



data visualisation workflow

dataviz workflow

pareto's principle
20% of decisions have effect on the 80% of the result.

the most reliable approach is to follow a design process

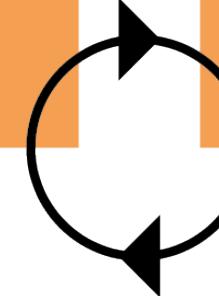
Stage 1

Formulating
your **brief**



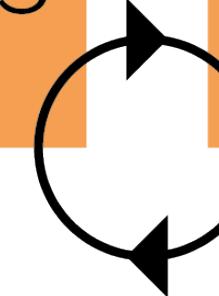
Stage 2

Working
with **data**



Stage 3

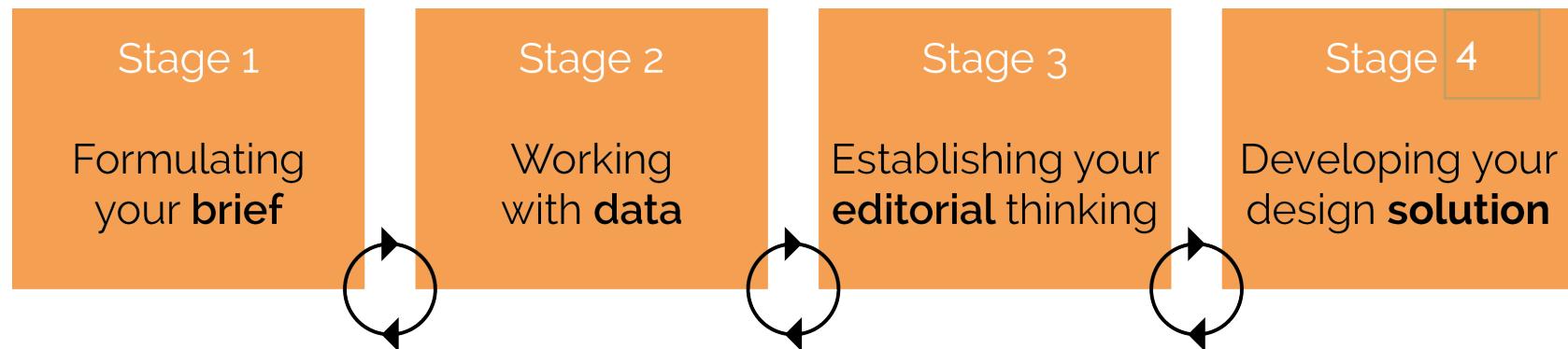
Establishing your
editorial thinking



Stage 4

Developing your
design **solution**

design process



why a design process?

+pragmatic, -dogmatic

reducing randomness: break down the goal into a connected system of thinking

room for experiments

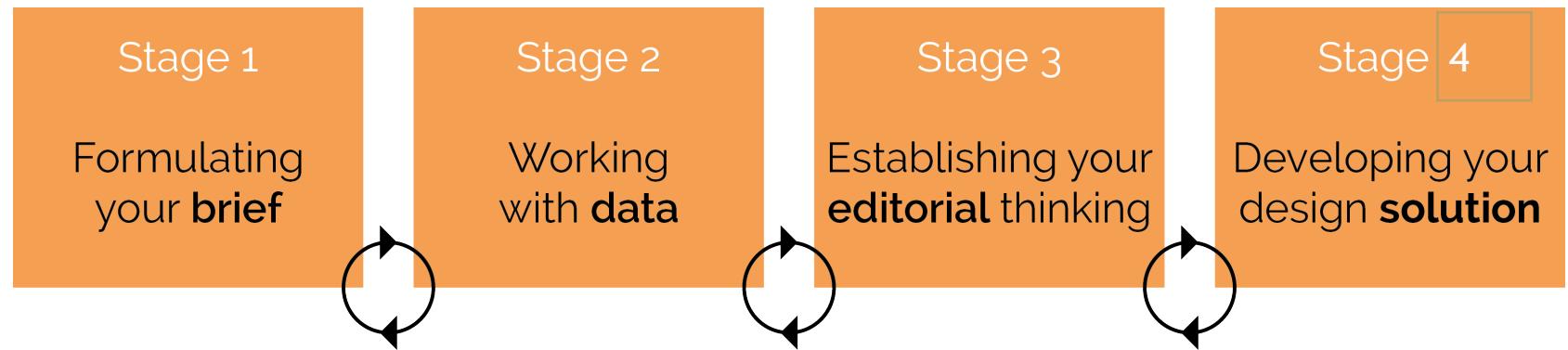
facilitate adaptability and iteration

continuous interaction with the subject

always the same process

partitioning your mindset: thinking/doing/making

design process



how?

managing progress and resources
room to think

heuristics to support decisions
pen & paper sketch
note-taking

communication
research

attention to details
make it work for you
be honest with yourself

learn

Stage 1

Formulating your **brief**

the brief

identify the context in which your work will be undertaken and then define its aims: who/what/why/where/when/how

brief: represents the set of expectations and capture all the relevant information about the project

in dataviz, this means establishing the *context* and the *vision*

context

- defining the origin
- curiosity
- identifying circumstances
- defining the purpose

vision

- planning a purpose map
- harnessing ideas

Stage 1

Formulating
your **brief**

context
define your origin curiosity

personal intrigue
specific question you raised

stakeholder intrigue
specific question someone else raised, no anticipation of interest

audience intrigue
combination of knowing what will be needed and anticipating what could be needed

anticipated intrigue
audience did not explicitly ask for, but it is perceived to be relevant

potential intrigue
opportunity of exploration without exactly knowing where to go

Stage 1

Formulating your **brief**

context

define your origin curiosity

I want to realize a dataviz project on the dynamics of some movie stars careers

personal



then I am asked to prepare a dataviz project focused on some particular profiles

stakeholder

... extended to a dashboard providing dataviz on demand about chosen actors

audience

... later highlighting the potential rising stars in a particular category of movie

anticipated

finally correlate the rising stars career with apparently unrelated variables

potential

Stage 1

Formulating your **brief**

context

identifying your project's circumstances

pointing out all the requirements and restrictions that are inherited by you, imposed on you or determined by you

people

- *stakeholder*: what impact will they have on the work?
- *audience*: who are your viewers?

constraints

- *pressure*: how much time do you have and what milestones along the realisation path?
- *rules*: layout/size restrictions, style guidelines, functional restrictions

deliverables

- *quantity*: how many things should be made? are they similar or very different?
- *format*: digital, print, physical? poster, website, app?

Stage 1

Formulating your **brief**

context

identifying your project's circumstances

pointing out all the requirements and restrictions that are inherited by you, imposed on you or determined by you

consumption

- *frequency*: how often this project will be repeated? what is the trade-off between effort and lifetime?
is it worth trying to automatise part of the process?
- *setting*: how the work will be consumed? Four types of setting:
 1. boardroom - limited time/patience/tolerance, immediate insights
 2. coffee shop - more relaxed setting, time to familiarise & for details
 3. cockpit - instrumentation nature of dataviz, or reference map, many levels, operational
 4. prop - dataviz as a supporting visual device for understanding facilitation

resources

- *skills*: what competencies are available among those who will work at the project?
- *technologies*: what tools/apps/programming options will you use?

Stage 1

Formulating
your **brief**

context

define your project's purpose

what is it you specifically hope to accomplish
with your visualisation ?

do you want to be impactful?
are you attempting to shock or inspire or persuade?
do you want just to inform or actively seek to make a difference?

no single type of dataviz will be capable of delivering an experience
whereby all flavours of understanding are facilitated

do not define your purpose before establishing your trigger curiosity, or
you will force data to do your talking

Stage 1

Formulating your **brief**

vision

the purpose map

experience

tone

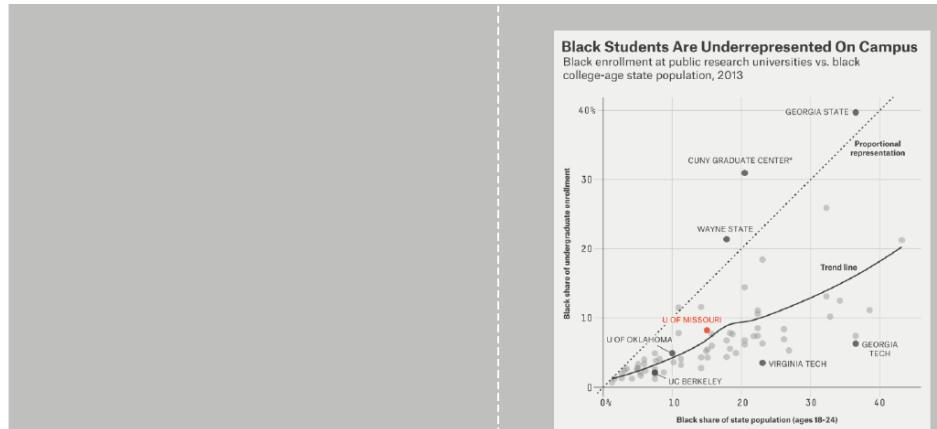
READING

FEELING

EXPLANATORY

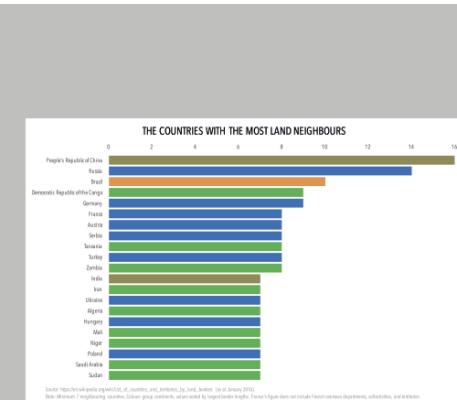
sequence | drama

annotate | describe



EXHIBITORY

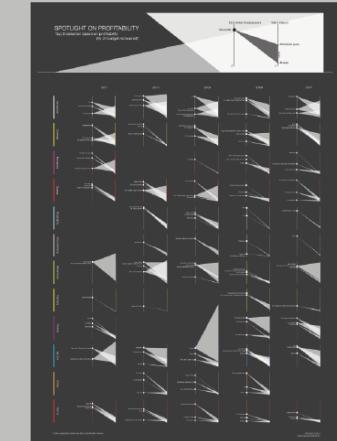
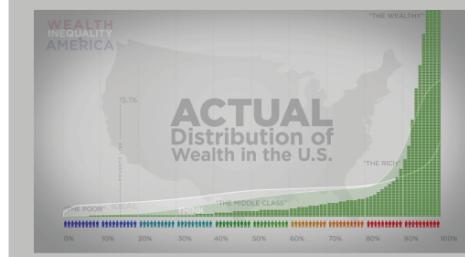
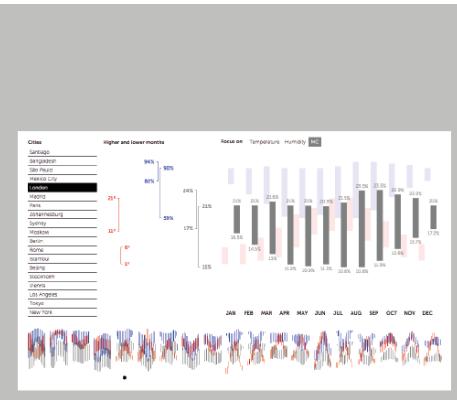
display



