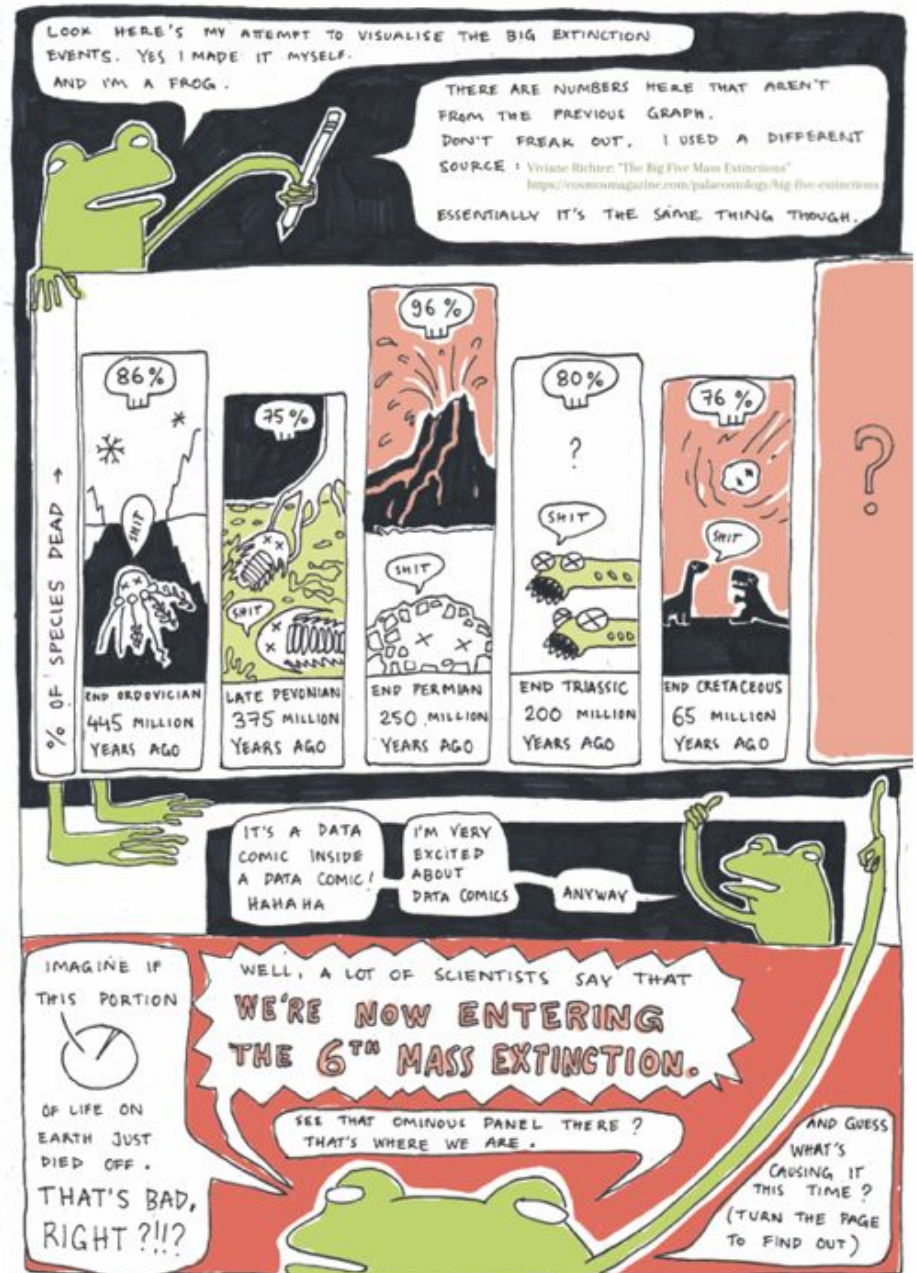
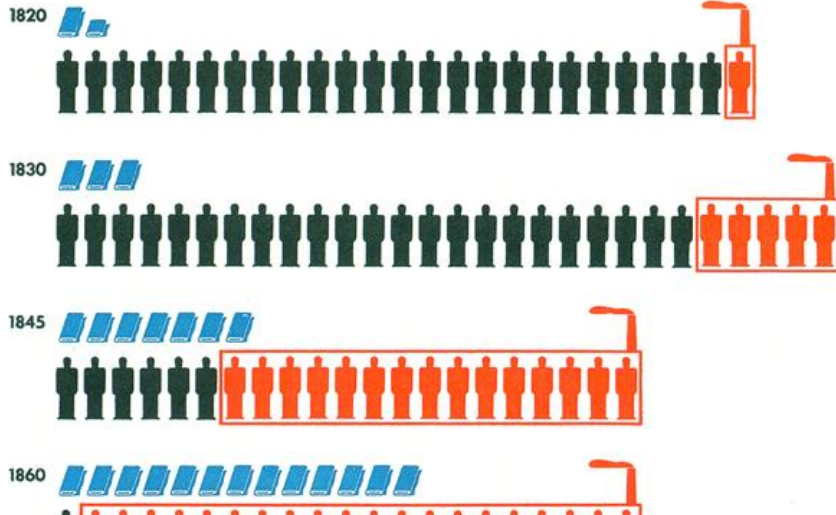


The World's Water

Advanced Storytelling

Benjamin Bach
<http://benjbach.me>
University of Edinburgh
2020



The World's Water

Exploration

Data centered

More is more

Experts

Insights

Lab Setting

Lengthy

Fuzzy

Explanation

Human centered

Less is more

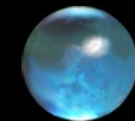
Non-experts

Messages

In-the-wild

To-the-point

Precise



All water on, in, and above the Earth



Liquid fresh water



Fresh-water lakes and rivers

Outline

- What is storytelling?
- Which story-formats exist?

Hans Rosling



HANS ROSLING
(1948-2017)

Storytelling

Storytelling

Story:

- Events, facts

Narrative:

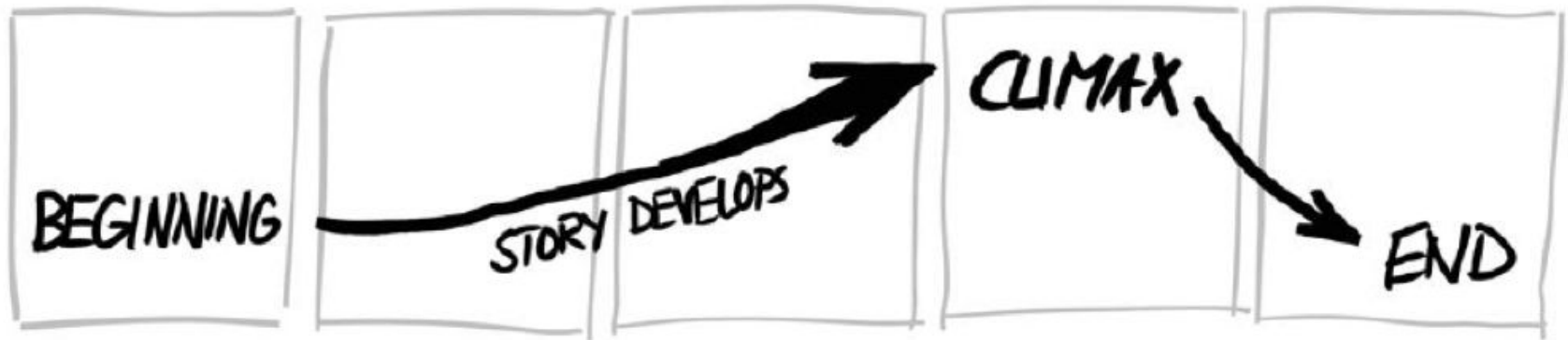
- Makes things understandable
- Putting things in context
- Communication
- Order (of events)
- Memory
- Audience, author, storytelling,
- Story-telling
- What medium?



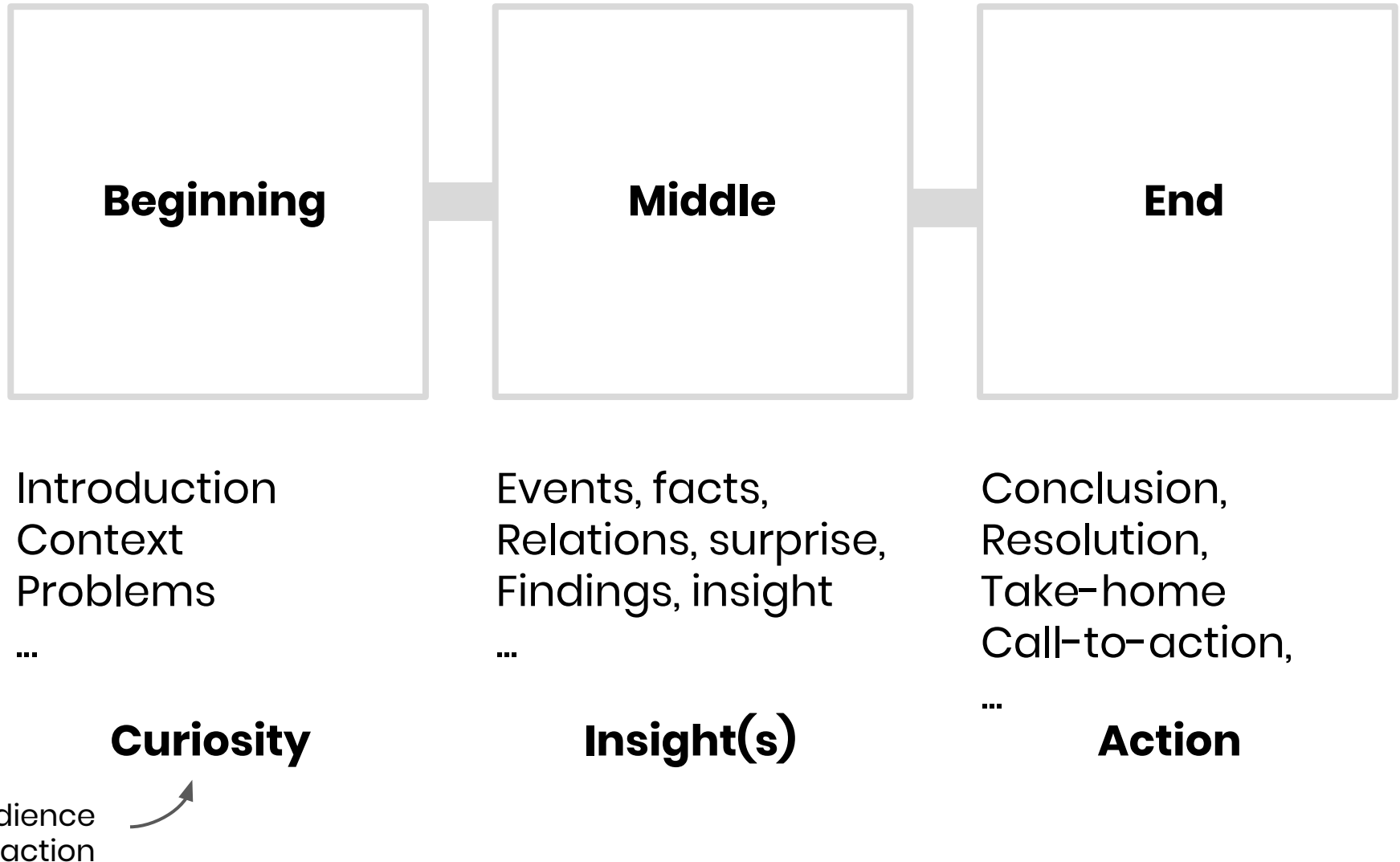
Data-Driven Storytelling

- Story:
 - **Facts, insights, messages, ...**
 - **Processes**
 - Data transformation, selection, aggregation
- Narration:s
 - Provide **context**
 - Persons, collection, importance, questions, ...
 - Explain **visualizations**
 - Talk to an **audience**
 - Take home **message**
 - Chose storytelling **medium**

