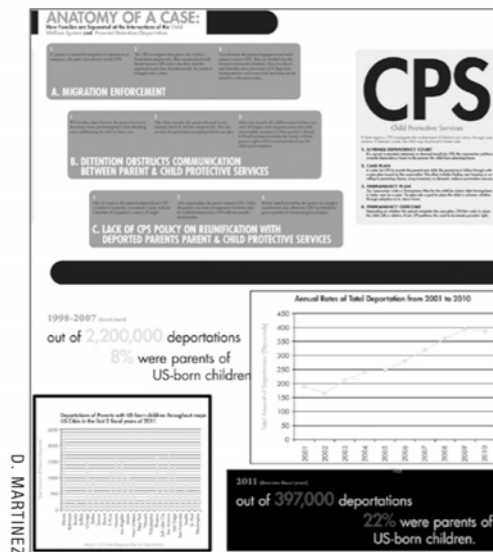


Do not bungle the meaning of your visualization. Say what you mean and do not confuse the reader, starting with your opening title and subtitle. This applies to choice of words as well as pictures. For example, if the topic is “Tuition fee increases” do not say: “Fee hikes on Mount Everest”; say instead: “Fee increases reach new high”. If the topic is “Black Friday (shopping)”, do not say: “Products cheap as a black sheep”; say instead: “Black Friday keeps more green in your wallet”. If the topic is “Christmas shopping”, do not say: “Christmas shoppers pray to God for bigger discounts”; say instead: “Consumerism and religion mix in traditional Christmas holiday”. Do not play loosely with irony and puns, and don't mix-up your metaphors.

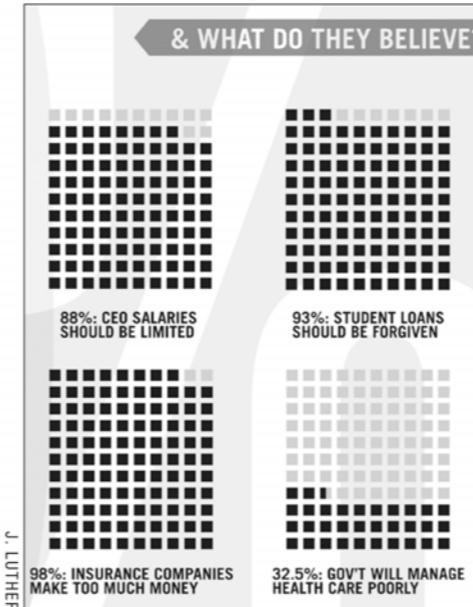
08 Do not create op-art.



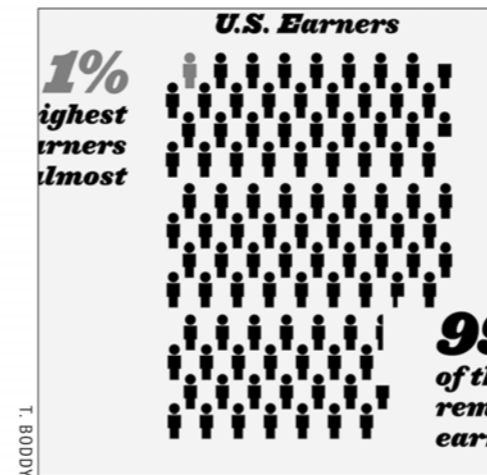
Do not make op-art (optical art) effects by using bold condensed sans-serif fonts where the strokes are the same width as the counters in the font and also the width of the spacing between the letters. This creates a very annoying, vibrating checkerboard effect. Do not use solid backgrounds, boxes, thick borders, or arbitrary bold type. If you are using solid backgrounds throughout, invert the whole image to see if it's better with the opposite values. On a Mac, use control-option-command-8 to instantly invert the colors of your screen on the computer. See if it would be better the other way around (black type on white background). If nothing is gained by the solid fills, then get rid of them.



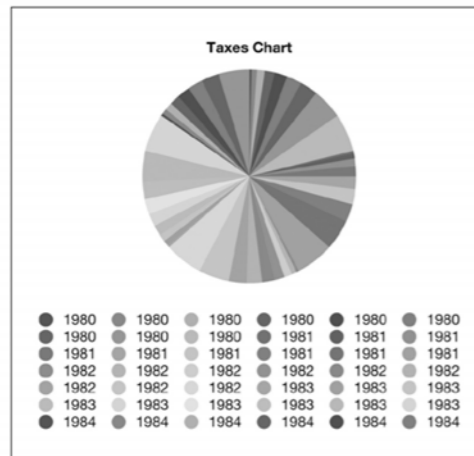
09 Do not use little dots for numbers.