EXPLORATORY

manipulate | interrogate

participate | contribute

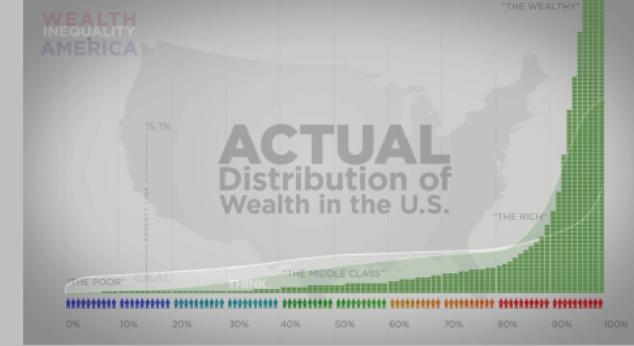


READING

sequence | drama



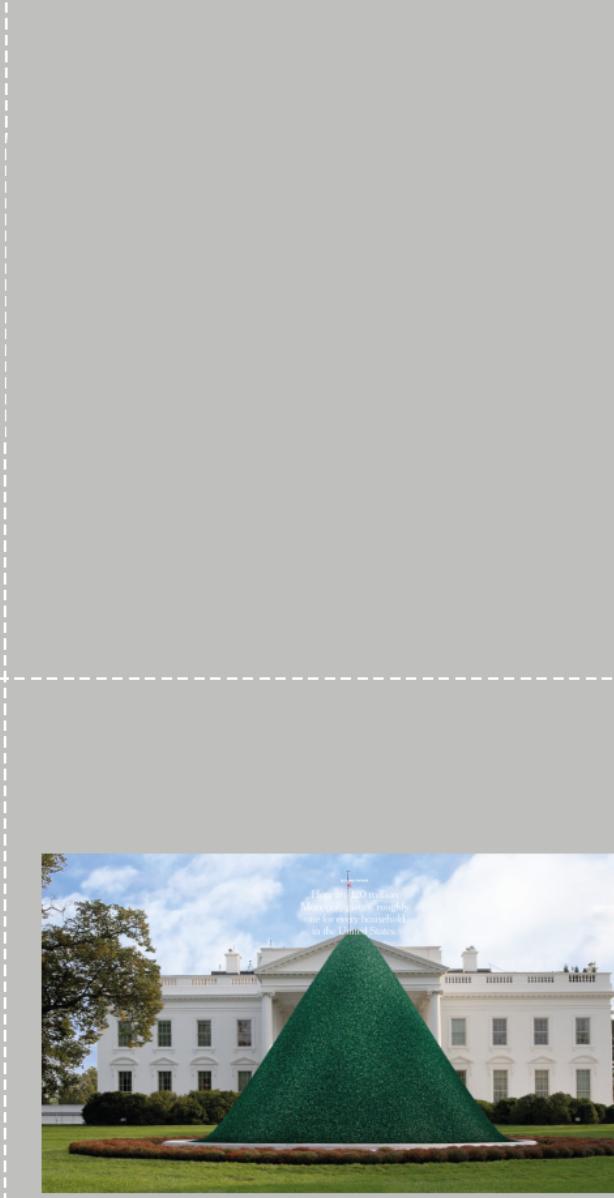
emotive | seductive | 'big-picture'



utilitarian | efficient | precision

FEELING

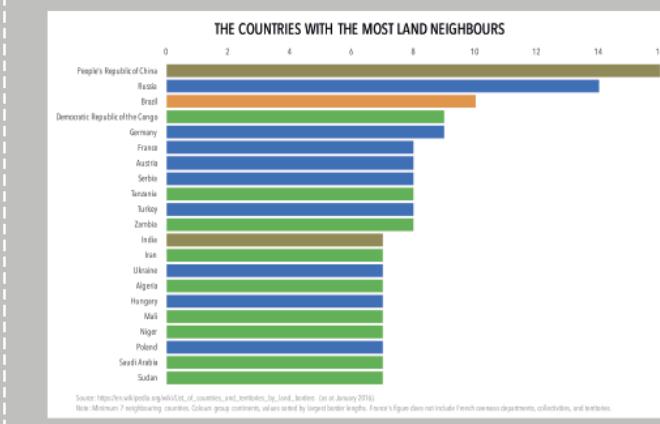
annotate | describe



EXPLANATORY

EXHIBITORY

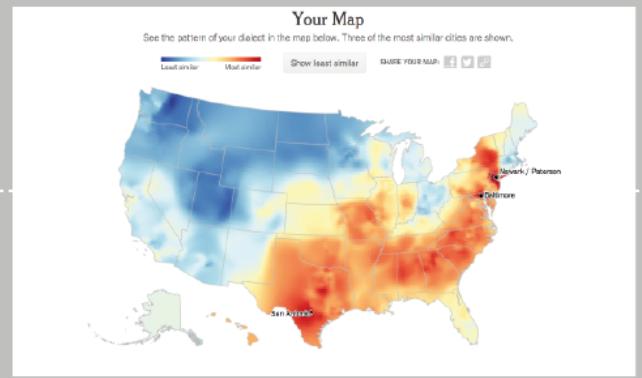
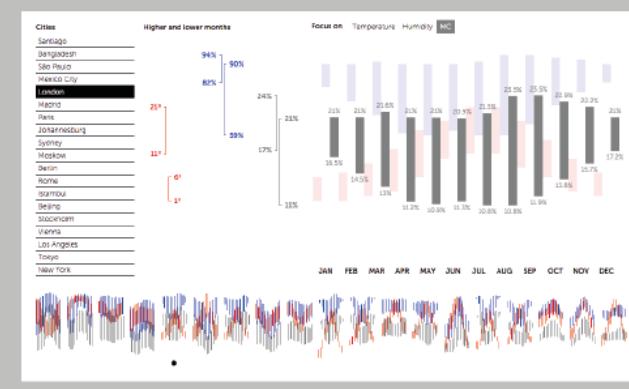
display



manipulate | interrogate

EXPLORATORY

participate | contribute



Stage 1

Formulating
your **brief**

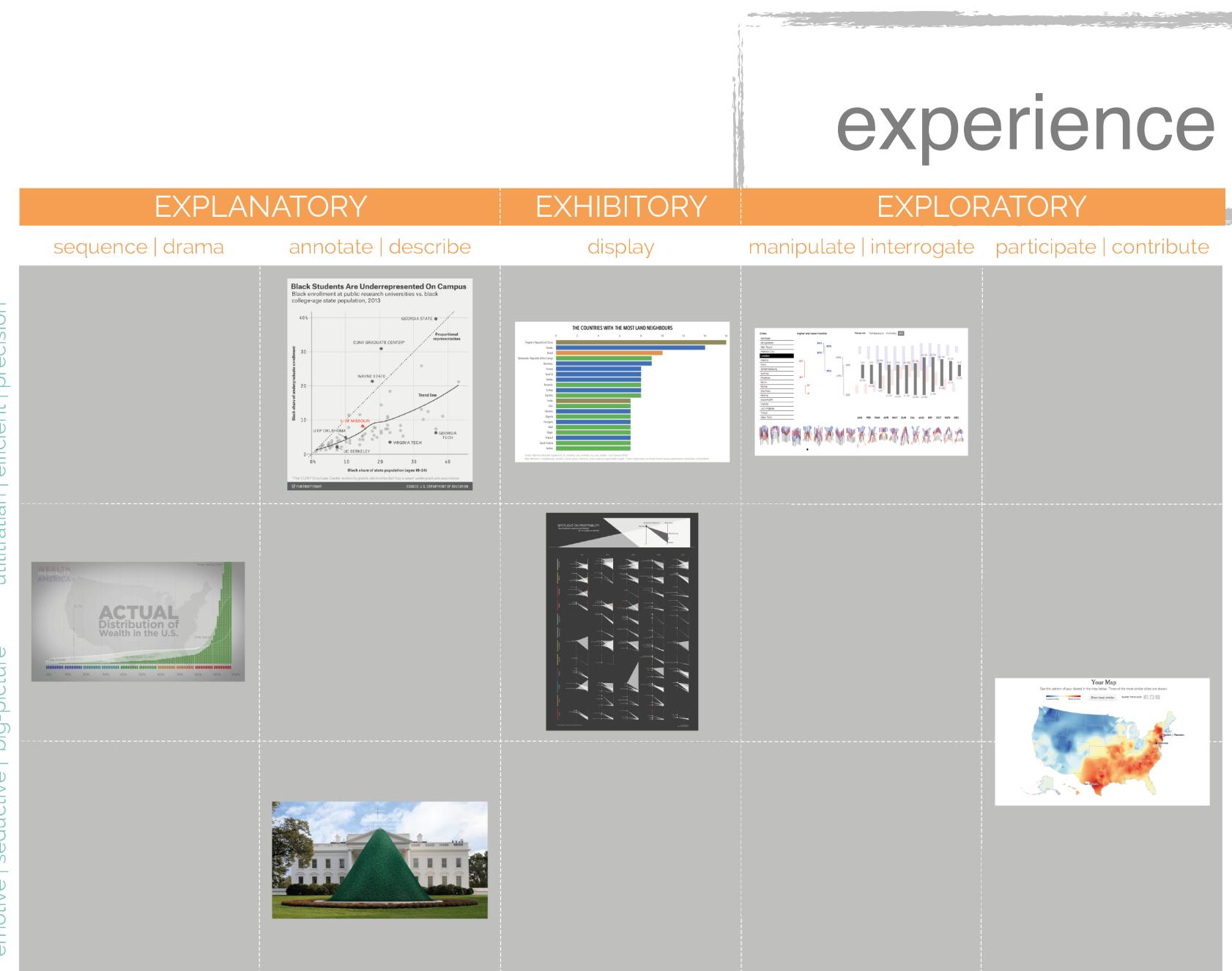
vision

the purpose map

tone

READING

FEELING



how will the dataviz practically
operate as a means of
communication?

through what functional experience
will understanding be achieved by
the viewer?