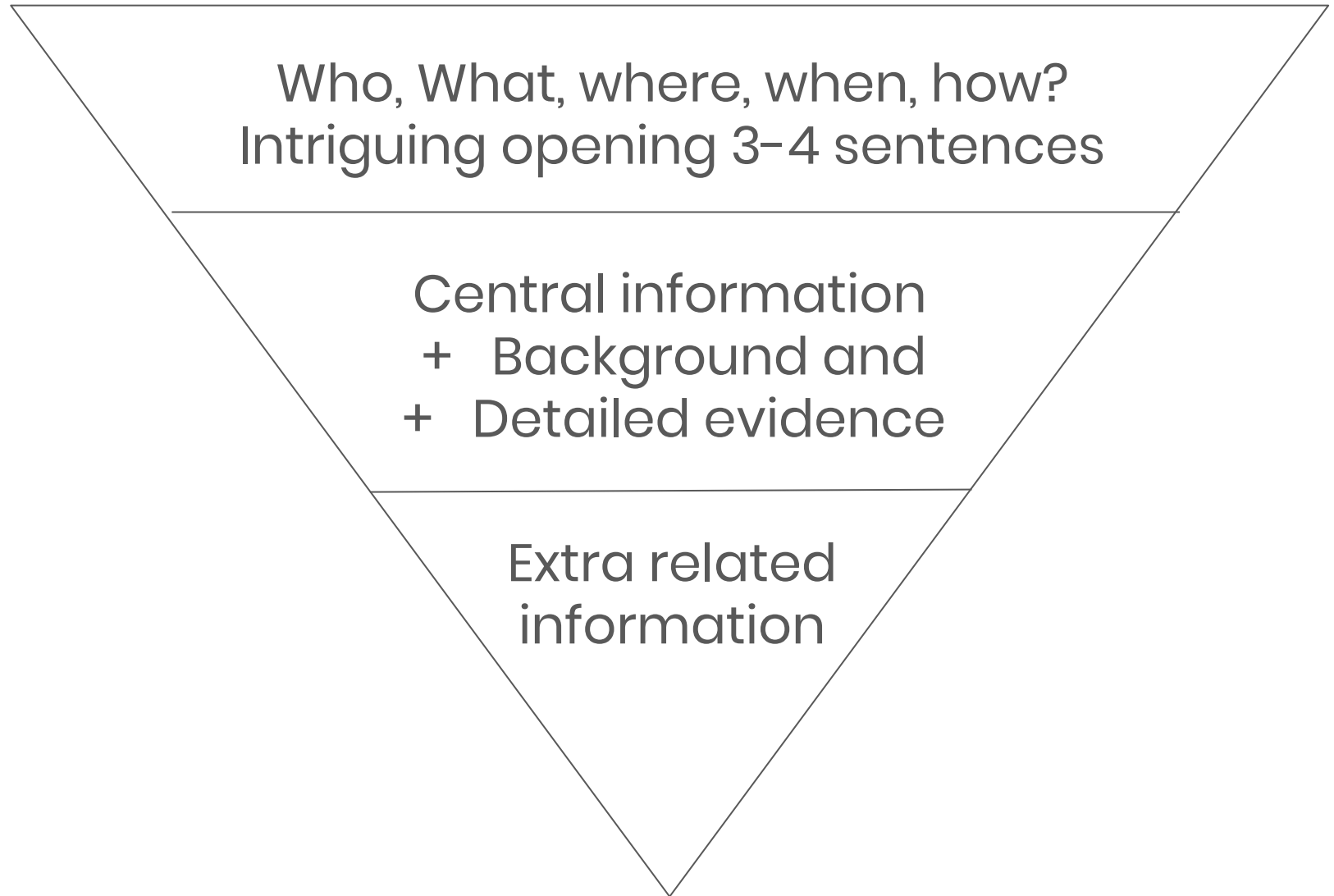
Story structure: **Drama**



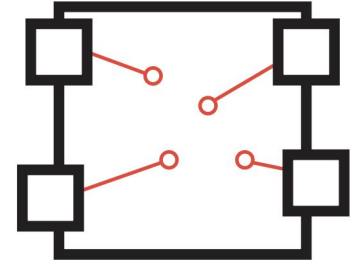
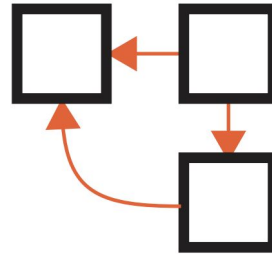
Story Structure



Story structure: **Journalism**



Narrative Structures



Linearity



Interactivity

Author driven

Reader driven

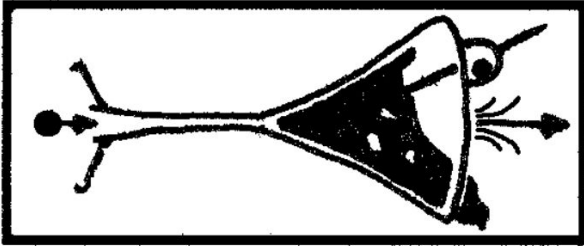
Heavy messaging

No messaging

No interactivity

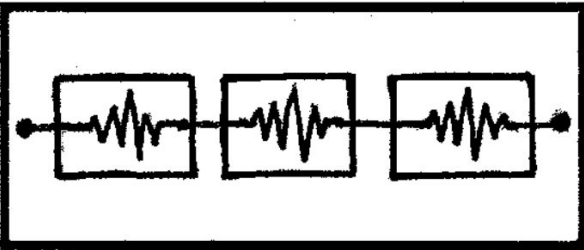
Free interactivity

Narrative Structures



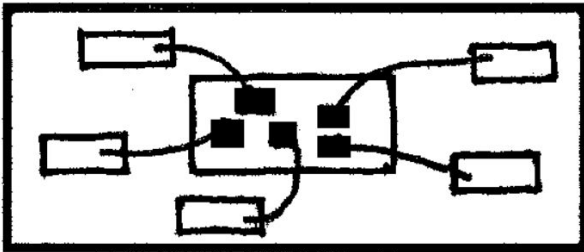
Martini-glass Structure

Guidance first, then exploration



Interactive slideshow

Overall structure
+ local exploration

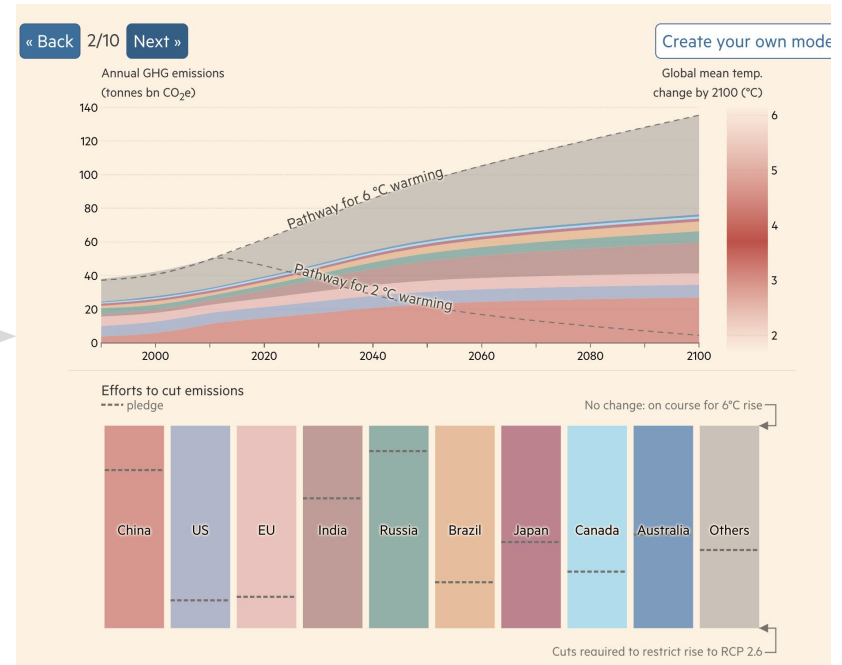
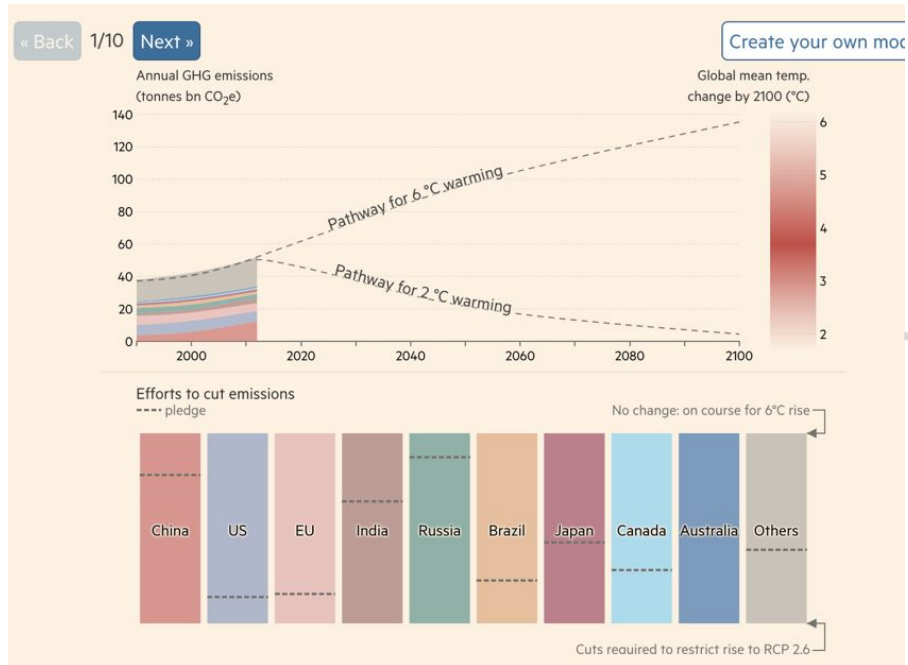


Drill-down story

Largely reader driven

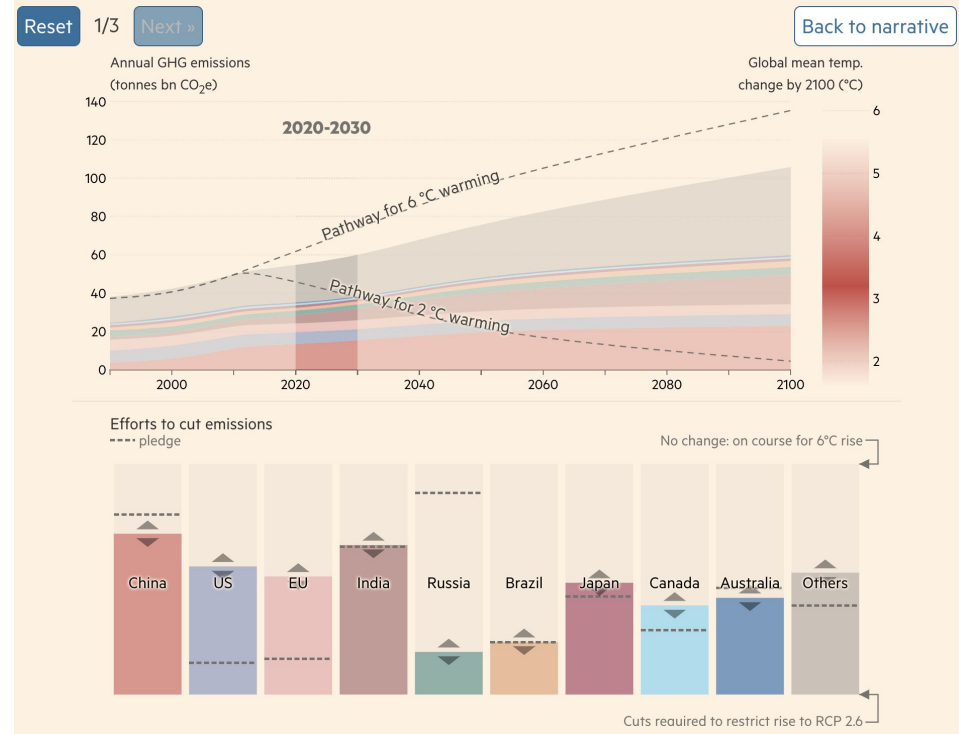
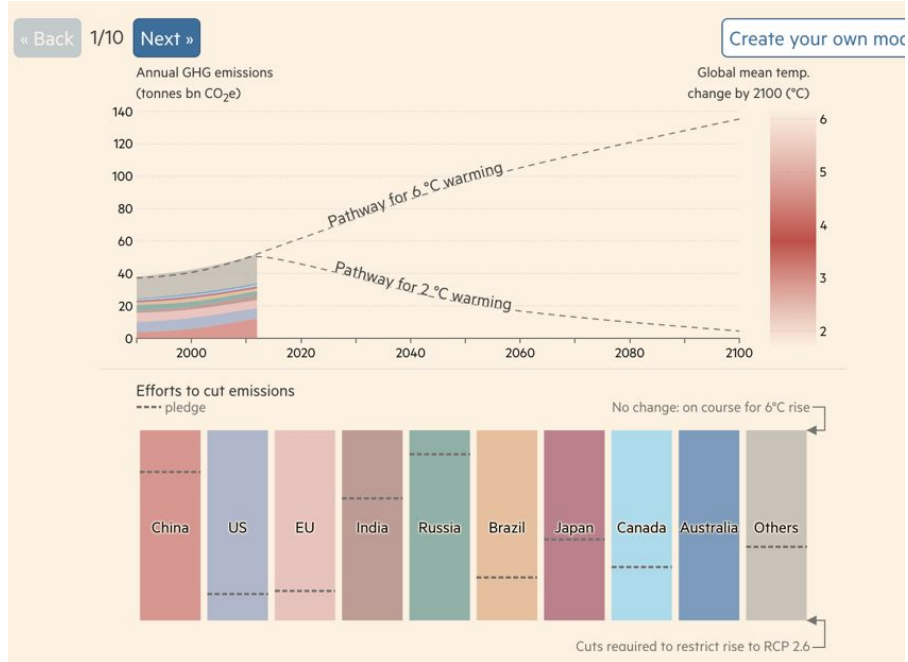
Narrative structures:

Interactive Slideshow

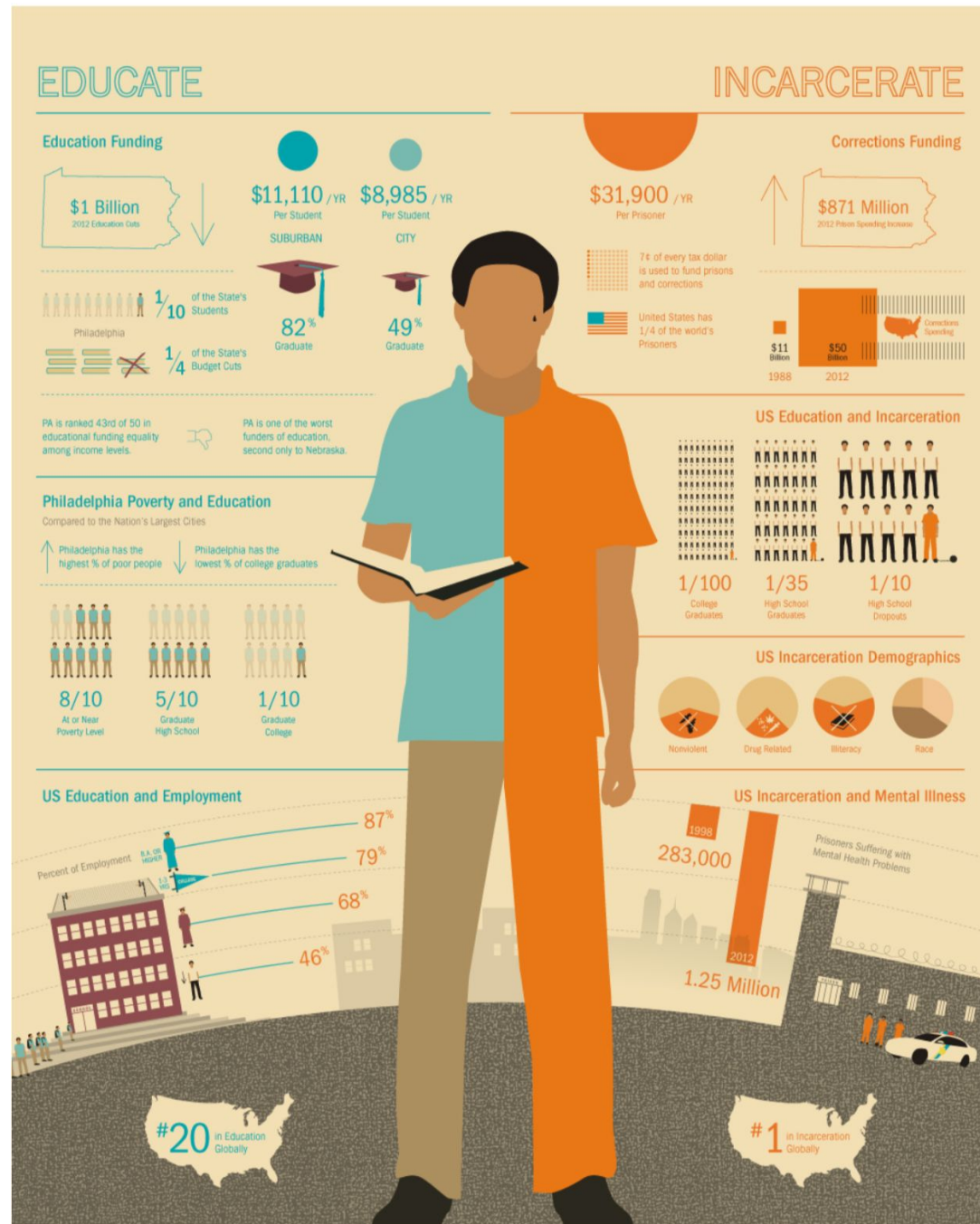


Narrative structures:

Martini-glass Structure



Narrative structures: **Drill-down story**



The Audience

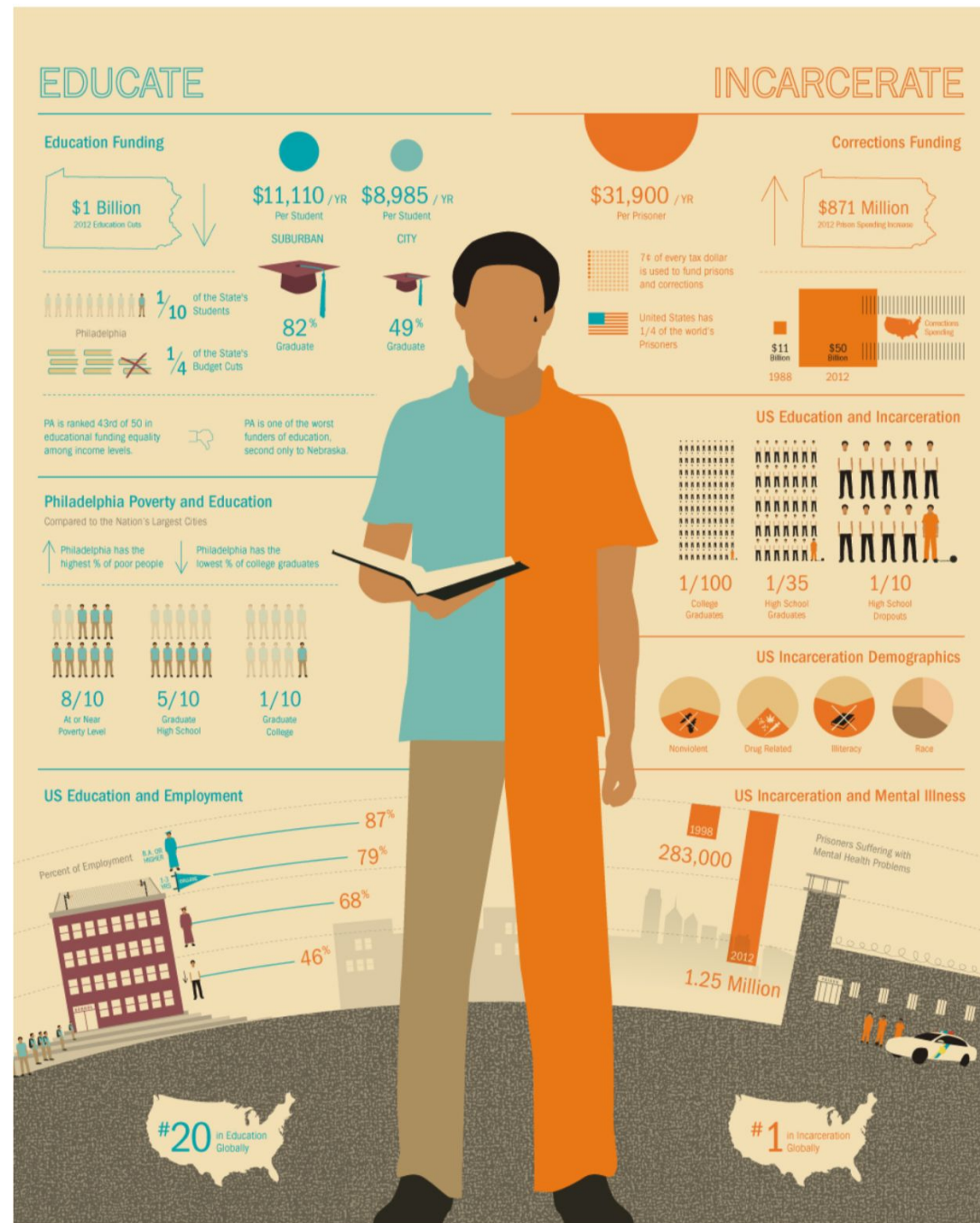
(lat: audire=to hear)

The audience

- Familiarity with your topic?
- Do they care?
- What do you want them to take away?
- What do they know about visualization?
- How do they encounter your visualization?
 - Mobile phone, computer, print media...

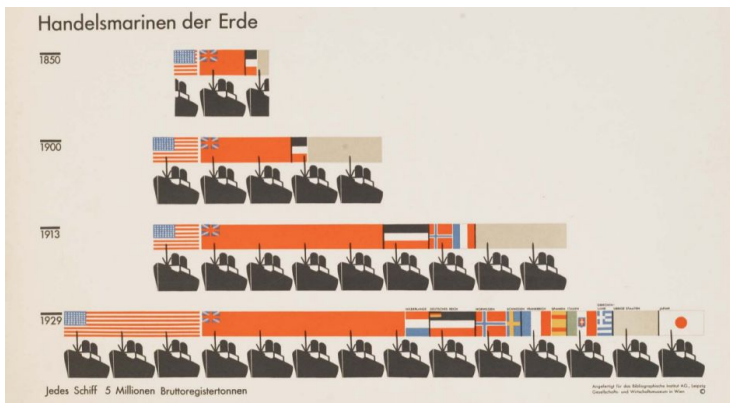
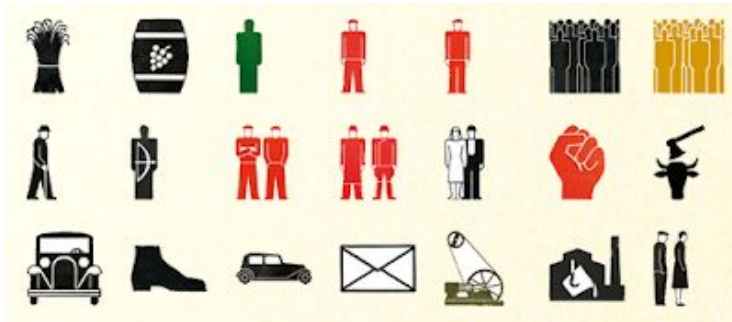
Narrative Design Patterns

Narrative Patterns Contrast

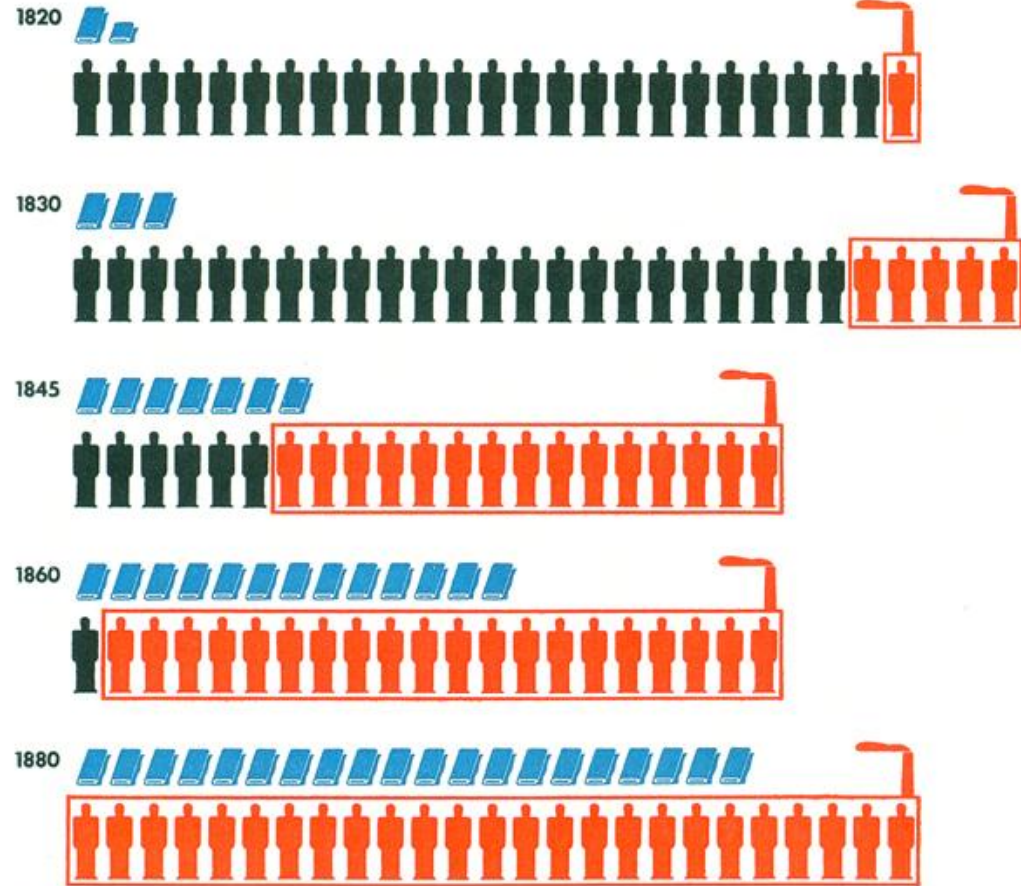


Bach, Benjamin, et al. "Narrative Design Patterns for Data-Driven Storytelling." *Data-Driven Storytelling*. AK Peters/CRC Press, 2018. 125-152.