Do not use little dots for percentages. Do not use little people for quantities. Do not visualize quantities by the endless repetition of single units like little dots or little squares. We don't use pebbles to count anymore, and we have invented a tool called "place value". It's better to write out the number or to visualize it using a single solid area, not many tiny areas in little rows. Do not use little people as units to show quantities, even if the quantities represent people. Think of those poor little guys whose limbs get mutilated when you have to represent a fraction: arms, legs, even heads get cut off without mercy!

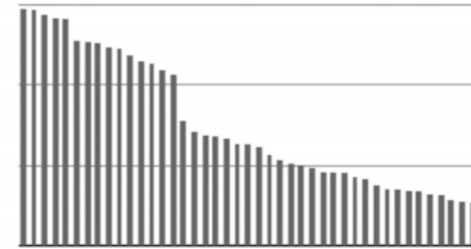
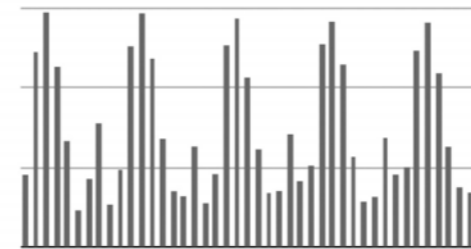


10 Do not use colors (to be memorized).



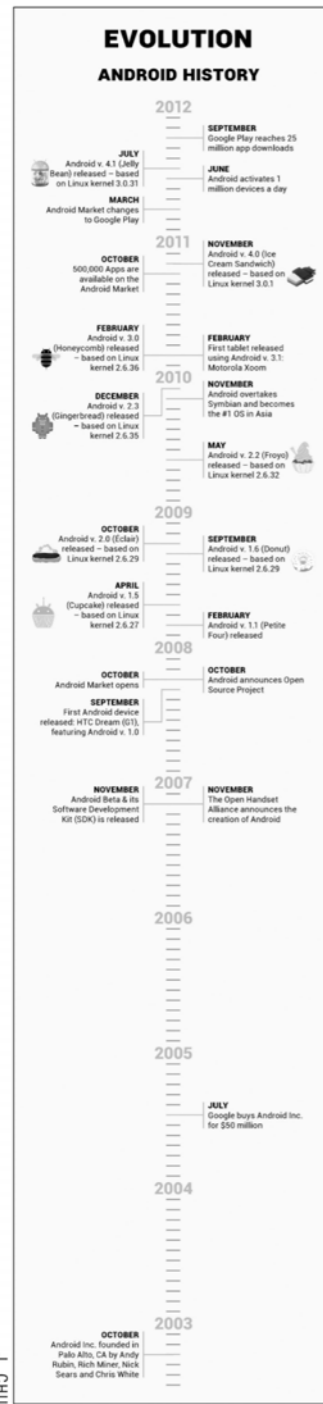
Do not use colors if the reader has to memorize them. Do not use colors if you have to have a legend for every single color in order to understand the graphic. If no legend is required, then little thinking is needed in order to perceive the graphic. Too many colors in the graph take a huge toll on the attention capacity of the reader. One cannot remember all those colors because we can only remember a small set of things at once: five-seven. Also, colors do not have an intrinsic order, therefore they should not be used to sort things, unless you use value as well: darker color for more, lighter color for less, both being from the same hue or two diverging hues maximum.

11 Sort by value, not category.



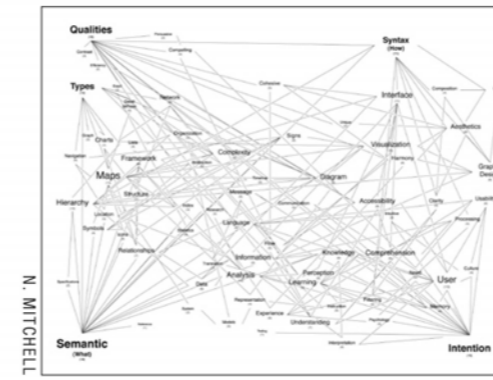
Sort by performance (value), not alphabetically. When part of the information is categorical but includes values for each category, do not sort the categories alphabetically. Instead, sort by the values for each of those categories. For example if the categories are products or states and each is a value, sort by the value, not by the alphabetical names of the states or the names of the products.

12 Equally space time intervals in timelines.



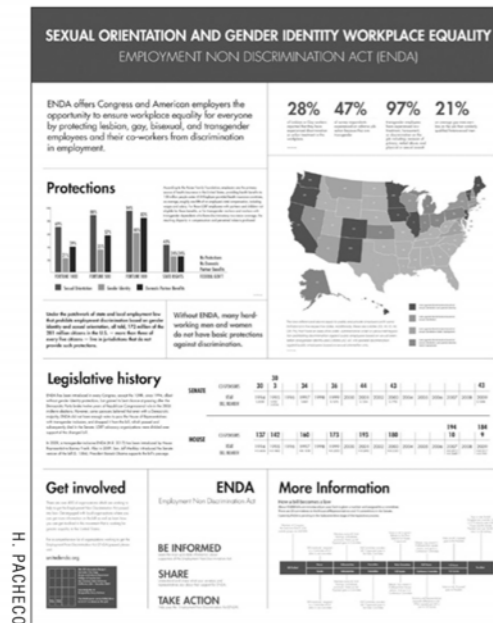
Keep the spacing equal (for equal periods of time) even if that results in big information gaps within certain periods of time. Gaps are as meaningful as periods of concentrated activity. When data is concentrated within a few years, use typography and other means to make everything readable while keeping the temporal spacing even and correct.