Stage 1

Formulating
your **brief**

experience

explanatory

vision
the purpose map

providing the viewer with a visual portrayal of the subject's
data

taking responsibility to bring key insights at the surface, rather
than leaving it to the viewer

attempting to assist with the viewer's process of
understanding as much as possible, drawing out the meaning
of the data

Stage 1

Formulating
your **brief**

experience

explanatory

annotate & describe

vision
the purpose map

mildest form of explanatory experience

including simple annotation devices assisting in the interpretation

use colour to separate different features

use captions to outline key messages

self-explanatory chart, without the need for in-person
explanation

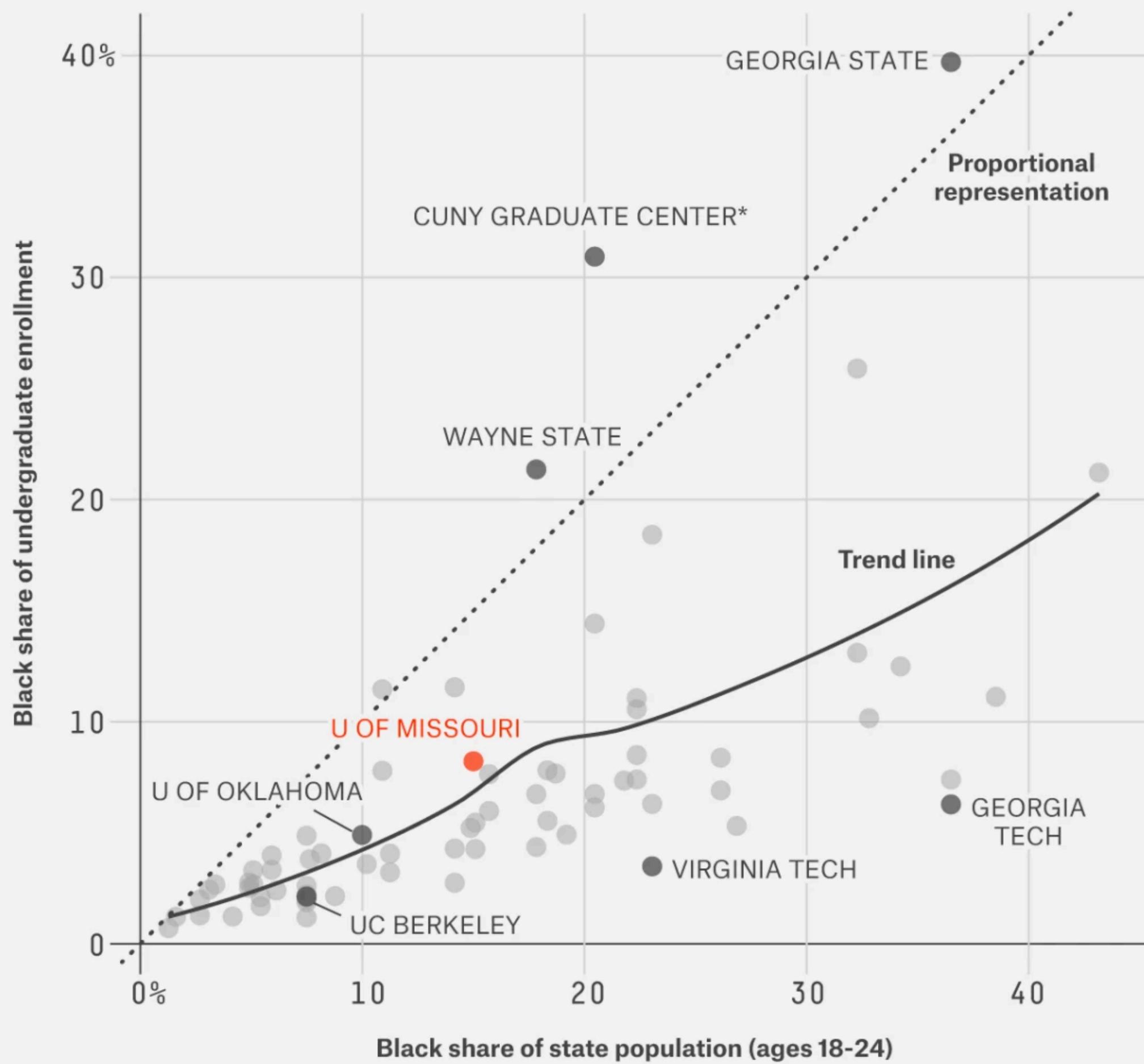
experience

explanatory

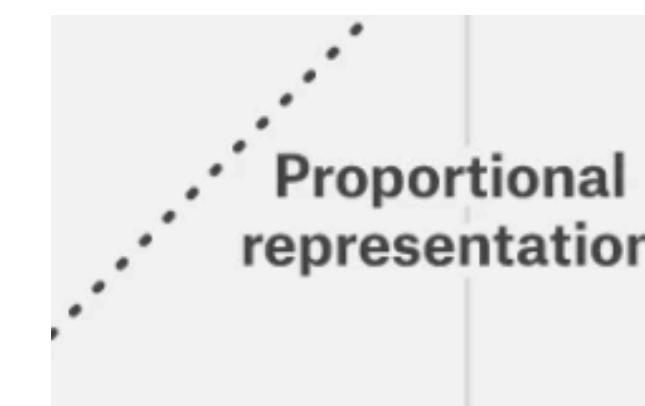
annotate & describe

Black Students Are Underrepresented On Campus

Black enrollment at public research universities vs. black college-age state population, 2013



*The CUNY Graduate Center primarily grants doctorates but has a small undergraduate population.