Narrative Patterns: **Concretize (ISOTYPE)**



Home and Factory Weaving in England



Each blue symbol represents 50 million pounds total production

Each black man symbol represents 10,000 home weavers

Each red man symbol represents 10,000 factory weavers

Scales

<https://www.youtube.com/watch?v=XqUwr-Nkq9g>

\$1 TRILLION & \$20 TRILLION IN PHYSICAL \$100 BILLS

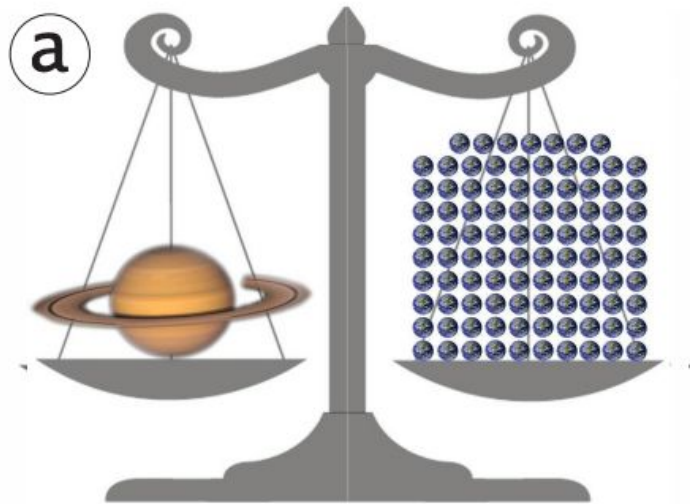


▶▶ 0:00 / 2:10

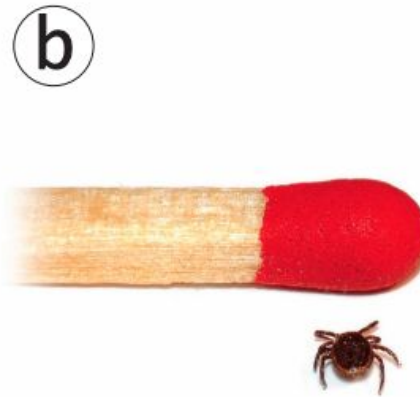
ECONOMIC INFO GRAPHICS

DEMOCRACY 360

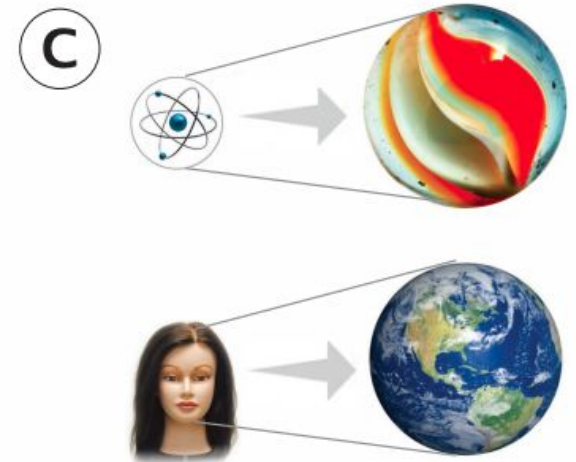
Scales



Quantities



Reference

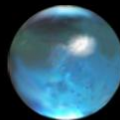
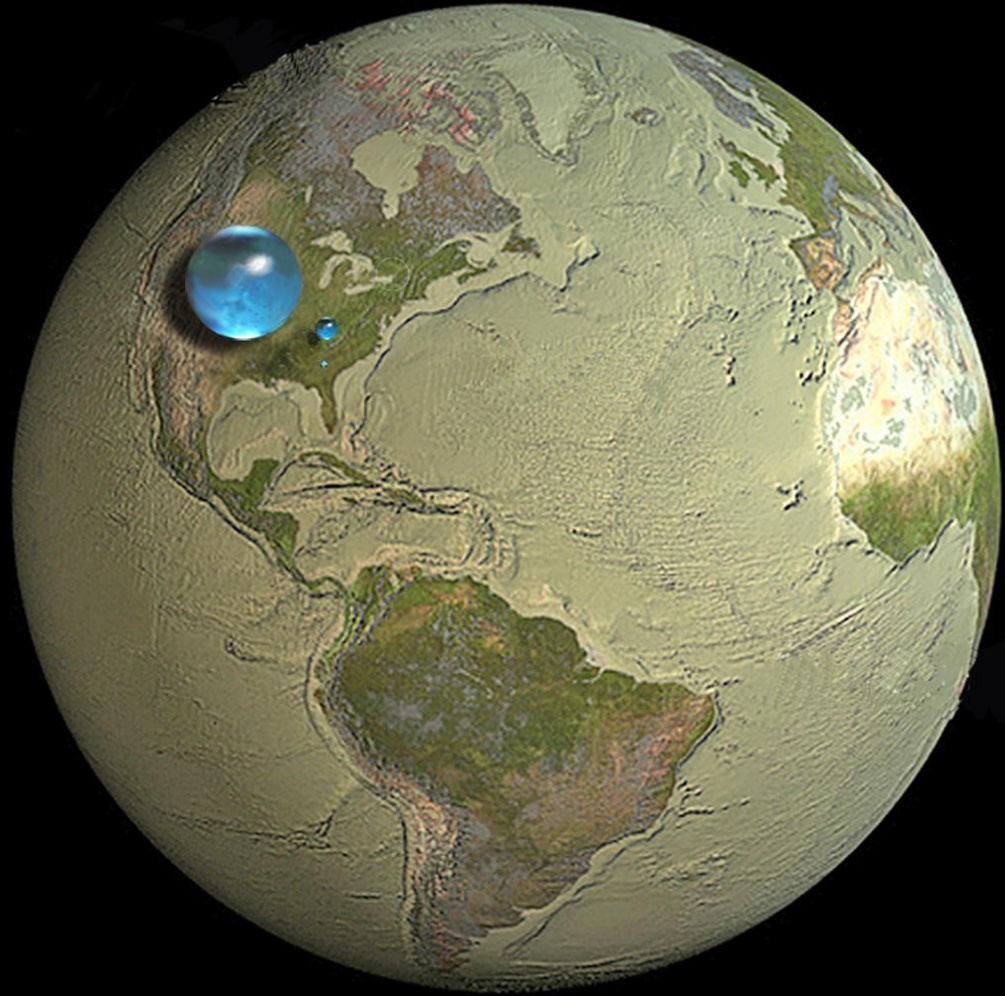


Analogies

Chevalier, Fanny, Romain Vuillemot, and Guia Gali.
"Using concrete scales: A practical framework for
effective visual depiction of complex measures."
*IEEE transactions on visualization and computer
graphics* 19.12 (2013): 2426-2435.

Scales

The World's Water



All water on, in, and above the Earth



Liquid fresh water



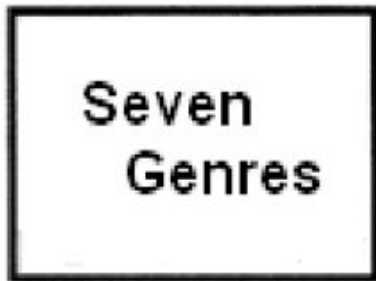
Fresh-water lakes and rivers

Howard Perلمان, USGS,
Jack Cook, Woods Hole Oceanographic Institution,
Adam Nieman
Data source: Igor Shiklomanov
<http://ga.water.usgs.gov/edu/earthhowmuch.html>

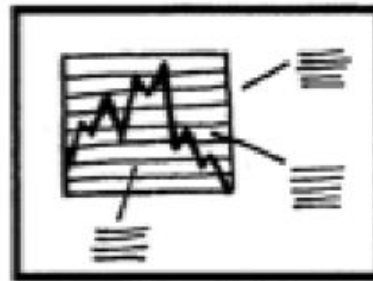
Chevalier, Fanny, Romain Vuillemot, and Guia Gali.
"Using concrete scales: A practical framework for
effective visual depiction of complex measures."
*IEEE transactions on visualization and computer
graphics* 19.12 (2013): 2426-2435.

Storytelling Genres

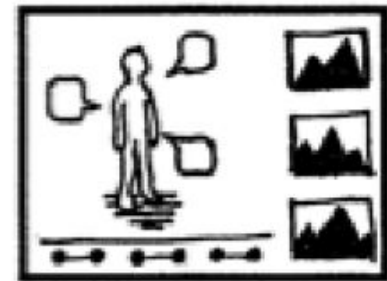
Seven Genres by Segel & Heer



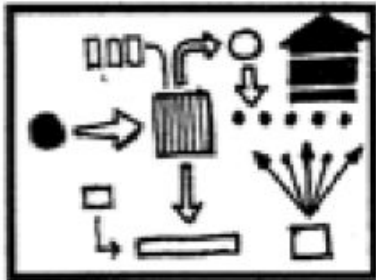
Magazine Style



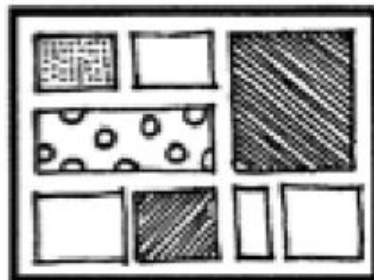
Annotated Chart



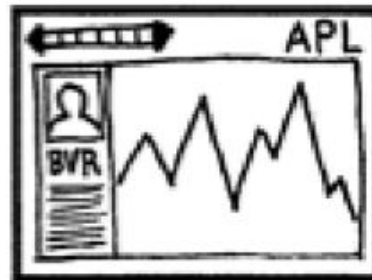
Partitioned Poster



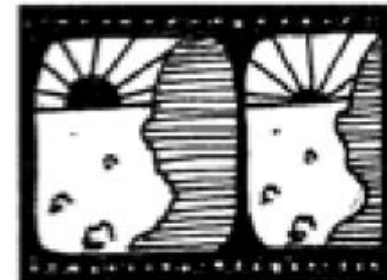
Flow Chart



Comic Strip

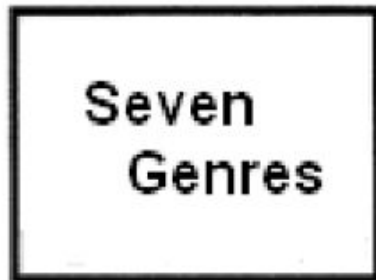


Slide Show

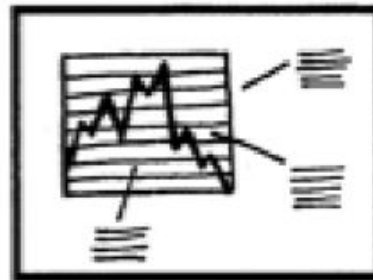


Film/Video/Animation

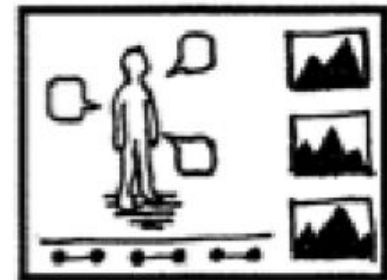
Seven Genres by Segel & Heer



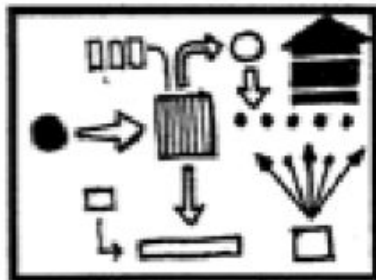
Magazine Style



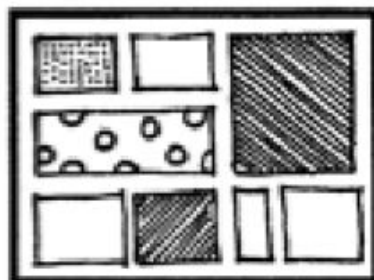
Annotated Chart



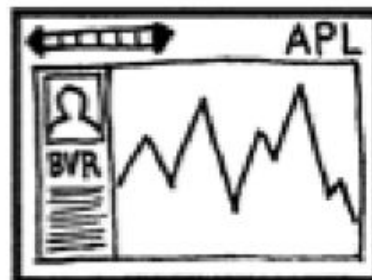
Partitioned Poster



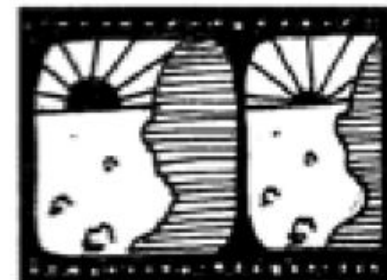
Flow Chart



Comic Strip



Slide Show

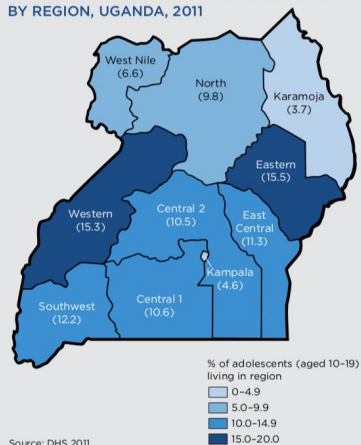


Film/Video/Animation

Magazine Style

physical, social, political, and economic structures of a region can place residents at varying risks for vulnerability. Areas susceptible to violence or natural disaster pose clear threats to individuals. An individual's environment also affects his or her development and behavioral choices. Resources available in the physical and social environments create the contexts within which decisions are made about health, education, and employment. Political and social environments also dictate whether resources are accessible to all adolescents. An examination of the residential distribution of adolescents provides a baseline for comparing geographical patterns of vulnerability. Within Uganda, by type of residence, the majority of adolescents (87 percent) live in rural versus urban areas. Figure 6 shows the distribution of adolescents aged 10 to 19 living in Uganda. Regional distributions show Karamoja contains only four percent of the adolescent population. Kampala with a much denser population contains 4.6 percent of the population. The Eastern and Western regions contain the largest proportions of the adolescent population.

FIGURE 6
PROPORTION OF ADOLESCENTS AGED 10-19 BY REGION, UGANDA, 2011



Household factors influencing vulnerability

Household-level factors have direct impacts on the well-being of adolescents. Households are the primary setting where adolescents live and engage in activities. For this reason, the household environment and the people who live there have significant impacts on the lives of adolescents. Physical conditions of the home influence the health of residents. Family structures and demographic characteristics of household members affect the knowledge, decisions, behaviors and interactions in the environment of the adolescent.

Access to improved water sources and sanitation

Unsafe water, inadequate sanitation, and poor hygiene are among the five leading risk factors responsible for one quarter of all deaths in the world (WHO 2009). Unsafe water supplies and inadequate sanitation in homes increase exposure to water-borne diseases and can cause diarrhea. Ensuring access to clean water sources and sanitation is key to maintaining hygiene and health. Improved water sources are those that either naturally protect water from contamination or are constructed to do so. These include piped water, public taps, standpipes, boreholes, tube wells, protected wells and springs, and rainwater collection. Improved sanitation includes constructs and systems that prevent fecal contamination. These include flush or pour toilets, ventilated pit latrines, pit latrines with slabs, and composting toilets (UNICEF 2013b).

Housing conditions across East and Southern Africa are largely in need of improvement, and lack of improved sanitation varies by country. In nearly all of East and Southern Africa, over half of adolescents either do not have improved sanitation or share facilities with other households. Conditions are worst in Madagascar and Mozambique where fewer than four percent of adolescents live in households with improved sanitation that is not shared (Figure 7). Rwanda has the lowest proportion of adolescents affected—35 percent—which is still unacceptably high. Lack of access to improved water sources affects lower proportions but is still a problem in the region. In five countries, fewer than half of adolescents have access to improved water sources (Figure 8). Water conditions are best in Namibia, where only 15 percent of adolescents have no access to improved water.

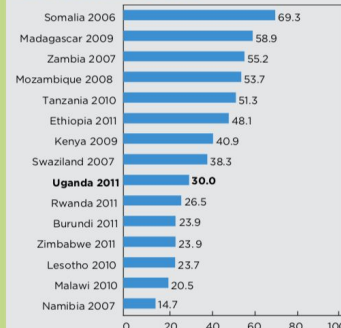
In Uganda, overall access to improved water and sanitation increased by a small but significant percentage between 2006 and 2011 (Figure 9). In 2006, 33 percent of adolescents had no access to improved water; in 2011, it is 30 percent. The proportion of adolescents without access to improved

FIGURE 7
PERCENT OF ADOLESCENTS AGED 10-19 LIVING IN HOUSEHOLDS WITH NO IMPROVED OR WITH SHARED SANITATION, EAST AND SOUTHERN AFRICA



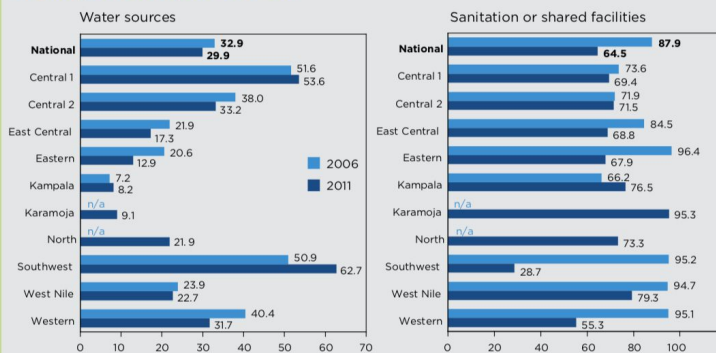
Source: DHS 2007-2011; MICS 2006-2008.