13 Avoid meaningless concept maps.



Avoid meaningless concept maps and network graphs. For a simple reason: they include on the page too many items and abstract concepts at once. Our working memory (short-term memory) allows us to hold in memory only a few items (4-7) for a very short time (2-4 seconds) before we have to move on. Concept maps look very cool but they are also very uninformative and little information is retained from them in our long-term memory. Generally, the thing one remembers from them is their vague visual form – the shape of the graph – rather than the more important subject matter.

14 You can use small type.



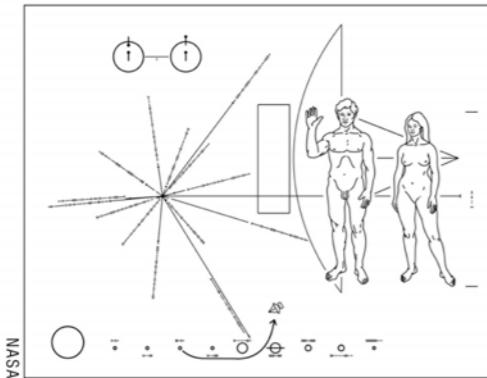
You can use small type in a big poster. Use as many sizes as needed. A range from 16-18pt to 24pt is the best size range for most text on a poster, excluding the main title and possibly the subtitle, with even smaller sizes for captions and labels. For short texts, use 24pt. Sometimes 30pt for larger text can be used. In general, imagine that you're standing 20 to 30 inches from the poster. At this distance, you should be able to read most text elements in the layout.

15 Do not screen type.



Every font is a wonderful and beautiful universe unto itself. Do we really need to tinker with what is already a very sophisticated sign system? Do not reverse, screen (make tints), border, condense or expand type. Do not italicize type by pressing the “oblique” button. Use a font that already has a wide range of weights. Traditional old-style italic fonts are best to save space if needed, as they are naturally condensed and were designed for this purpose. Do not let your text lines run longer than two-and-a-half times the alphabet – about 60 characters. Break up the big text boxes into two or more columns whenever necessary so that your measure (box width) is “measured” and correct. Do not justify text if possible, use flush left / ragged right (FL/RR).

16 Psychology of perception.



Be aware of the following terms related to cognitive psychology and psychology of perception: working memory, co-construction of meaning, background knowledge, conventions of representation, cultural (visual and verbal) conventions, context, genre, the annotation layer, closure.

For more information about the terms above, read my two papers:

The Four-Second Window

<http://bit.ly/Ve2mph>

and

The Double Constraints of Convention and Cognition in Successful Graphic Design

<http://bit.ly/12zLinL>

Visit URLs to download the PDFs of the articles.

Notes:

Small Handbook of Information Design: 16 Principles for Better Data Visualizations.

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- 08 Do not create op-art.
- 09 Do not use little dots for numbers.
- 10 Do not use colors (to be memorized).
- 11 Sort by value, not category.
- 12 Equally space time intervals in timelines.
- 13 Avoid meaningless concept maps.
- 14 You can use small type.
- 15 Do not screen type.
- 16 Psychology of perception.

Some of these principles are based in part on Edward Tufte's books and workshops.
For more info visit: www.edwardtufte.com
Thanks (and apologies) to my students for showing details from their various projects.
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ABSTRACT

LITTLE MEN, LITTLE BOXES

LIMITATIONS OF NEURATH'S INTERNATIONAL PICTURE LANGUAGE
AS A TOOL FOR STATISTICAL VISUALIZATION

PINO TROGU – SAN FRANCISCO STATE UNIVERSITY, USA

The 2013 publication of *Isotype: Design and Contexts 1925–1971* by Hyphen Press, London has renewed interest in the great Otto Neurath, the inventor of Isotype (small, repeated pictorial representations of people or things), and his theories about the pictorial presentation of statistics. With the help of recent psychological findings, this paper explains why Isotype is unevenly effective in communicating statistical data. The paper compares Isotype charts with traditional bar charts and discusses the use of pictorial symbols instead of numerical notations. The strict temporal limitation of working memory is considered, along with findings about the optimal verbal/visual means of mitigating this bottleneck of the mind, and helping the viewer achieve fast closure, accurate understanding, and reliable storage in long-term memory.

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