Black Students Are Underrepresented

Stage 1

Formulating
your **brief**

experience

explanatory

sequence & drama

vision
the purpose map

more intensive form of explanatory experience

use of a narrative structured around a sequence of information

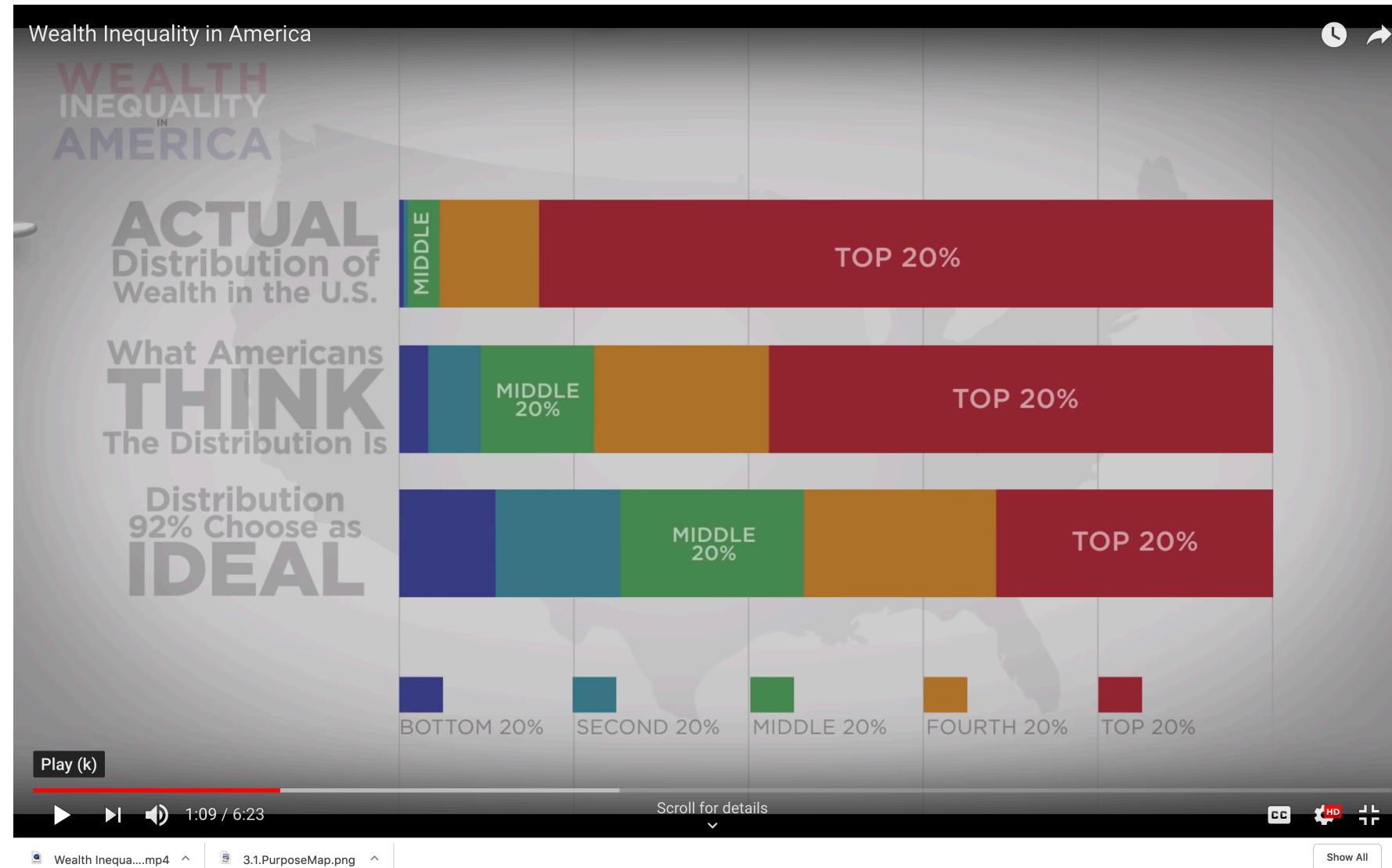
extensive use of animation

storytelling

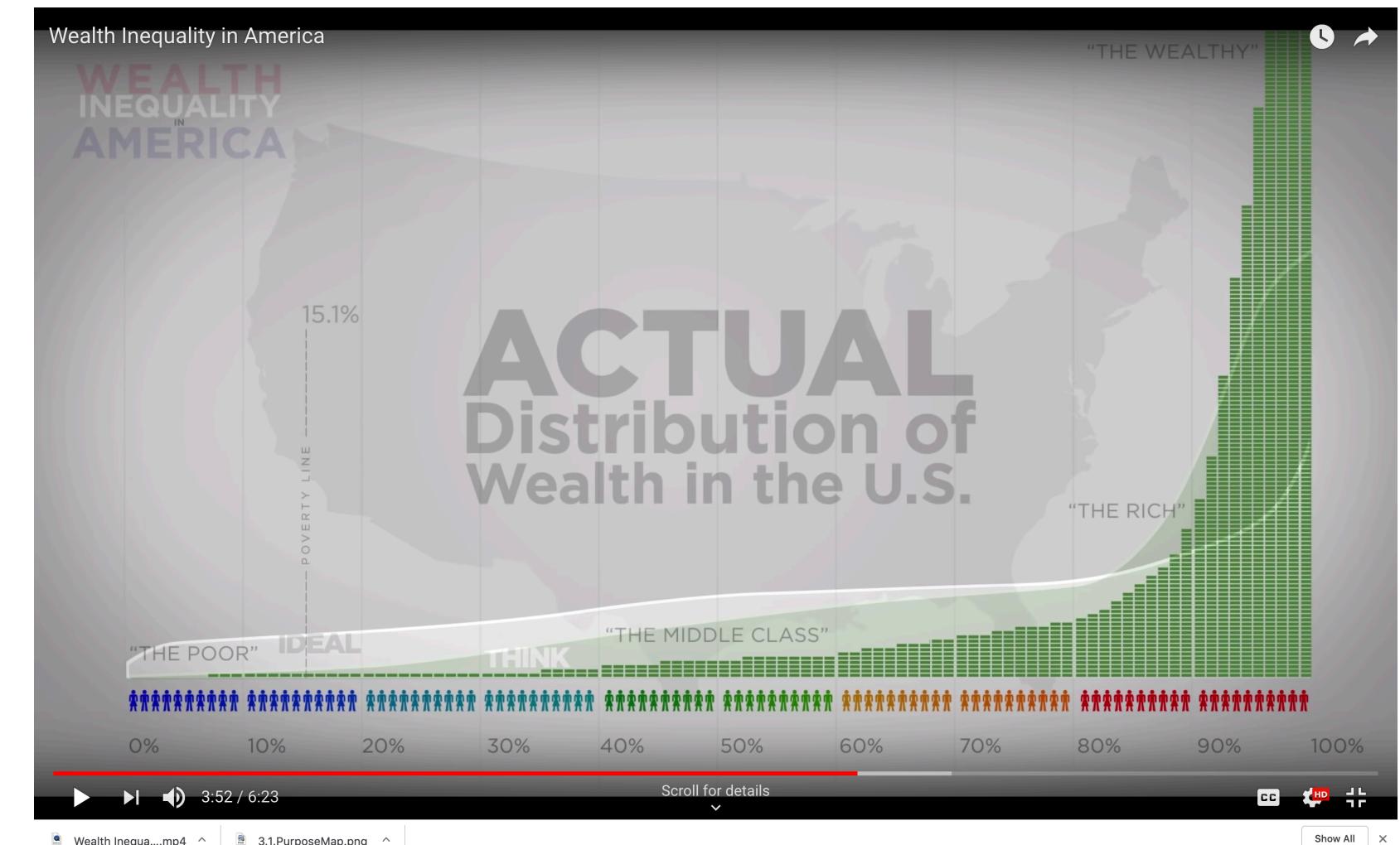
experience

explanatory

sequence & drama



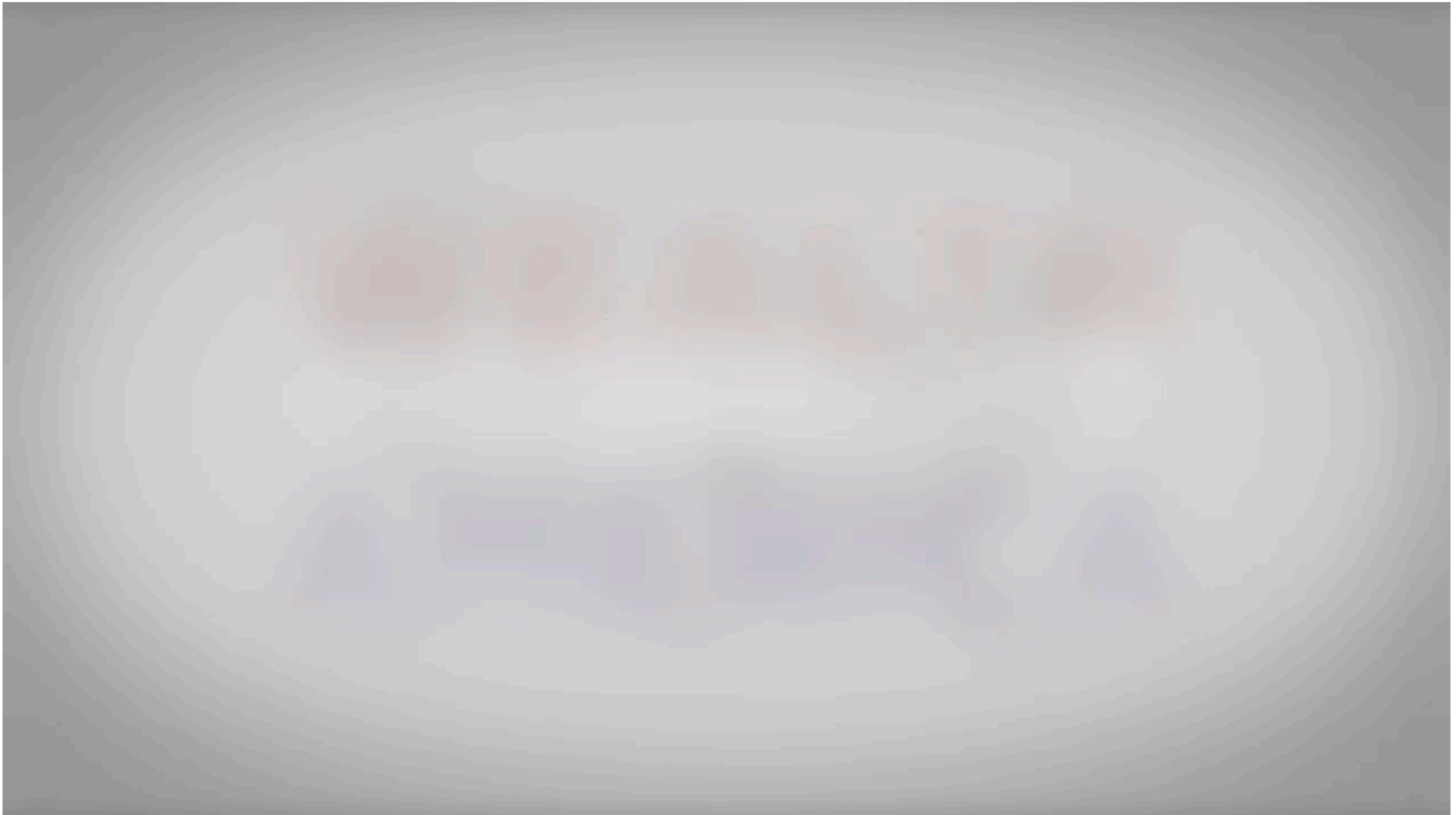
wealth inequality in America
[<https://www.youtube.com/watch?v=QPKKQnijnsM>]



experience

explanatory

sequence & drama



wealth inequality in America

[<https://www.youtube.com/watch?v=QPKKQnijnsM>]

Stage 1

Formulating
your **brief**

experience

exploratory

vision

the purpose map

helping the viewer/user in finding their own insights

digital and interactive in nature

Stage 1

Formulating
your **brief**

experience

exploratory

manipulate & interrogate

highlighting/filtering categories of interest

change data parameters

switch between different views

hover over different features to reveal detailed annotations

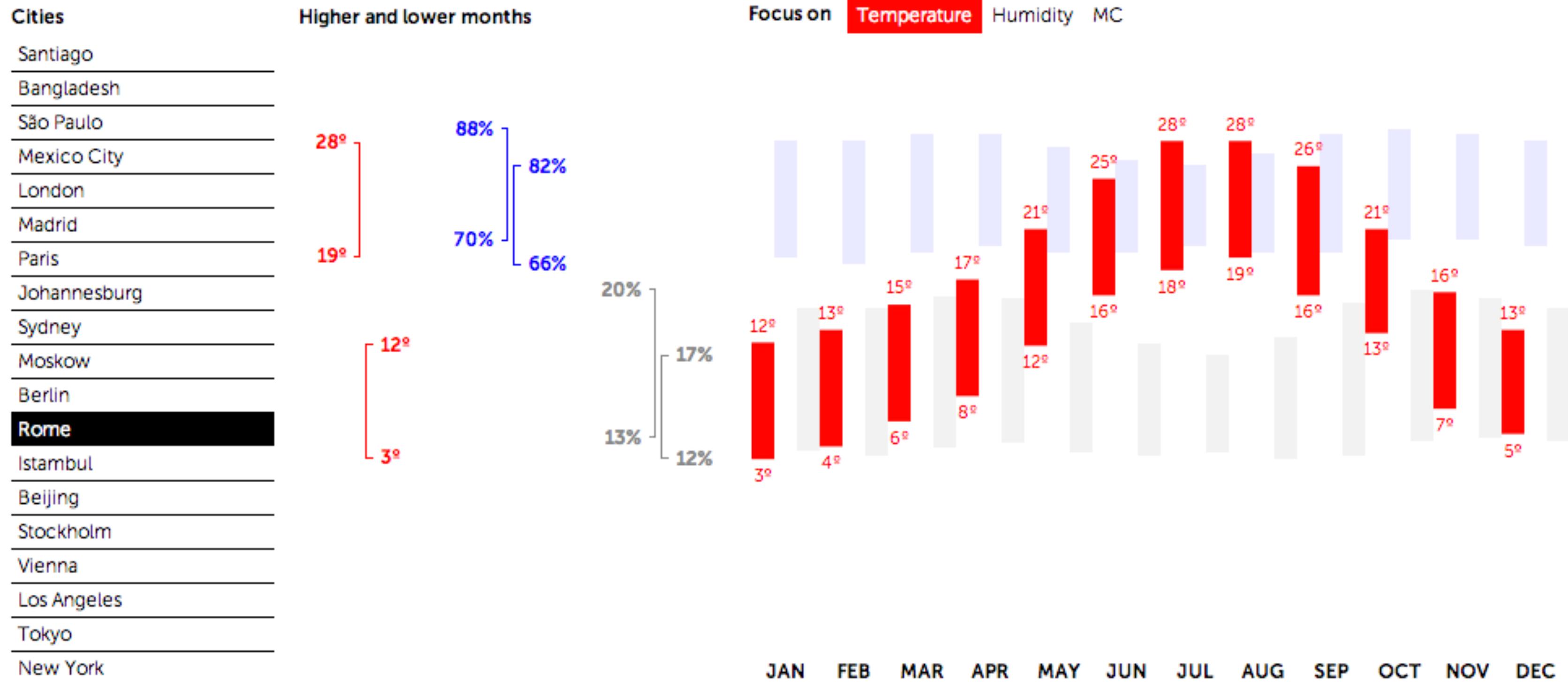
suitable for audience with foundation knowledge of the subject

vision
the purpose map

experience

exploratory

manipulate & interrogate



no captions, no indications of significance/insignificance

no good/bad values

visual window into the data analysis

Stage 1

Formulating
your **brief**

experience

exploratory

participate & contribute

far deeper exploratory experience

greater control & deeper array of features

contributing one's own data

audience drawn to challenges

vision

the purpose map

experience

exploratory

participate & contribute

How Y'all, Youse and You Guys Talk

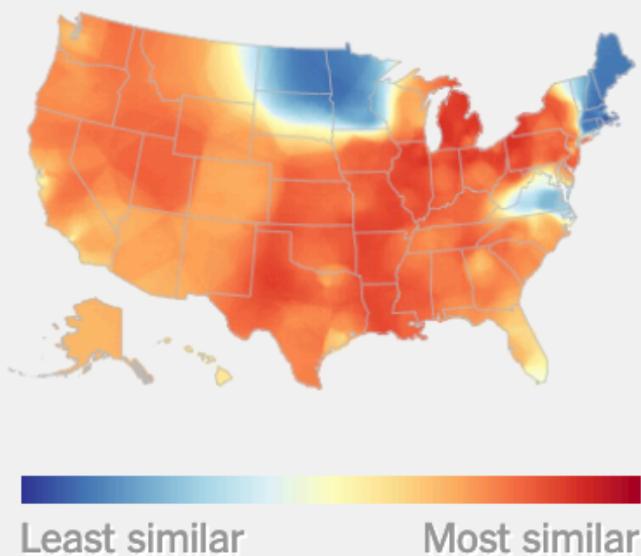
What does the way you speak say about where you're from?