FIGURE 8
PERCENT OF ADOLESCENTS AGED 10-19 LIVING IN HOUSEHOLDS WITH NO IMPROVED WATER SOURCE, EAST AND SOUTHERN AFRICA



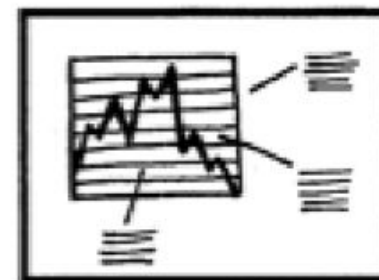
Source: DHS 2007-2011; MICS 2006-2008.

FIGURE 9
PERCENT OF ADOLESCENTS AGED 10-19 LIVING IN HOUSEHOLDS WITHOUT ACCESS TO IMPROVED WATER AND WITHOUT ACCESS TO IMPROVED OR WITH SHARED SANITATION, IN UGANDA, BY REGION, 2006 AND 2011

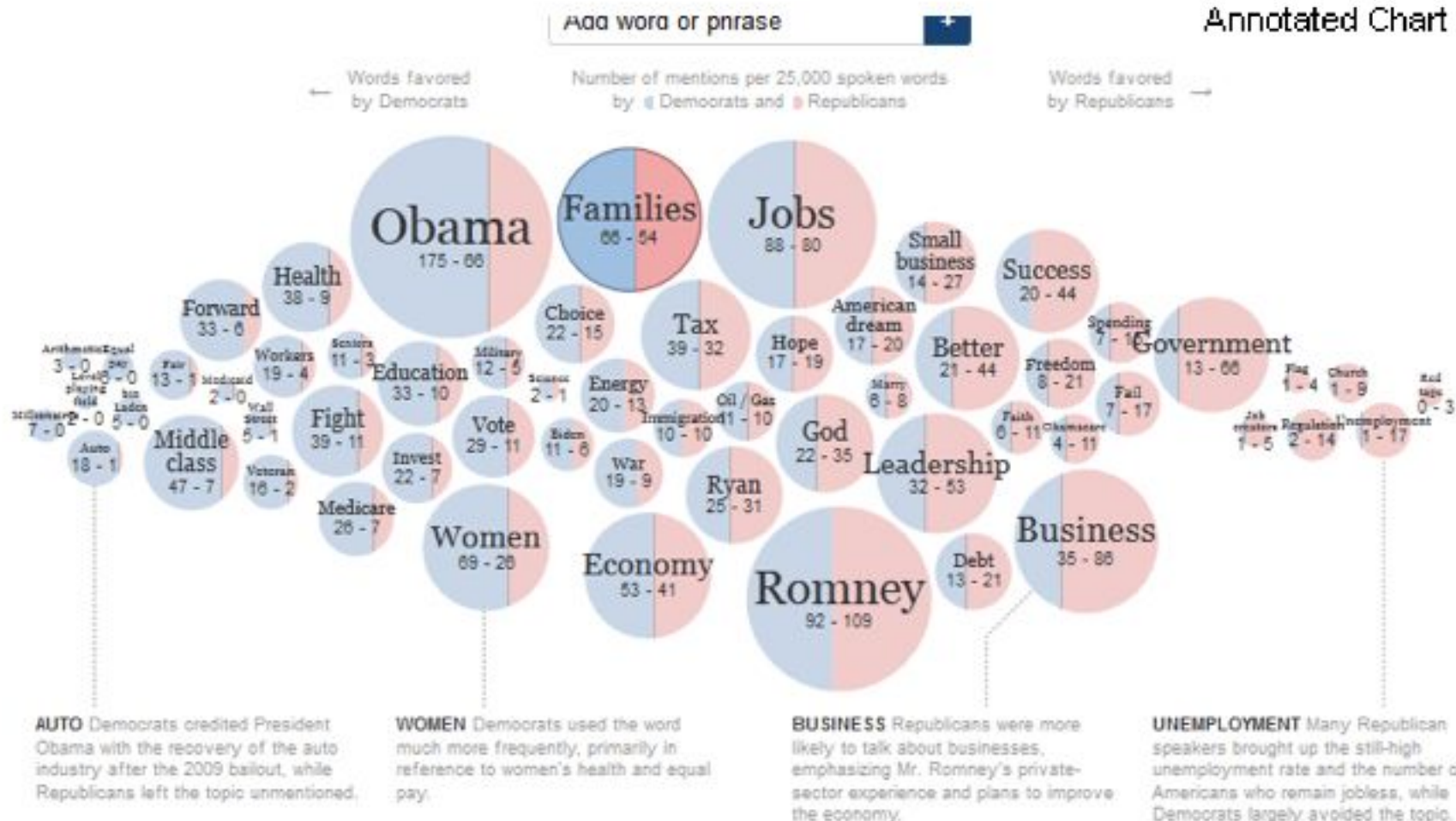


Source: DHS 2006 and 2011.
 Note: Changes to the geographic boundaries were made to the North region in the 2011 DHS. The 2006 DHS North region is now divided into the North and Karamoja. For this reason, rates for 2006 are not shown for the North since it is not comparable and Karamoja was not identified in the previous survey.

Annotated Chart



Annotated Chart



Partitioned Poster (Infographic)



Partitioned Poster

<https://www.visualcinnamon.com/portfolio/baby-spike>

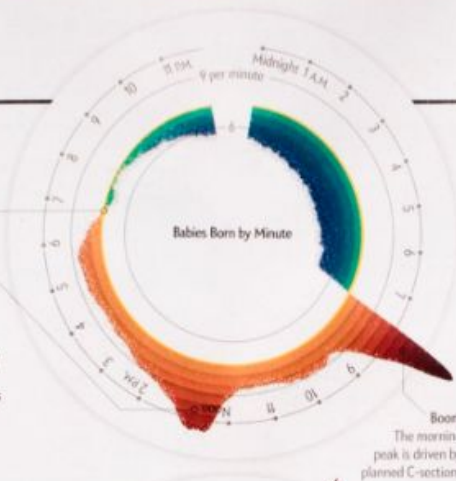
GRAPHIC SCIENCE

The Average
7.3 babies born
per minute

Eat First
More births of all types
occur right after lunch

Day Shift

Births peak around 8 A.M.,
then rise again between noon
and 1 P.M. Hospitals typically
have more doctors and nurses
on hand during the morning
and fewer later in the day.

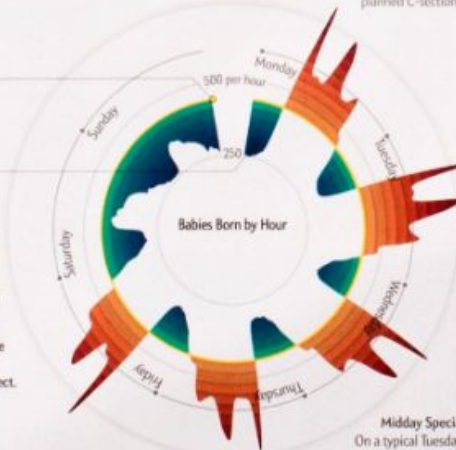


The Average
447 babies born per hour

Fewest Births
Sunday night
between 2 and 3 A.M.

Early Riser

More babies than average
are born on weekdays during
daylight hours. Fewer are
born on weekends or at night,
primarily because fewer
hospital staffers are on duty,
so women tend not to schedule
their delivery then. Despite
folklore, a full moon has no effect.



The Average
72,000 babies born per week

No, Thanks
Moms do not schedule C-sections
around Thanksgiving

Happy Holidays
Babies seem to arrive
nine months after Christmas
and New Year's Eve

Summer Son

Evidently, more people have
sex during colder months,
leading to more births nine
months later from July through
October, and less sex during
warmer months.



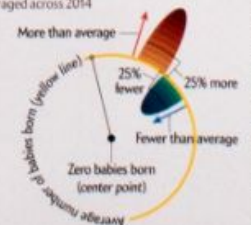
The Baby Spike

Births peak on
weekdays during
daytime work hours

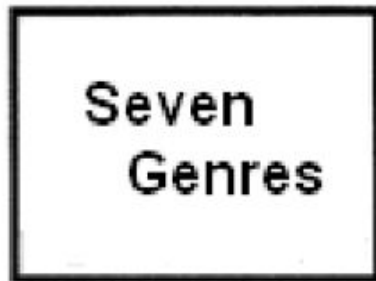
Two generations ago babies were
born pretty much spontaneously,
around the clock. But today in the
U.S., about half of all births are cesar-
ean sections prescheduled by Mom
or deliveries induced by doctors con-
cerned about the mother's or baby's
health. These medical procedures
have skewed the days of the week,
and hours of the day, during which
those little bundles of joy arrive.

The procedures dominate because
more than 98 percent of infants are
born in a hospital, despite what seems
to be the rising popularity of home
births. Far more babies now arrive on
weekdays than on weekends, most
between 8 A.M. and 6 P.M. "We can't
schedule spontaneous labor, obviously,"
says Neel Shah, a physician and
professor at Harvard Medical School.
"But we can schedule delivery."
—Mark Fischetti and Zan Armstrong

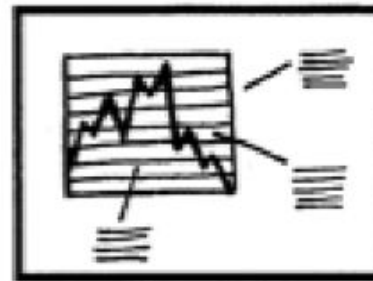
Each graph shows U.S. data
averaged across 2014