Answer all the questions below to see your personal dialect map.

YOUR LAST ANSWER

How do you pronounce
aunt?

to sound like ant



QUESTION 13 OF 25

How do you pronounce *crayon*?

- with one syllable—rhymes with *man*
- with two syllables—sounds like *cray-ahn*
- with two syllables, where the second syllable rhymes with *dawn*
- sounds like *crown*
- other

Next ▶

Stage 1

Formulating
your **brief**

experience

exhibitory

vision

the purpose map

the viewer has to do the work to interpret meaning

no explanatory qualities / no scope for interrogatory explorations

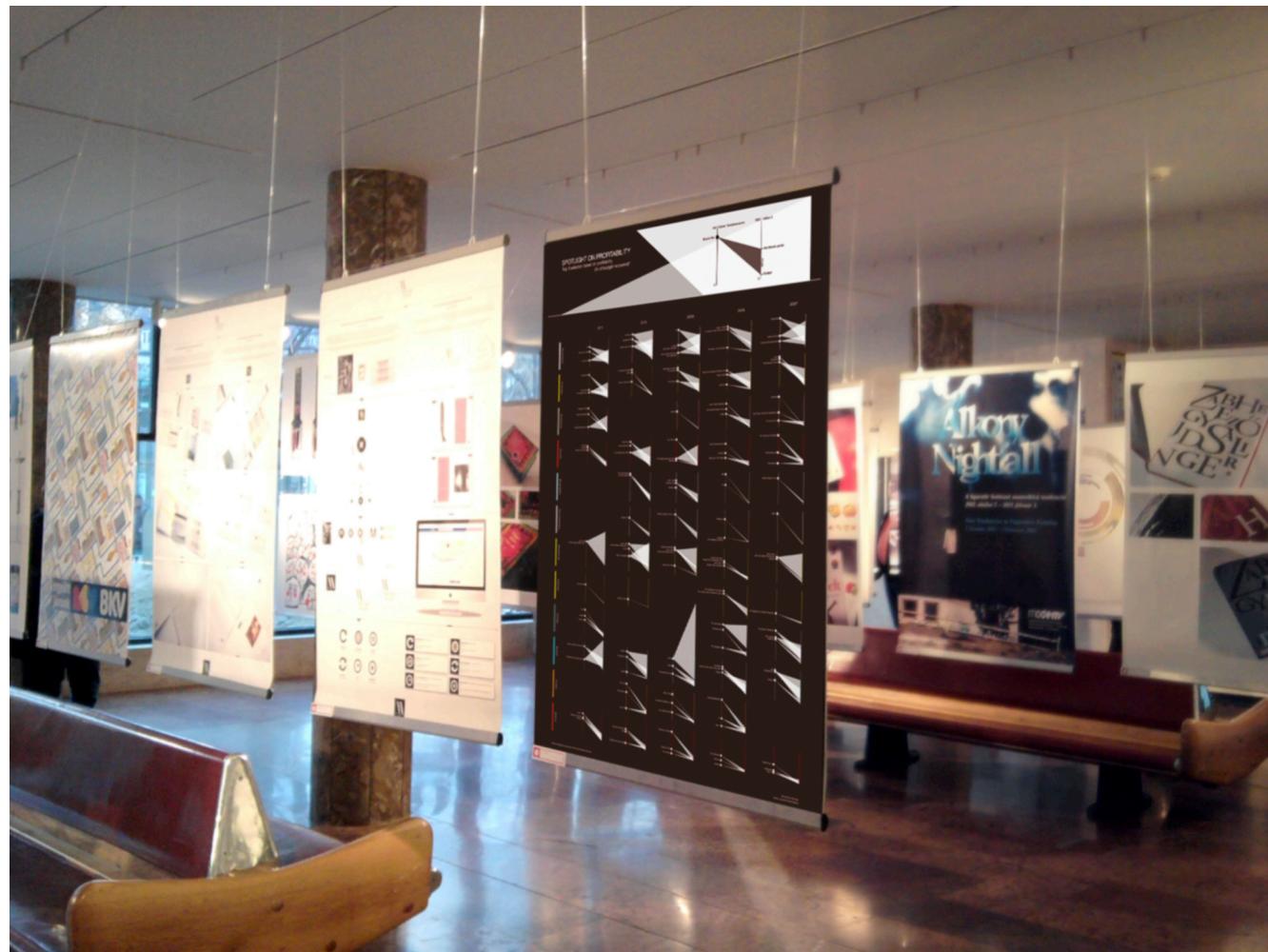
the viewer needs to know the content and the context

supporting a written article or report

very specific audience

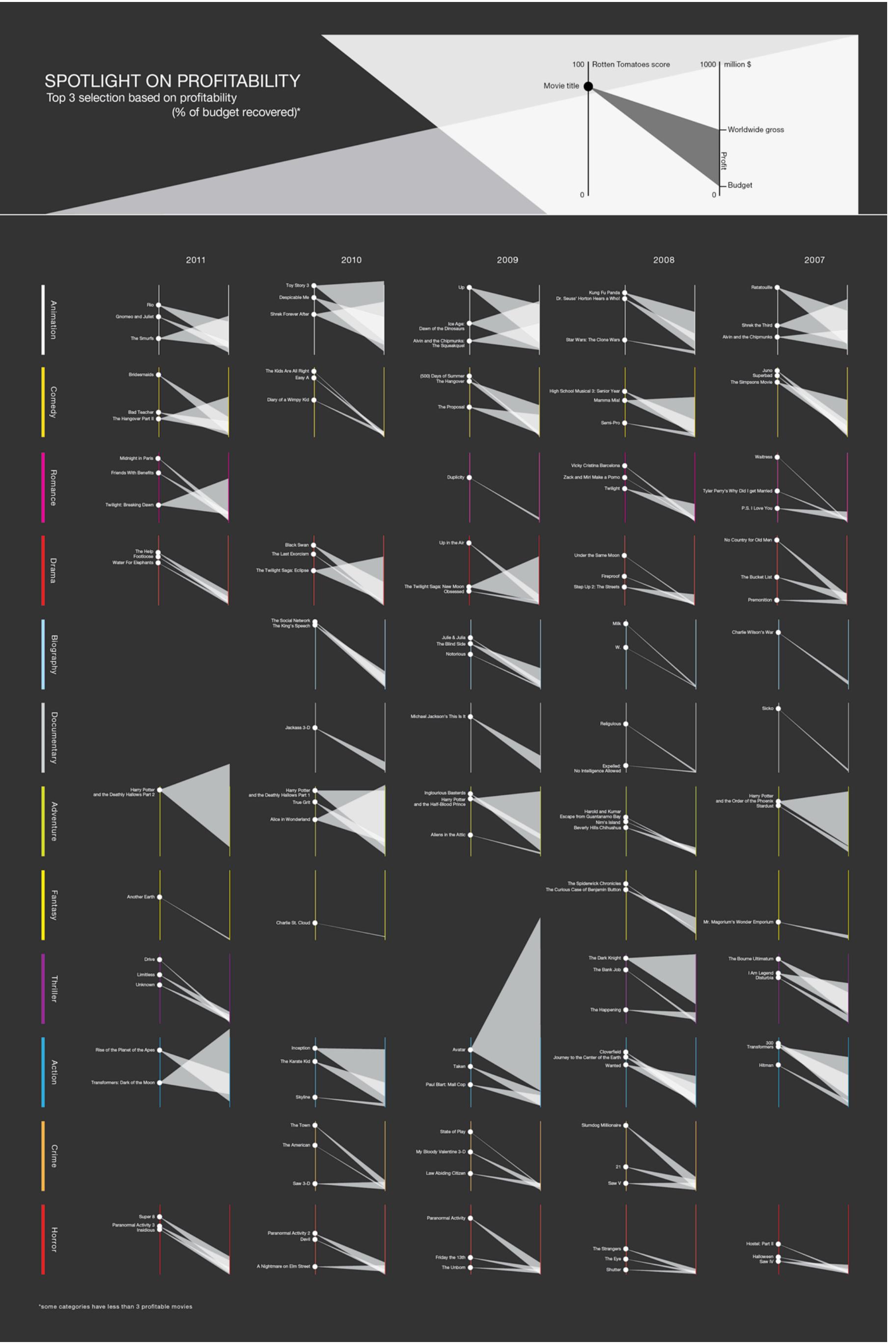
an inconvenient truth [a.gore] / gapminder [h. rosling]

experience exhibitory



no exploration
no interaction
no explanations

SPOTLIGHT ON PROFITABILITY
Top 3 selection based on profitability
(% of budget recovered)*