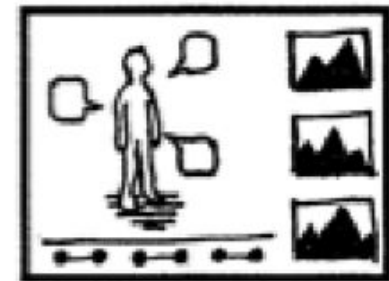
Slide Shows



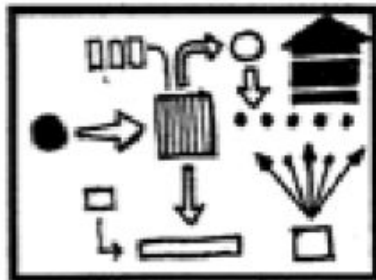
Magazine Style



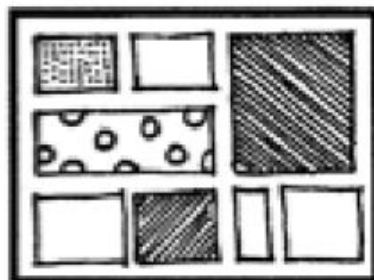
Annotated Chart



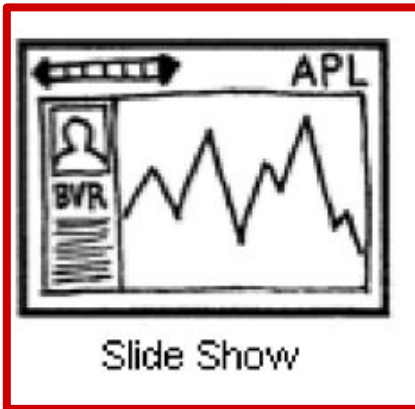
Partitioned Poster



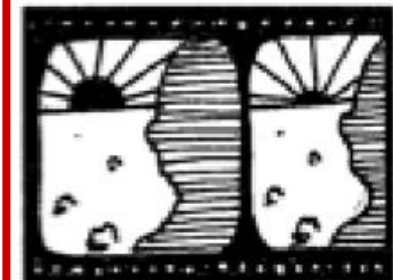
Flow Chart



Comic Strip



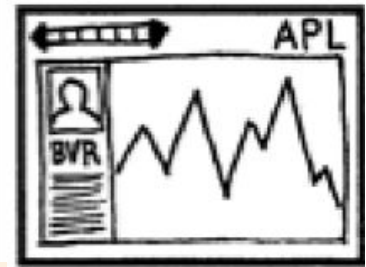
Slide Show



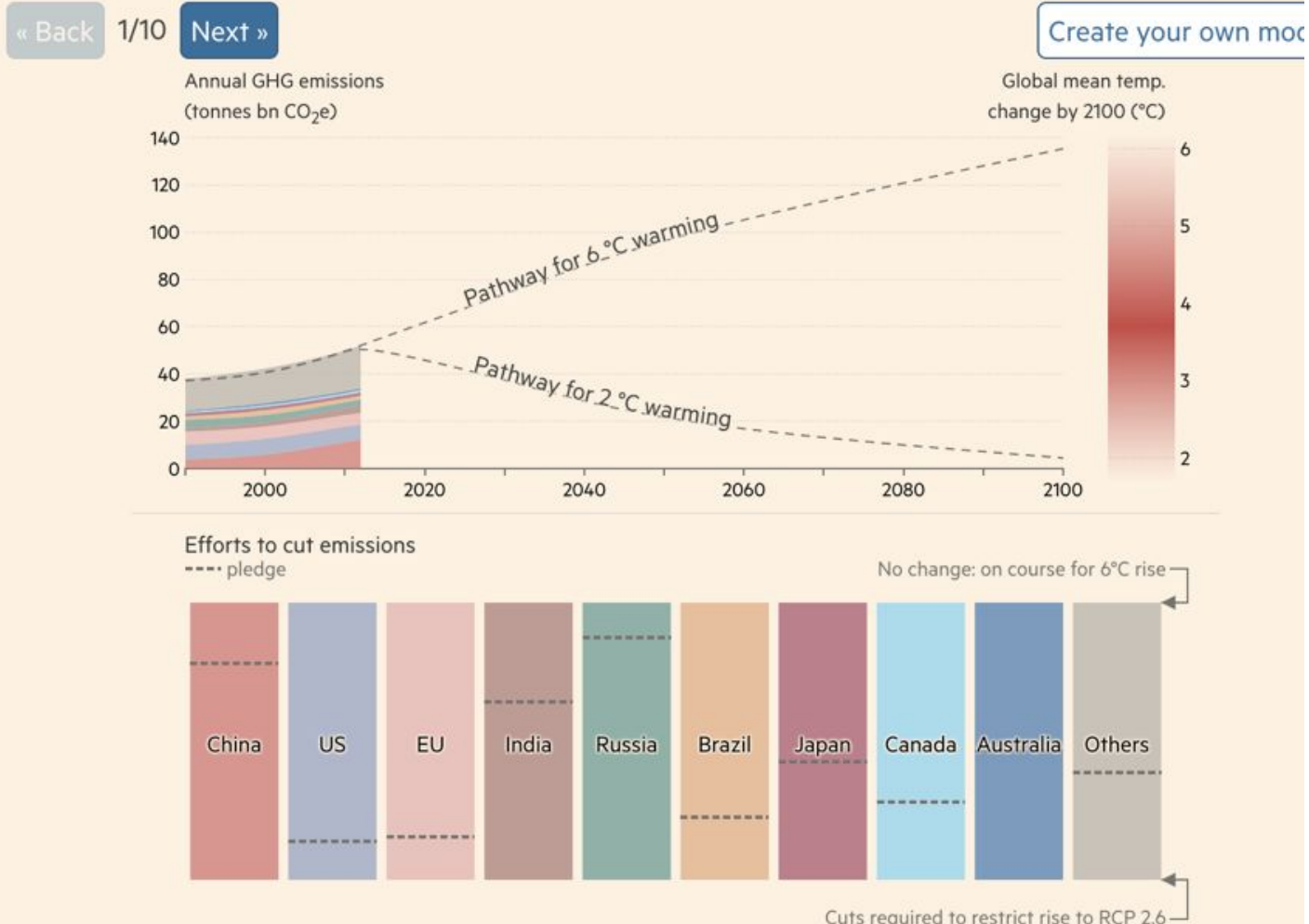
Film/Video/Animation

Slideshow

<https://ig.ft.com/sites/climate-change-calculator/>



Slide Show



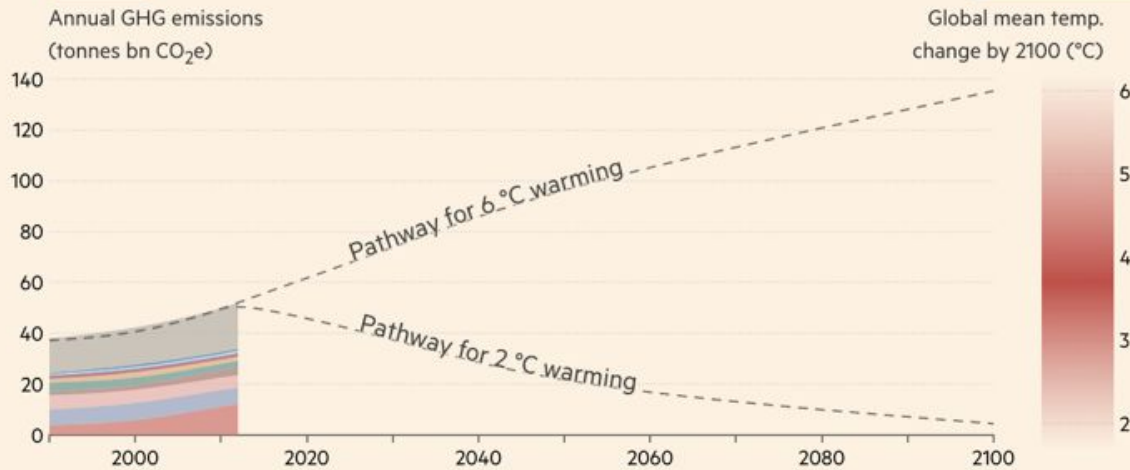
Interactive

« Back

1/10

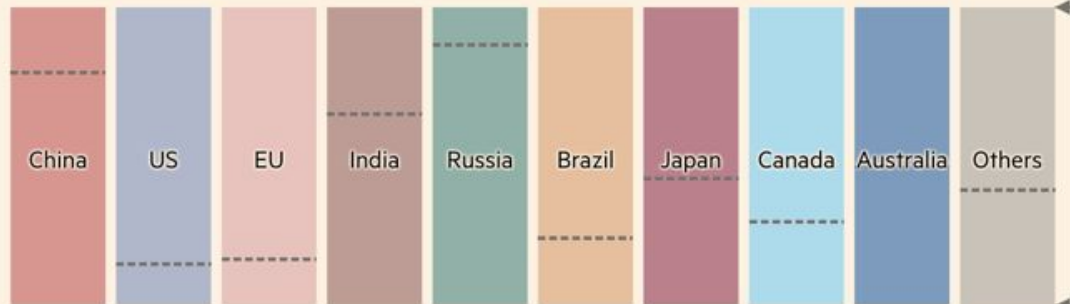
Next »

Create your own model



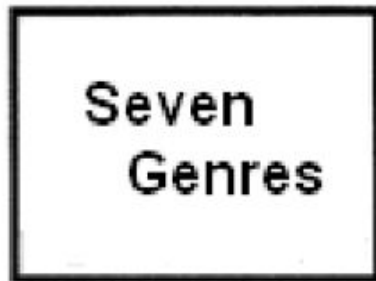
Efforts to cut emissions
---- pledge

No change: on course for 6°C rise

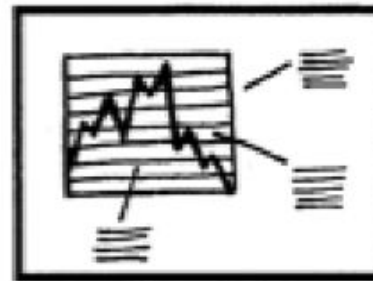


Cuts required to restrict rise to RCP 2.6

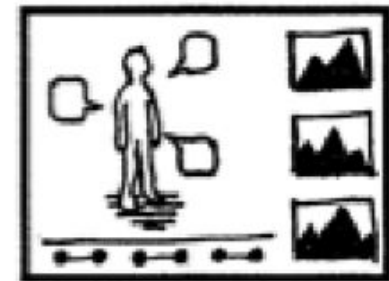
Data Videos



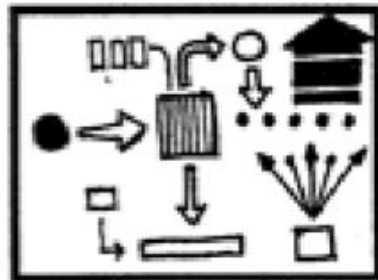
Magazine Style



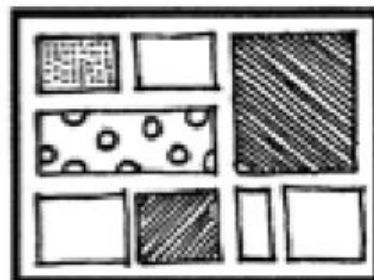
Annotated Chart



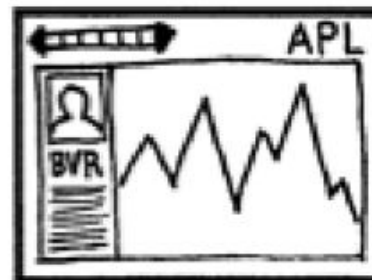
Partitioned Poster



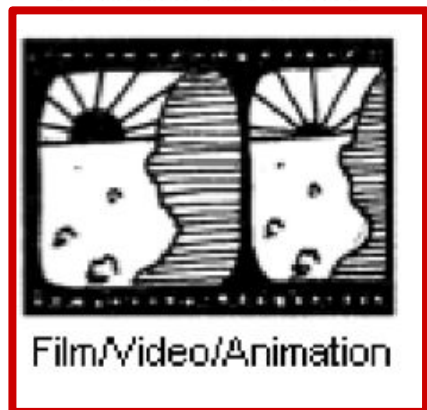
Flow Chart



Comic Strip



Slide Show



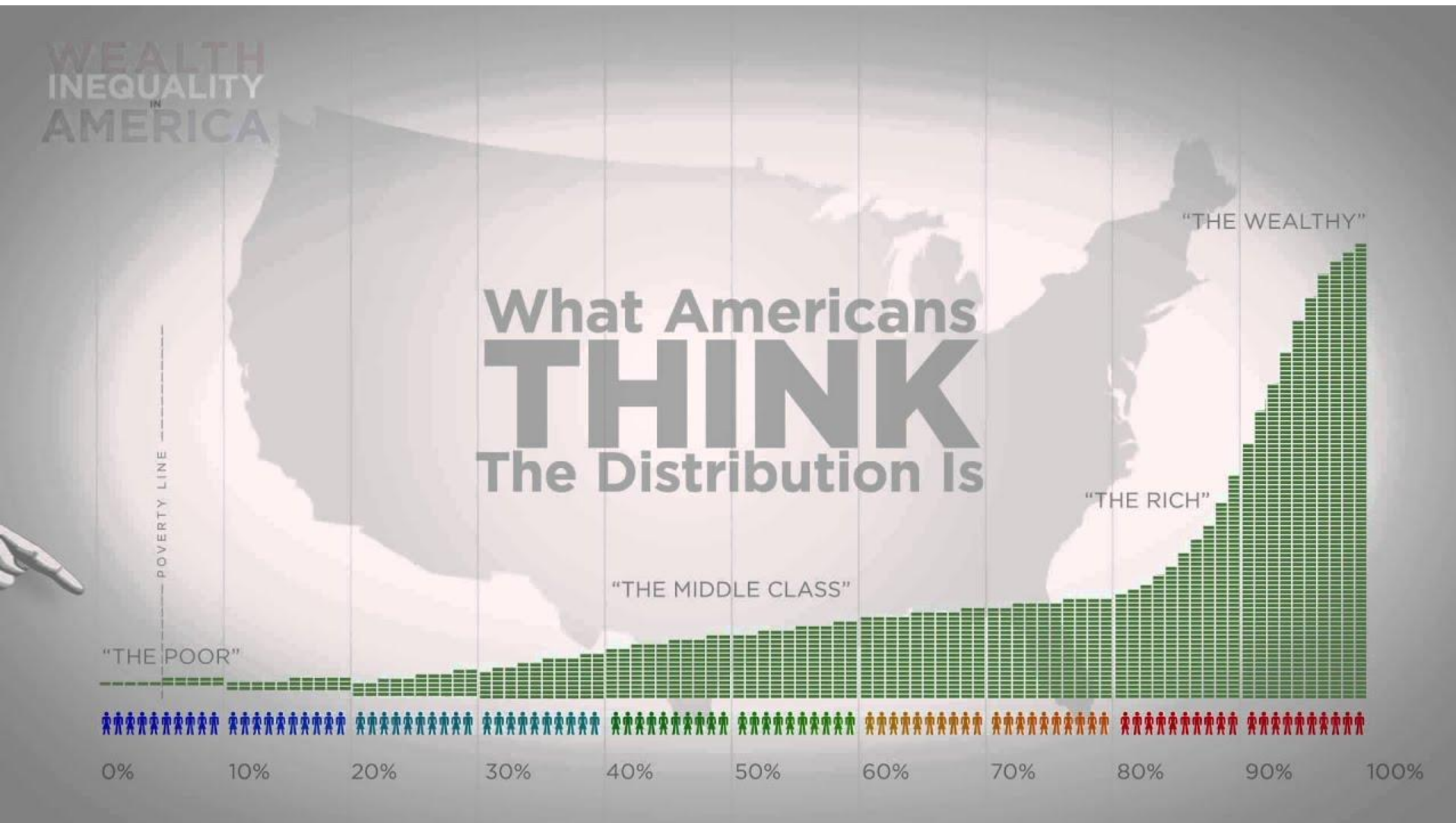
Film/Video/Animation

Life Presentations

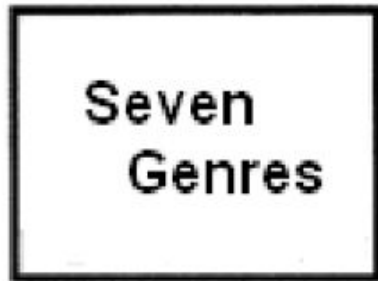


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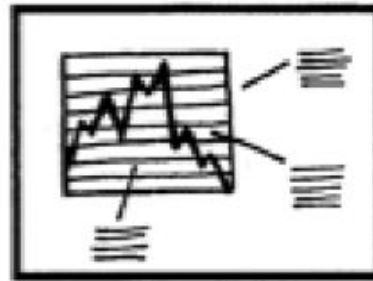
Data Videos



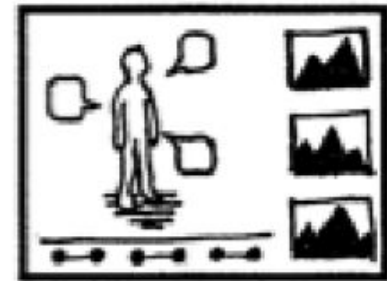
Data Comics



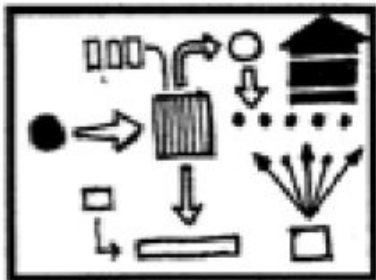
Magazine Style



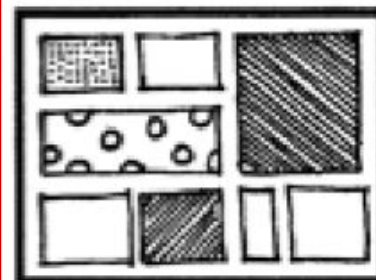
Annotated Chart



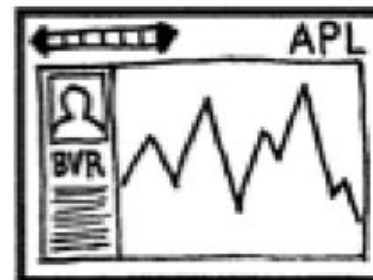
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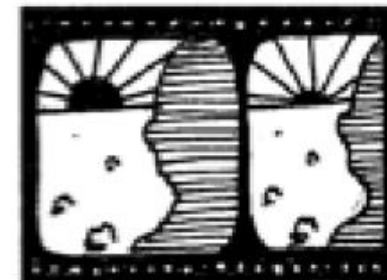
Flow Chart



Comic Strip



Slide Show

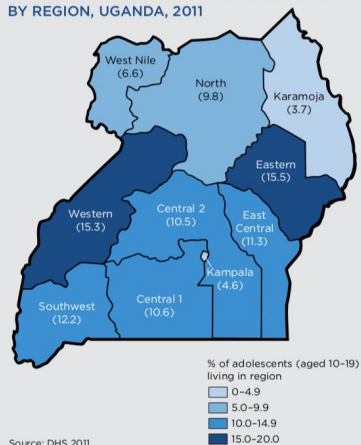


Film/Video/Animation

Report

physical, social, political, and economic structures of a region can place residents at varying risks for vulnerability. Areas susceptible to violence or natural disaster pose clear threats to individuals. An individual's environment also affects his or her development and behavioral choices. Resources available in the physical and social environments create the contexts within which decisions are made about health, education, and employment. Political and social environments also dictate whether resources are accessible to all adolescents. An examination of the residential distribution of adolescents provides a baseline for comparing geographical patterns of vulnerability. Within Uganda, by type of residence, the majority of adolescents (87 percent) live in rural versus urban areas. Figure 6 shows the distribution of adolescents aged 10 to 19 living in Uganda. Regional distributions show Karamoja contains only four percent of the adolescent population. Kampala with a much denser population contains 4.6 percent of the population. The Eastern and Western regions contain the largest proportions of the adolescent population.

FIGURE 6
PROPORTION OF ADOLESCENTS AGED 10-19 BY REGION, UGANDA, 2011



Household factors influencing vulnerability

Household-level factors have direct impacts on the well-being of adolescents. Households are the primary setting where adolescents live and engage in activities. For this reason, the household environment and the people who live there have significant impacts on the lives of adolescents. Physical conditions of the home influence the health of residents. Family structures and demographic characteristics of household members affect the knowledge, decisions, behaviors and interactions in the environment of the adolescent.

Access to improved water sources and sanitation

Unsafe water, inadequate sanitation, and poor hygiene are among the five leading risk factors responsible for one quarter of all deaths in the world (WHO 2009). Unsafe water supplies and inadequate sanitation in homes increase exposure to water-borne diseases and can cause diarrhea. Ensuring access to clean water sources and sanitation is key to maintaining hygiene and health. Improved water sources are those that either naturally protect water from contamination or are constructed to do so. These include piped water, public taps, standpipes, boreholes, tube wells, protected wells and springs, and rainwater collection. Improved sanitation includes constructs and systems that prevent fecal contamination. These include flush or pour toilets, ventilated pit latrines, pit latrines with slabs, and composting toilets (UNICEF 2013b).

Housing conditions across East and Southern Africa are largely in need of improvement, and lack of improved sanitation varies by country. In nearly all of East and Southern Africa, over half of adolescents either do not have improved sanitation or share facilities with other households. Conditions are worst in Madagascar and Mozambique where fewer than four percent of adolescents live in households with improved sanitation that is not shared (Figure 7). Rwanda has the lowest proportion of adolescents affected—35 percent—which is still unacceptably high. Lack of access to improved water sources affects lower proportions but is still a problem in the region. In five countries, fewer than half of adolescents have access to improved water sources (Figure 8). Water conditions are best in Namibia, where only 15 percent of adolescents have no access to improved water.

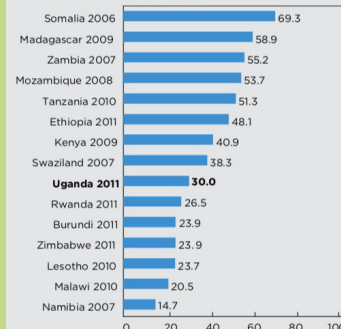
In Uganda, overall access to improved water and sanitation increased by a small but significant percentage between 2006 and 2011 (Figure 9). In 2006, 33 percent of adolescents had no access to improved water; in 2011, it is 30 percent. The proportion of adolescents without access to improved

FIGURE 7
PERCENT OF ADOLESCENTS AGED 10-19 LIVING IN HOUSEHOLDS WITH NO IMPROVED OR WITH SHARED SANITATION, EAST AND SOUTHERN AFRICA



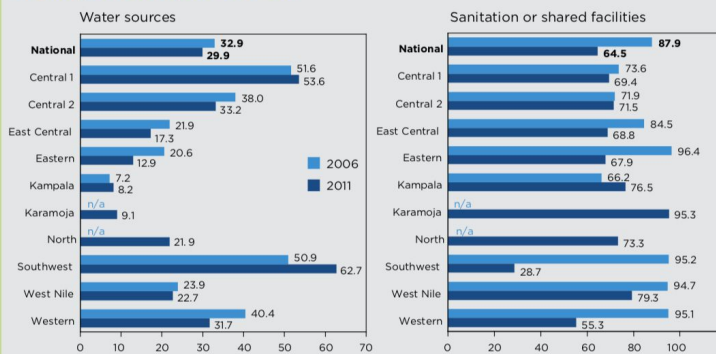
Source: DHS 2007-2011; MICS 2006-2008.

FIGURE 8
PERCENT OF ADOLESCENTS AGED 10-19 LIVING IN HOUSEHOLDS WITH NO IMPROVED WATER SOURCE, EAST AND SOUTHERN AFRICA



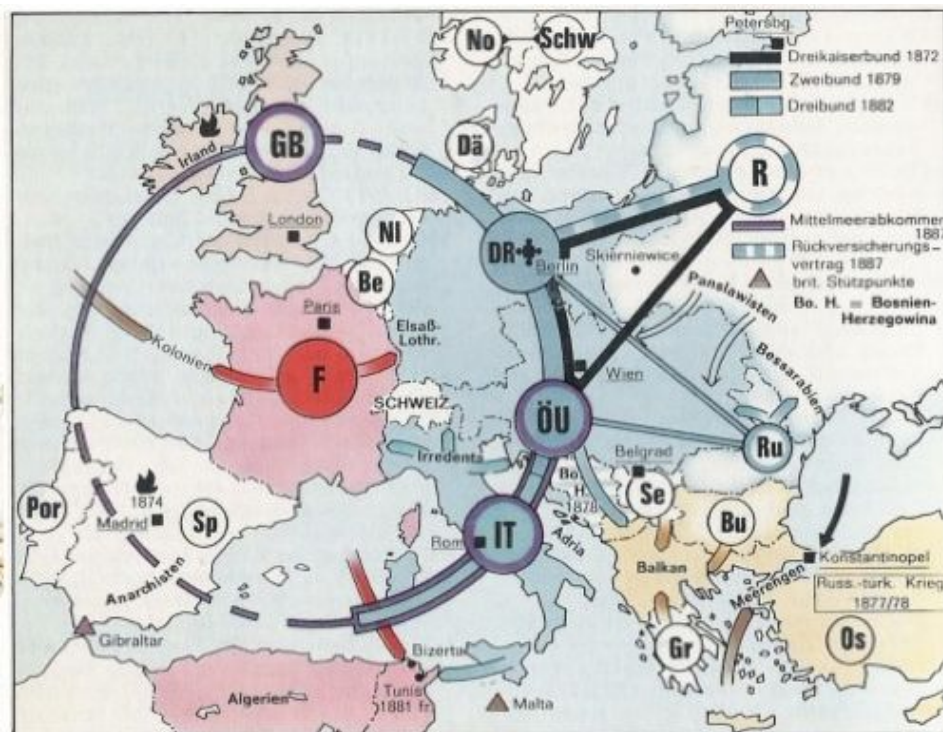
Source: DHS 2007-2011; MICS 2006-2008.

FIGURE 9
PERCENT OF ADOLESCENTS AGED 10-19 LIVING IN HOUSEHOLDS WITHOUT ACCESS TO IMPROVED WATER AND WITHOUT ACCESS TO IMPROVED OR WITH SHARED SANITATION, IN UGANDA, BY REGION, 2006 AND 2011



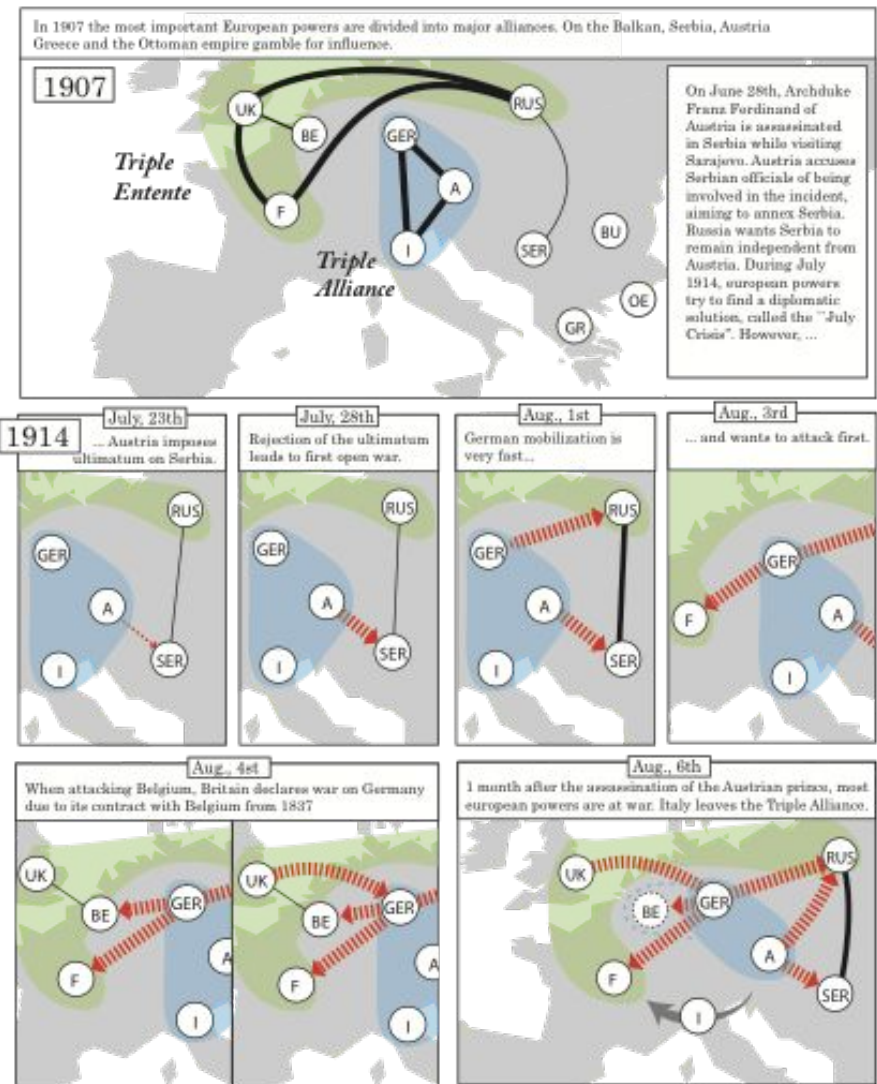
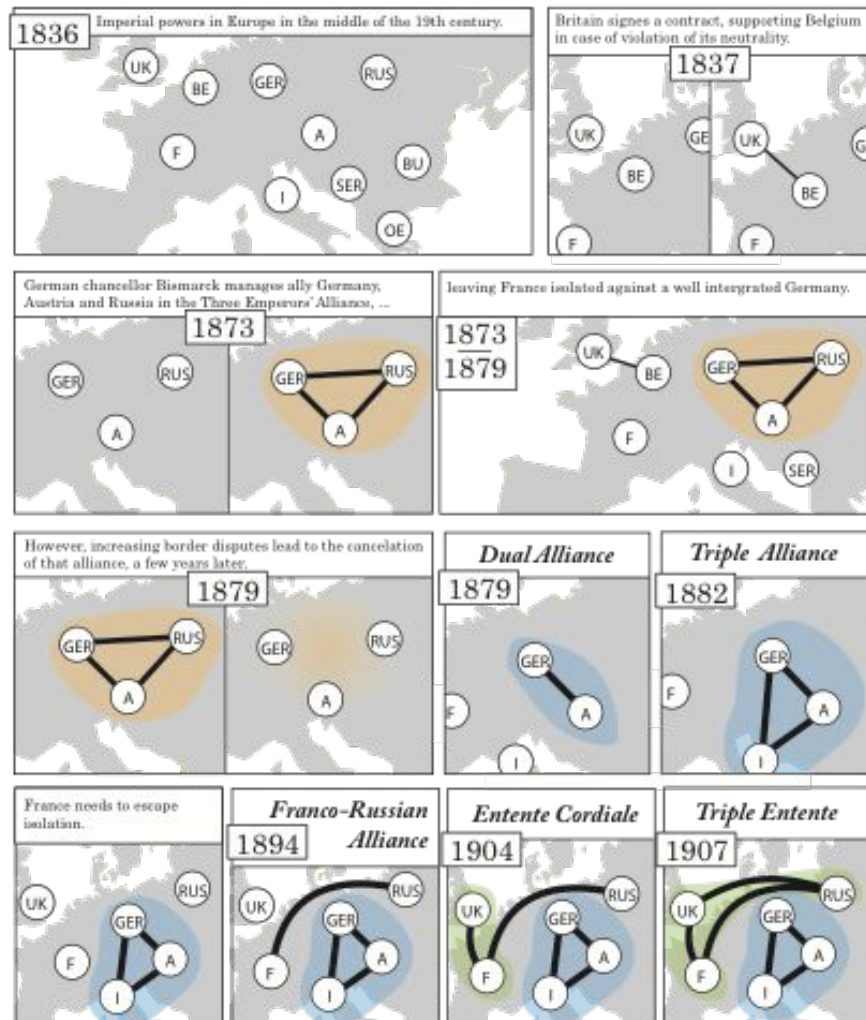
Source: DHS 2006 and 2011.
 Note: Changes to the geographic boundaries were made to the North region in the 2011 DHS. The 2006 DHS North region is now divided into the North and Karamoja. For this reason, rates for 2006 are not shown for the North since it is not comparable and Karamoja was not identified in the previous survey.