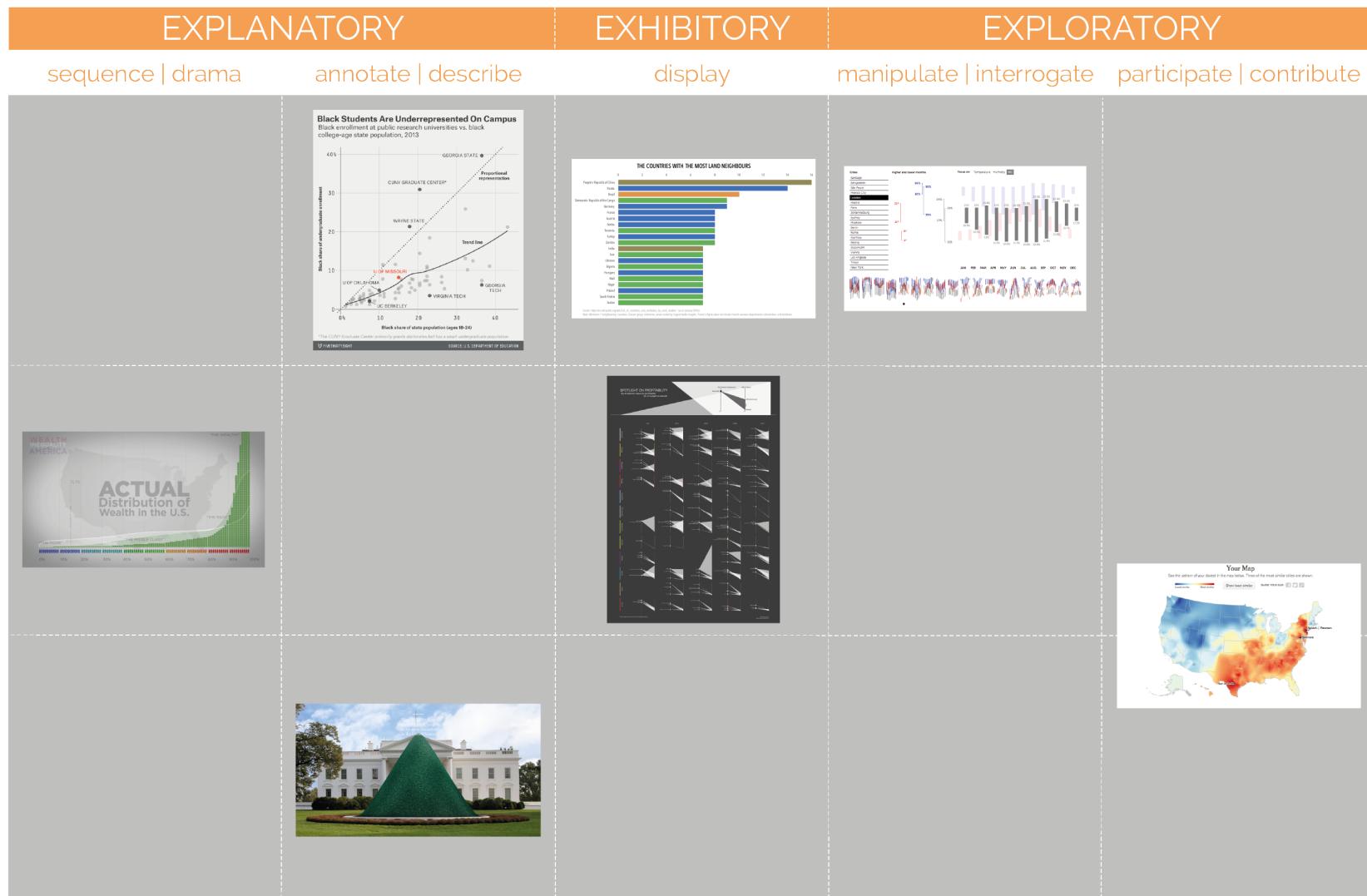


Stage 1

Formulating
your **brief**

vision *the purpose map*

experience



a continuum with subtle and very subjective variations between the two choices of reading and feeling

Stage 1

Formulating
your **brief**

tone

reading

vision

the purpose map

optimising the ease of viewer's estimation

efficiency of perceiving data

facilitate understanding at high degree of precision and detail

no need to seduce the audience

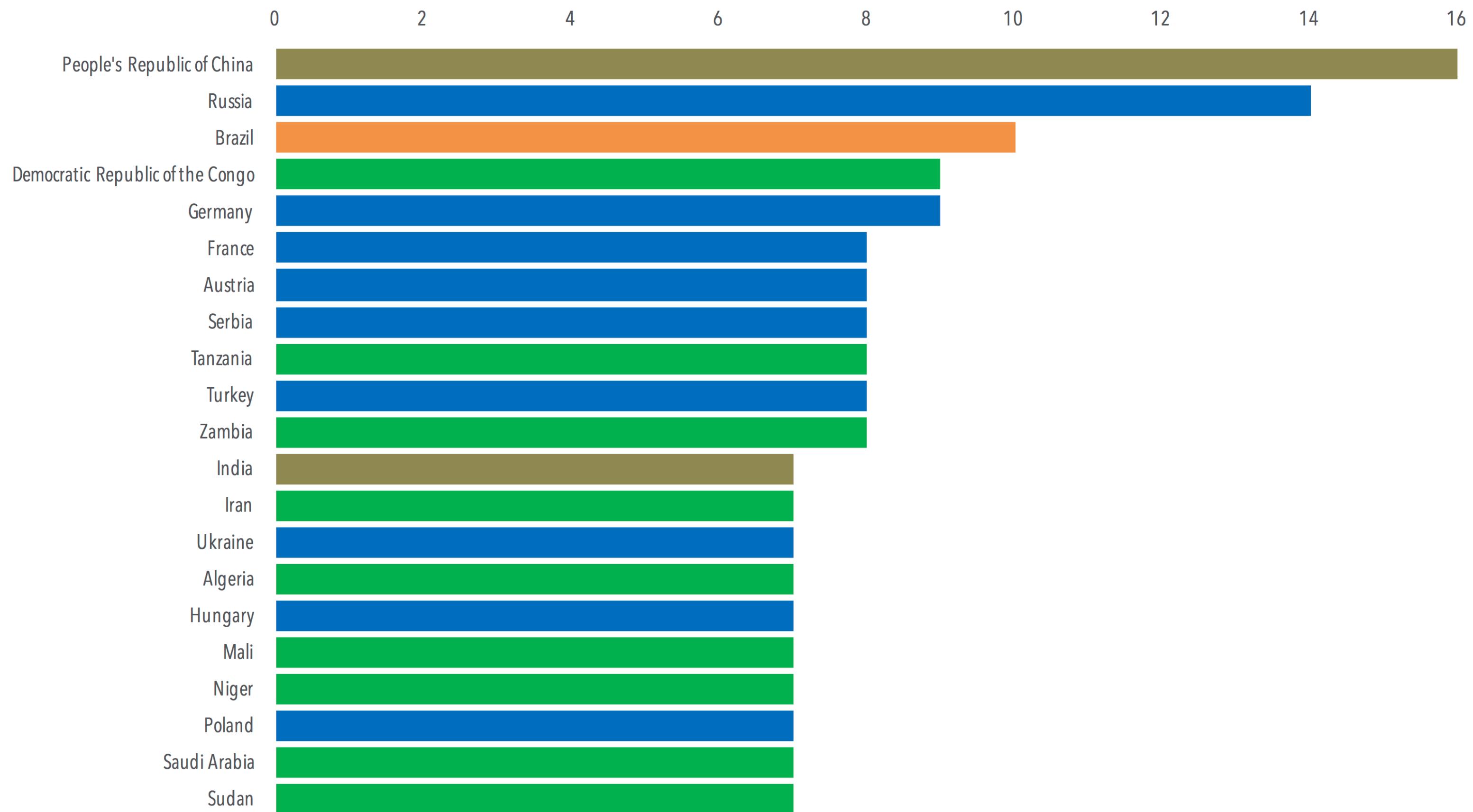
no need of visual stimulation

analytical, pragmatical & no-frills

tone

reading

THE COUNTRIES WITH THE MOST LAND NEIGHBOURS



Source: https://en.wikipedia.org/wiki/List_of_countries_and_territories_by_land_borders (as at January 2016).

Note: Minimum 7 neighbouring countries. Colours group continents, values sorted by largest border lengths. France's figure does not include French overseas departments, collectivities, and territories.

why would you need to build something different?

Stage 1

Formulating
your **brief**

tone

feeling

vision

the purpose map

different approach

visual look that attracts and also informs

audience needs to be engaged

subject stirring strong emotions

encapsulating emotions in the display

it is manipulation to a certain degree

tone

feeling



Just 158 families have provided nearly half of the early money for efforts to capture the White House.

Stage 1

Formulating
your **brief**

vision

harnessing ideas

building from the earliest seeds of any idea about the solution

- mental visualisation
- keywords
- sketching
- research & inspiration
- limitation of author's ideas
- limitation of others' ideas

Stage 1

Formulating your **brief**

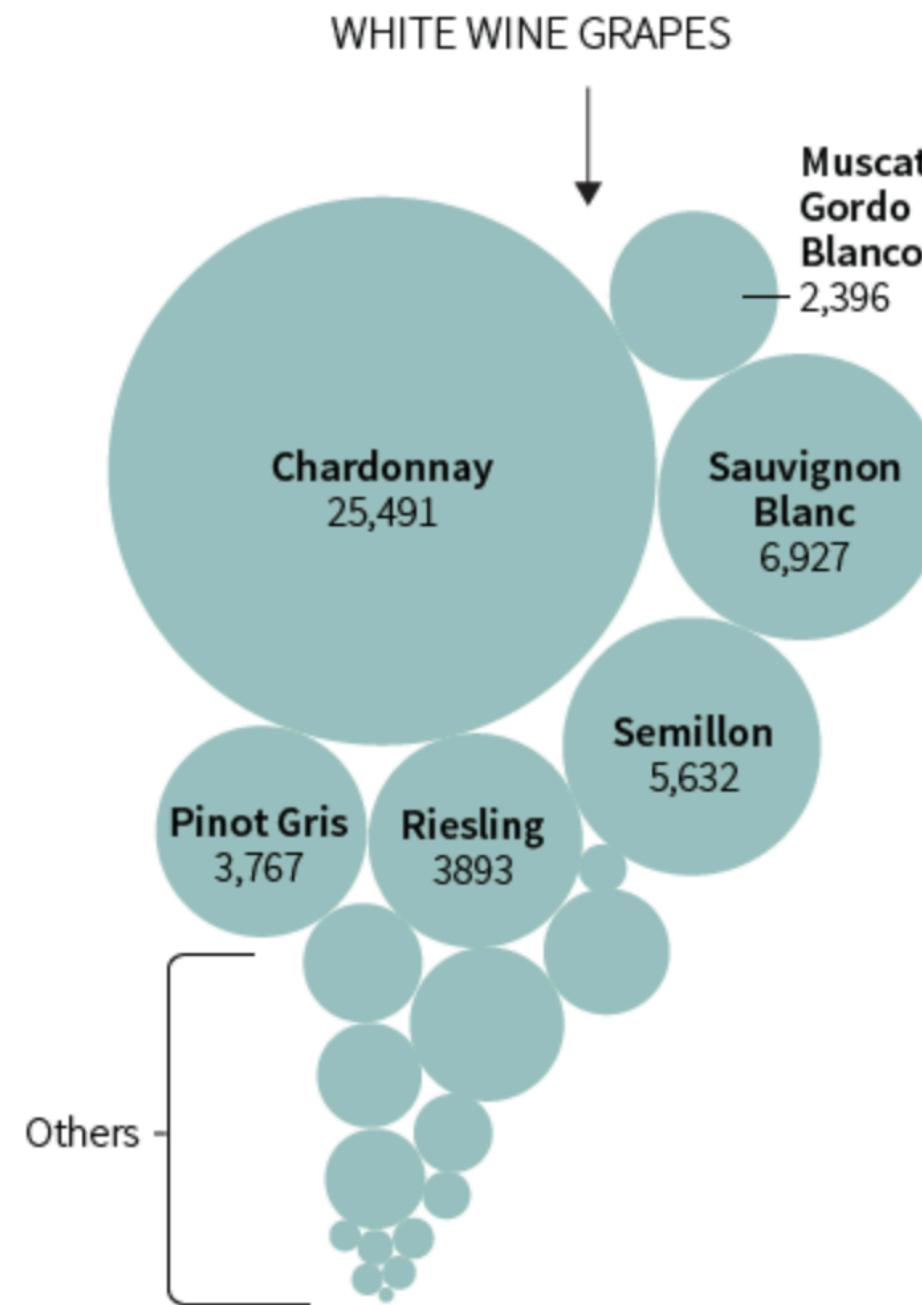
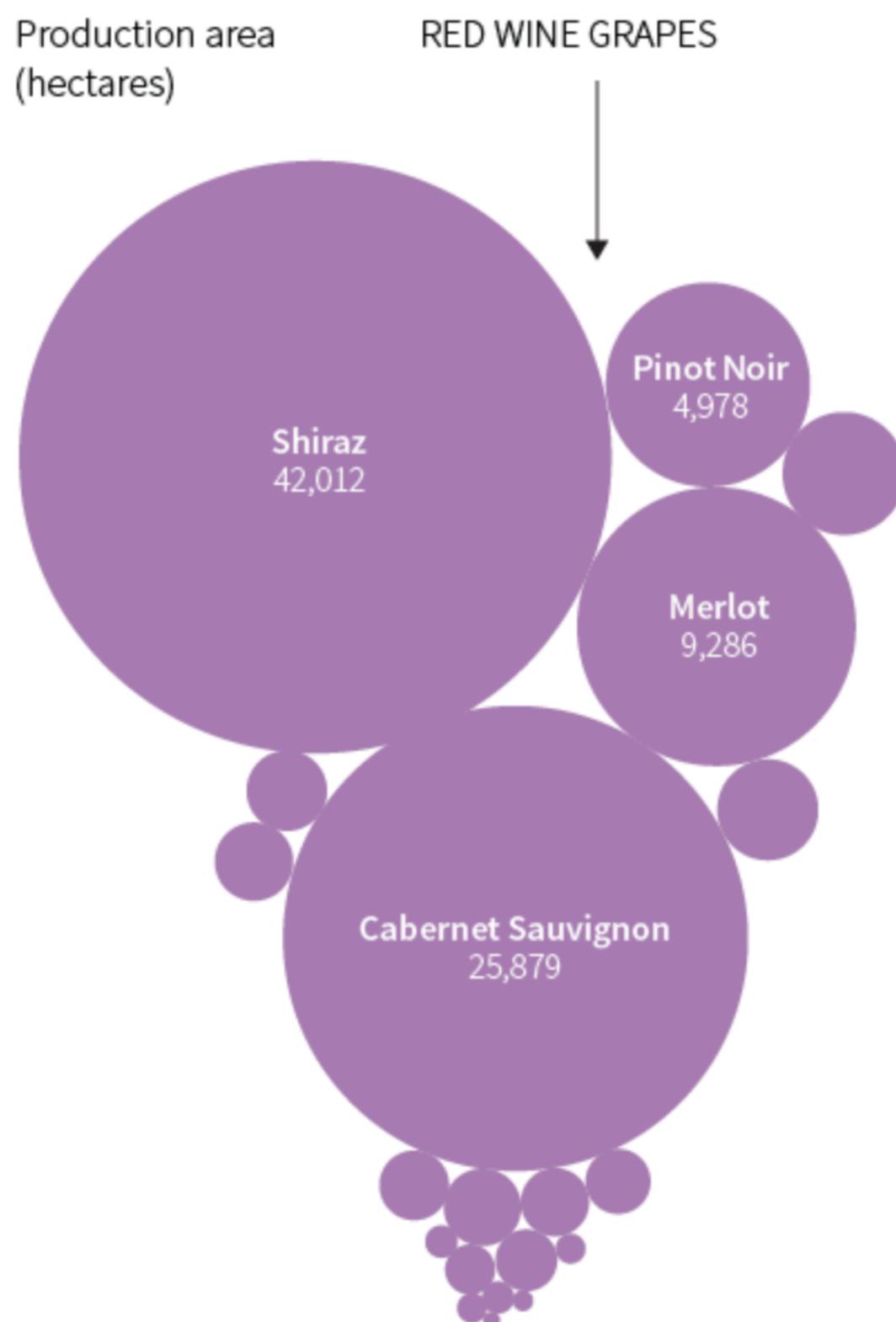
vision