Data Comics



Data Comics

European Alliances before World War I (1836-1914)



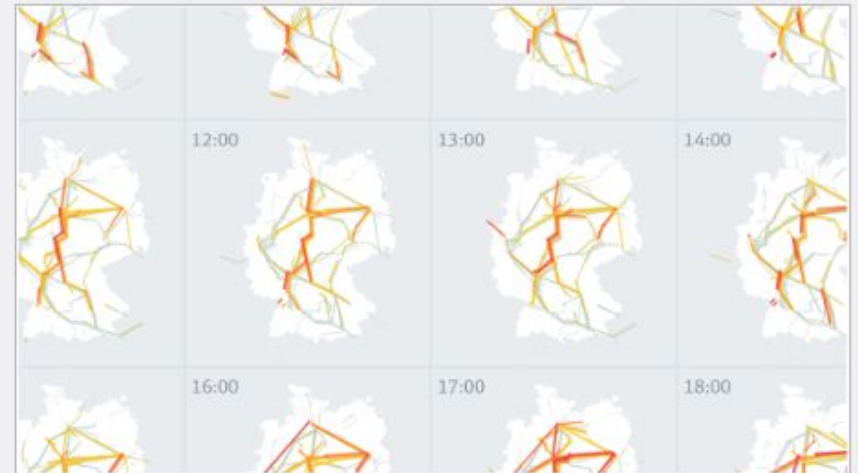
Style & Design

Moritz Stefaner

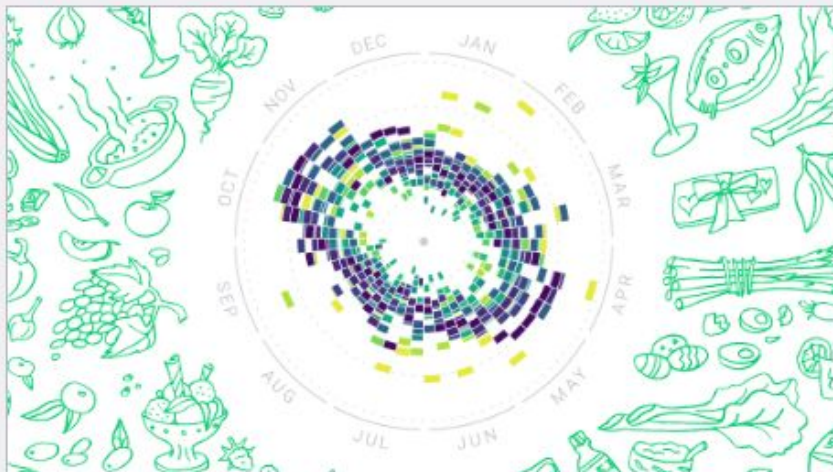
Featured projects



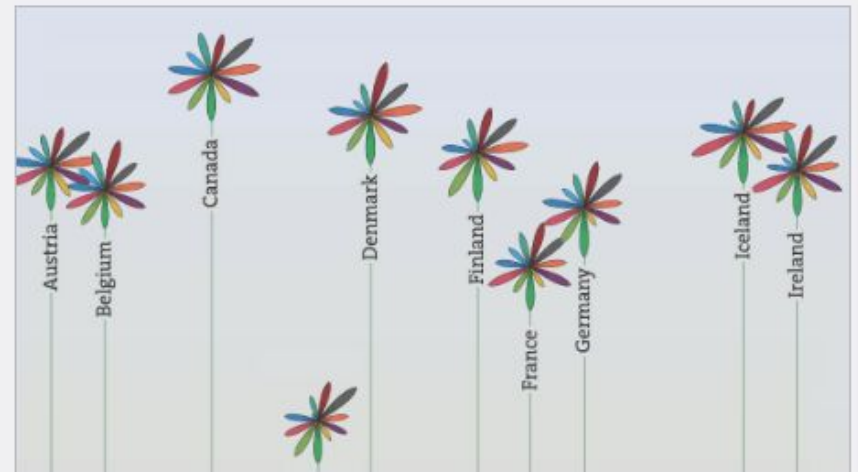
Multiplicity A collective photographic city portrait



Peak Spotting Data on rails

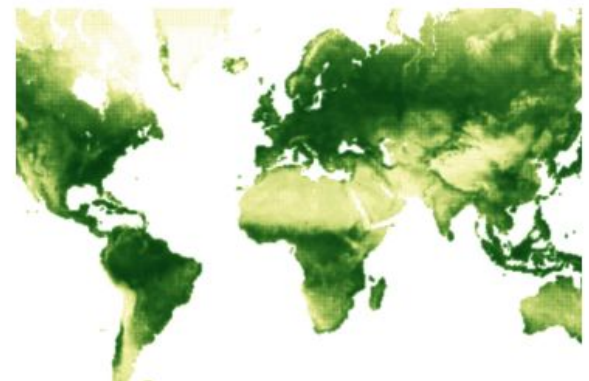
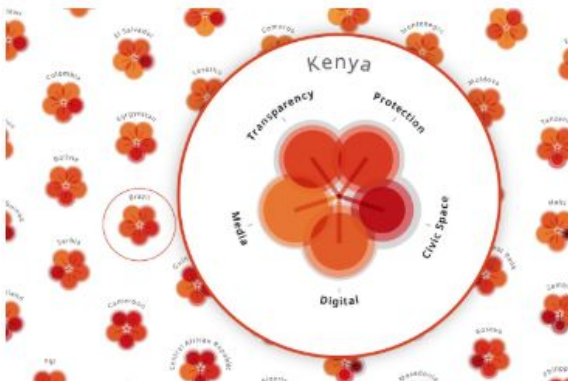
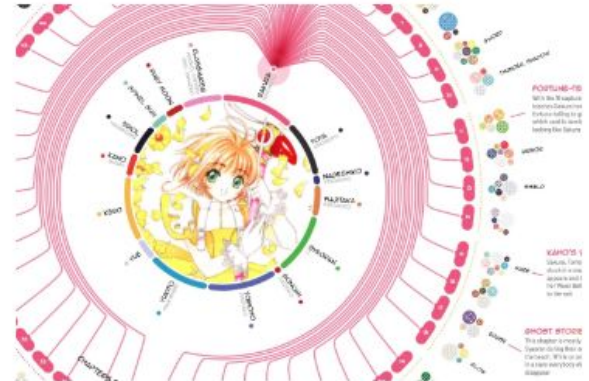
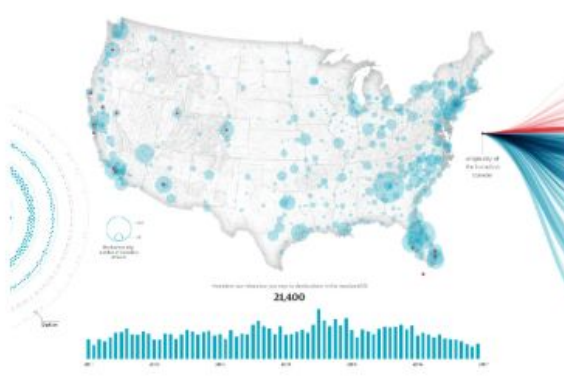
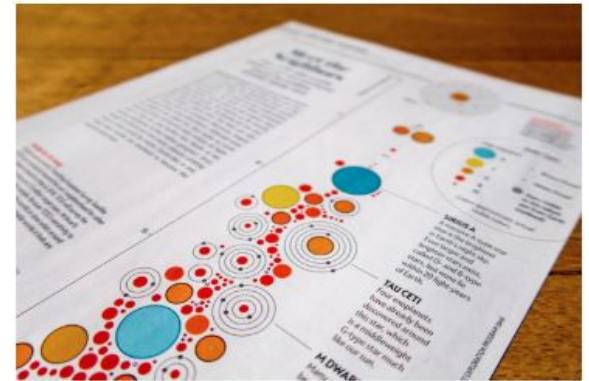
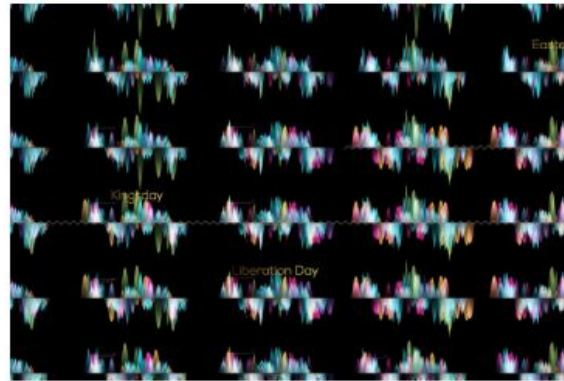


The Rhythm of Food Analyzing food seasonality

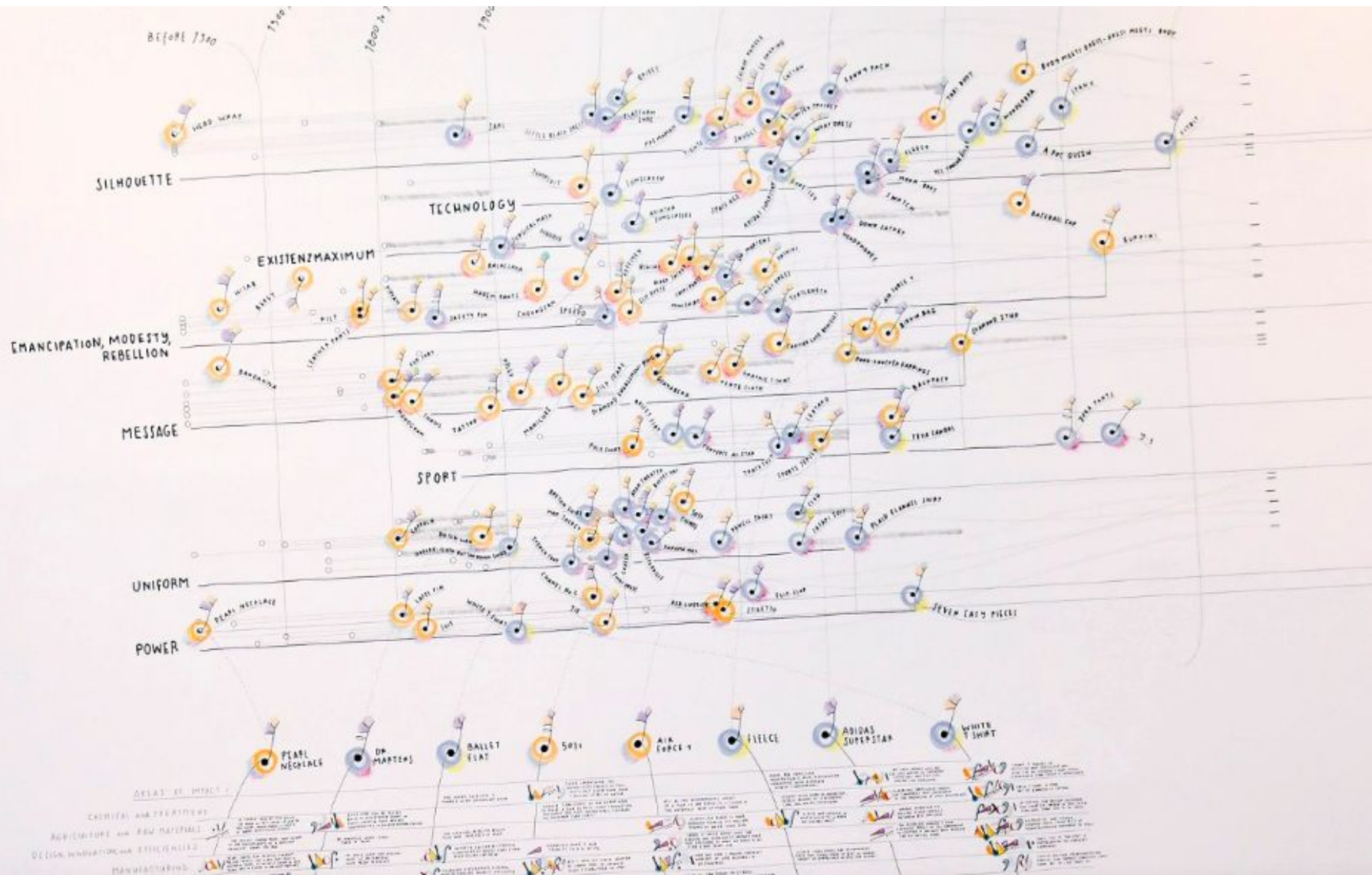


OECD Better Life Index How's life?

Nadieh Bremer



Georgia Lupi



Summary

- Storytelling for communication and engagement
- Story structures can be complex
- Form follows messages
- Know your audience
- Chose your storytelling genre

Book recommendations