harnessing ideas

➤ mental visualisation

‘system1’ kahneman’s model of thought

Top grape varieties grown



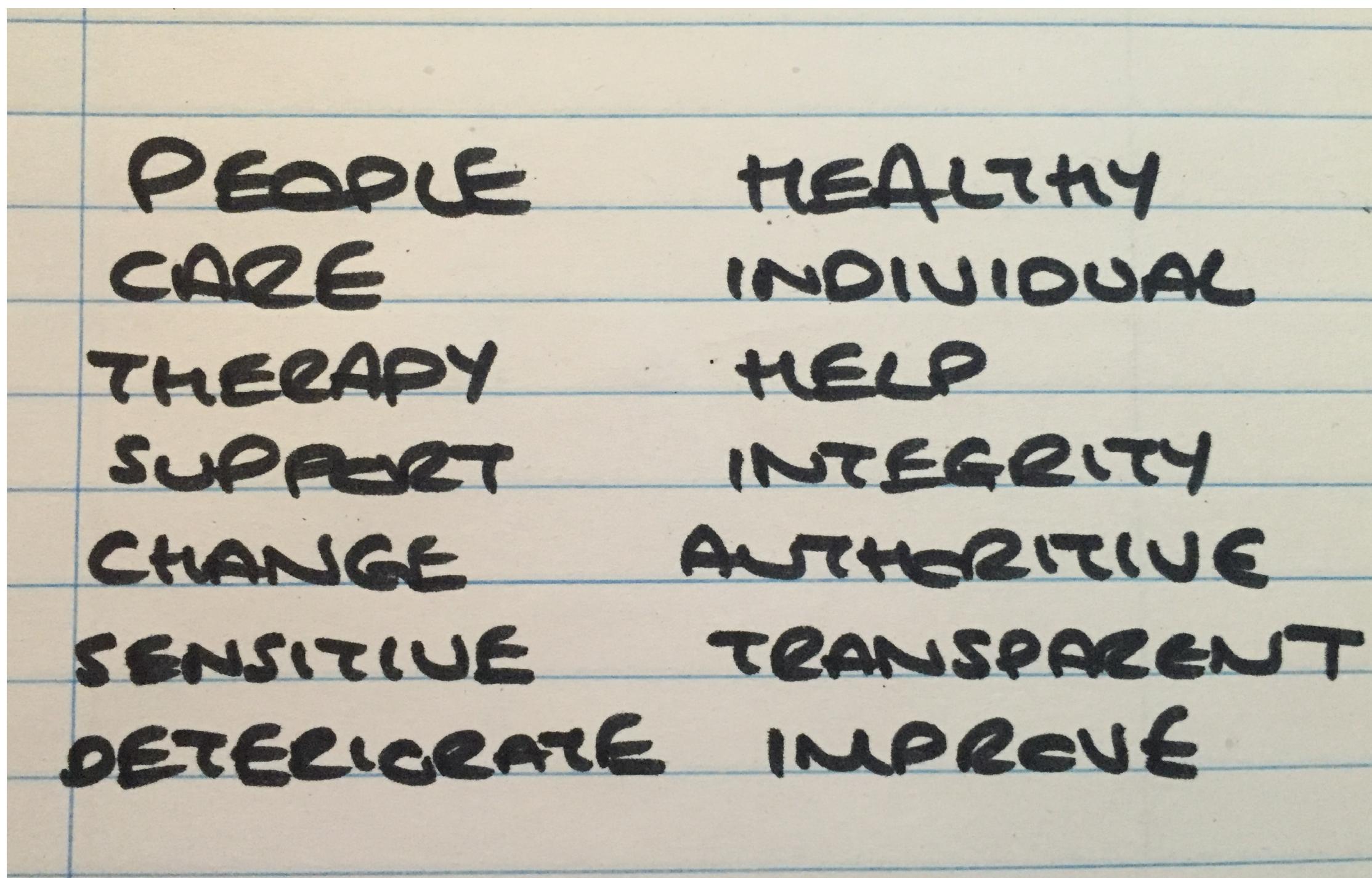
the mental impression forming in the mind when proposed with the challenge

Stage 1

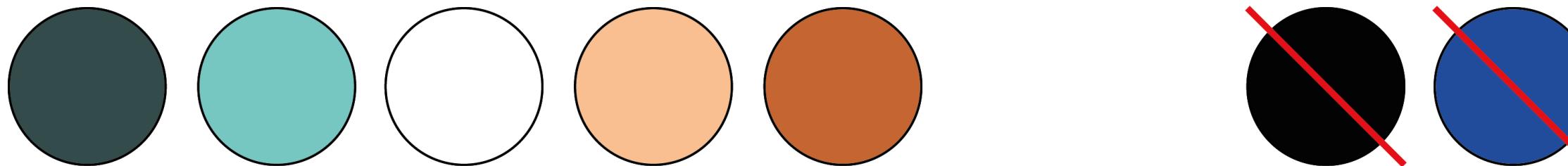
Formulating
your **brief**

vision
harnessing ideas
➤ keywords

terms of language instinctively connected with the topic



psychotherapy treatment

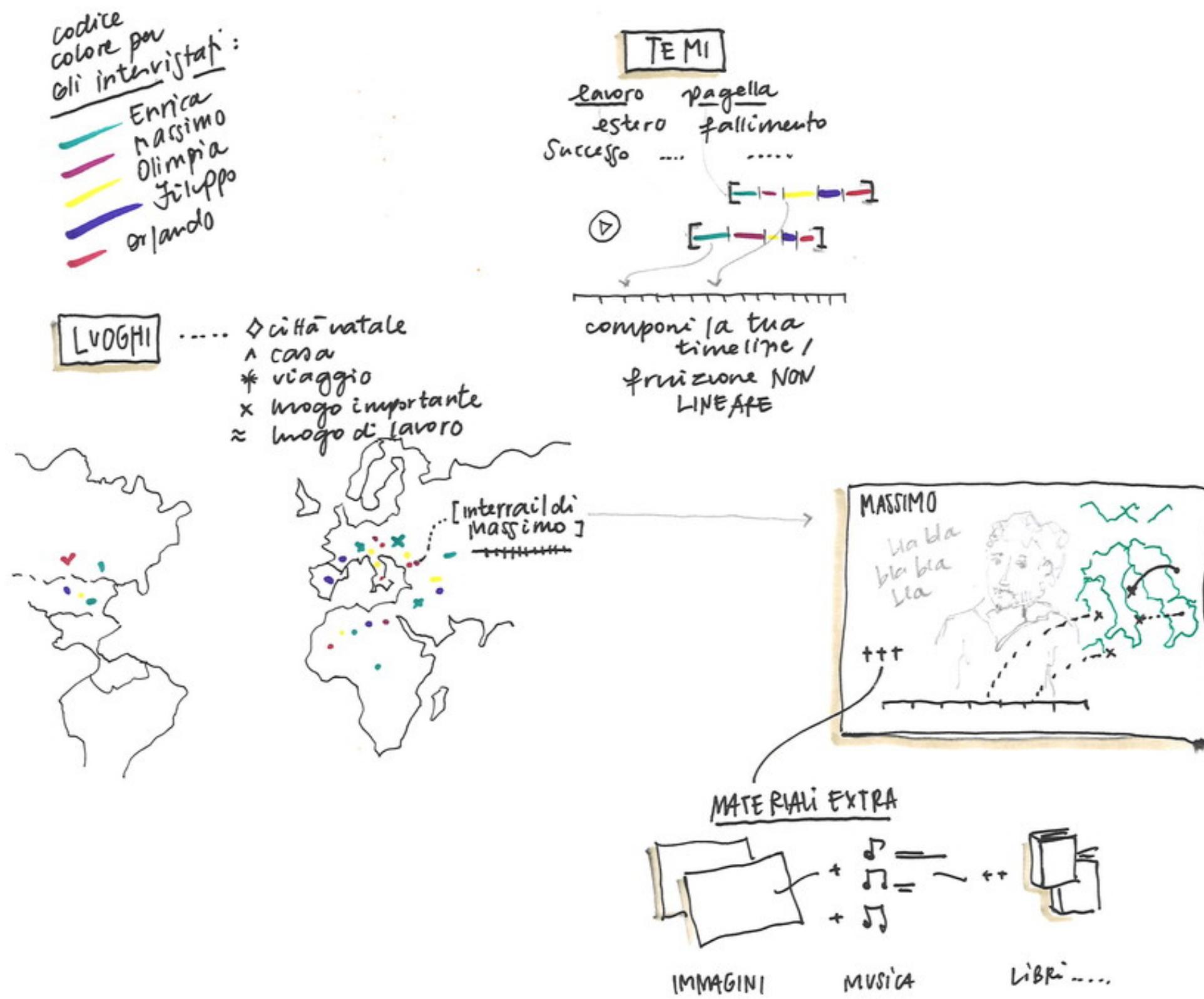


Stage 1

Formulating your brief

vision
harnessing ideas
➤ sketching

freedom & speed when extracting ideas from the mind



Stage 1

Formulating
your **brief**

vision

harnessing ideas

► research & inspiration

consider different sources of imagery:
colours/patterns/shapes/metaphors

► limitation of author's ideas

plagiarism, copying and stealing uncredited ideas

► limitation of others' ideas

author's responsibility to lead on the creative process

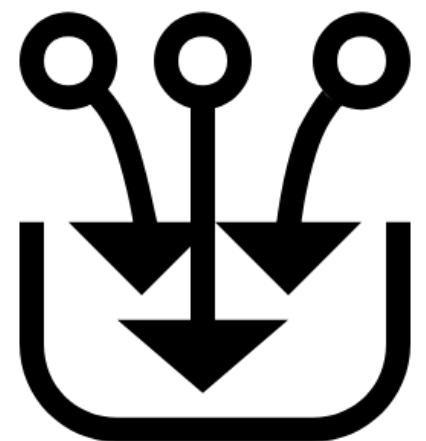
Stage 2

Working
with **data**

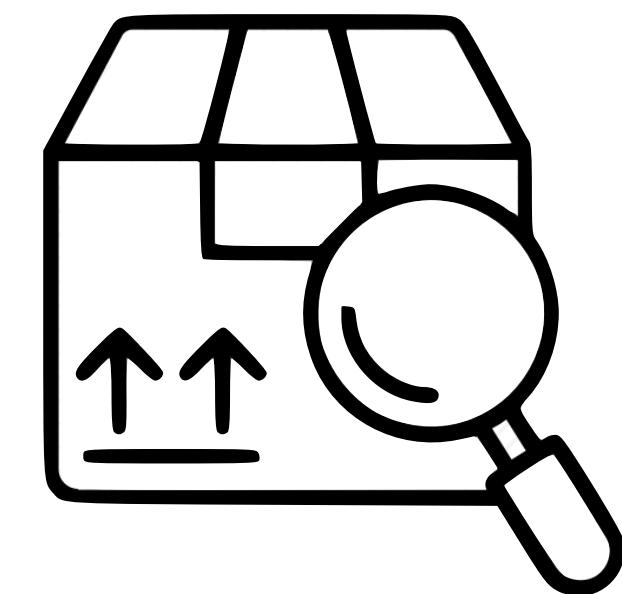
data processing

... refer to your stats & machlearn course

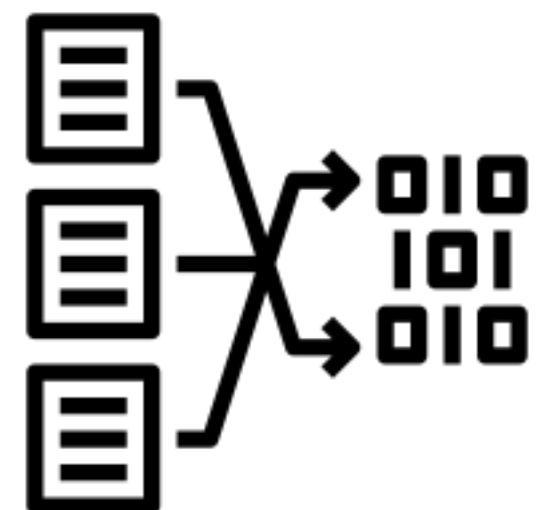
➤ data acquisition



➤ data examination



➤ data transformation



➤ data exploration

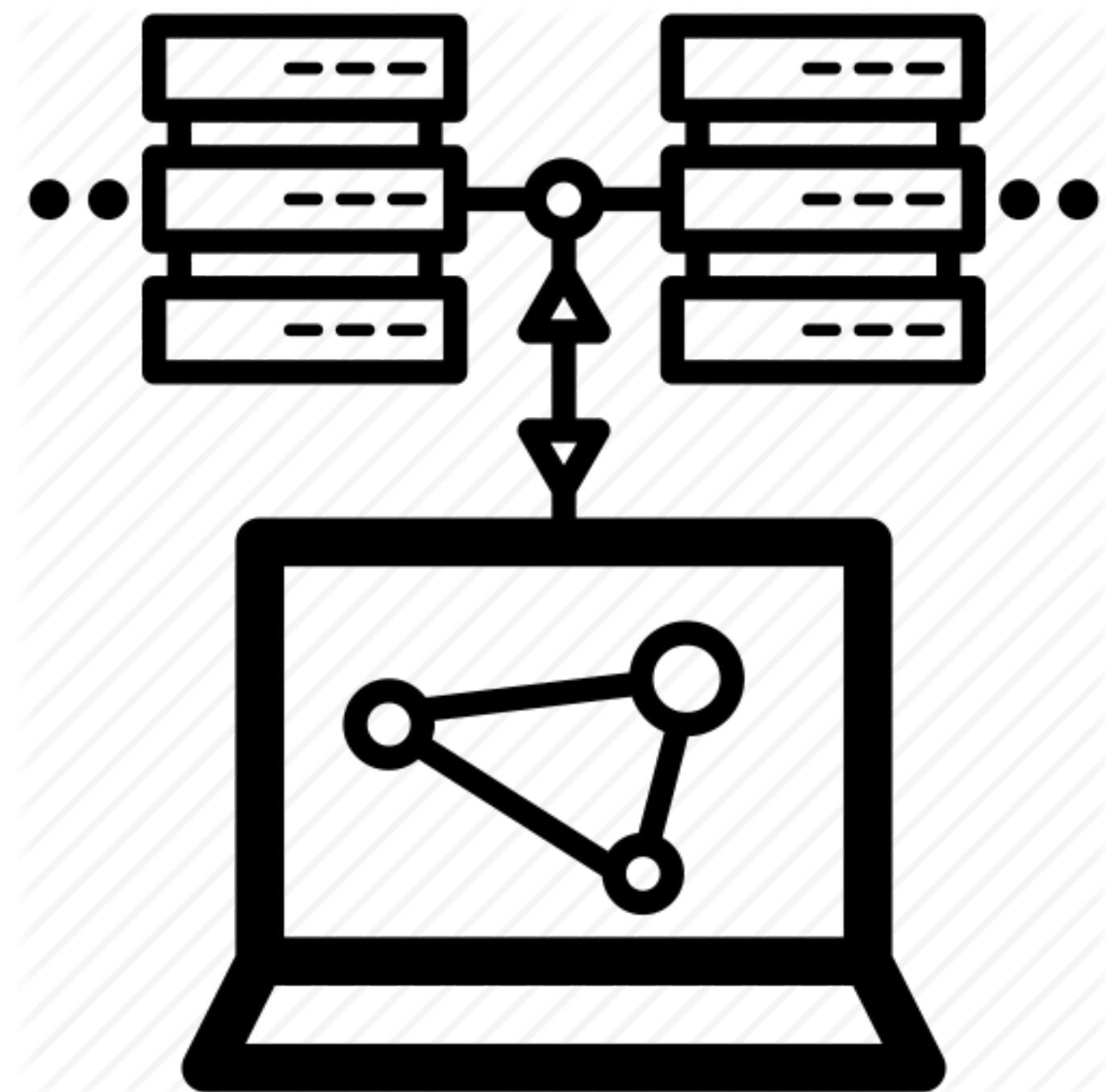


Stage 2

Working
with **data**

data processing

➤ data meaning



Stage 2

Working with **data**

data processing

"[A]s we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns — the ones we don't know we don't know."

Donald Rumsfeld (US secretary of defence), 2002

		ACQUIRED	
		KNOWN	UNKNOWN
AWARENESS	KNOWN	The things we are aware of knowing Beware complacency	The things we are aware of not knowing Deductive reasoning
	UNKNOWN	The things we are unaware of knowing Acknowledge & retrieve	The things we are unaware of not knowing Inductive reasoning

Stage 3

Establishing your
editorial thinking

editorial choices

which of the many viable perspectives offered by data you will focus on



focus



angle



framing

Stage 3

Establishing your
editorial thinking

editorial choices

choose viewpoint(s) in the analysis

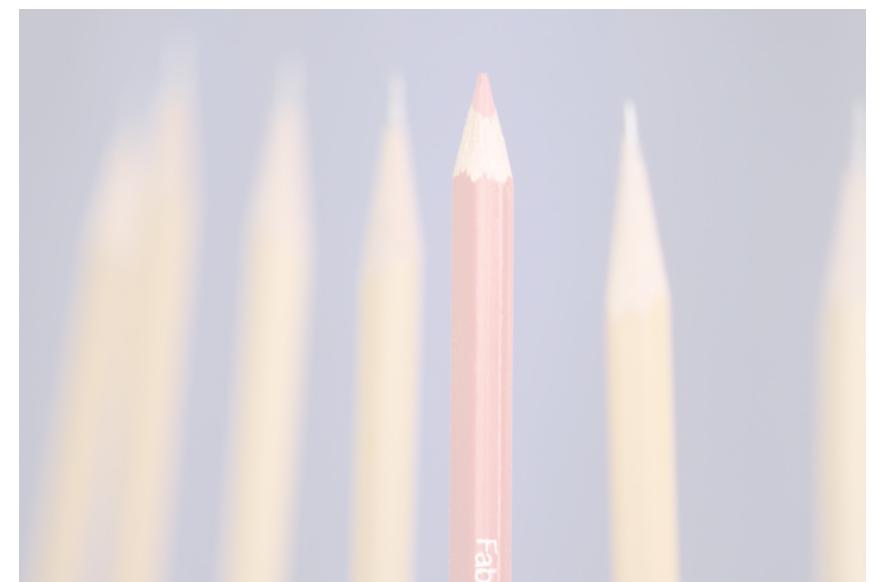
choose the dimensions to break down the subject

are they relevant?
are they sufficient?

angle



focus



framing



Stage 3

Establishing your
editorial thinking

editorial choices

relevant

why this angle?

why this is worth showing to this
audience?

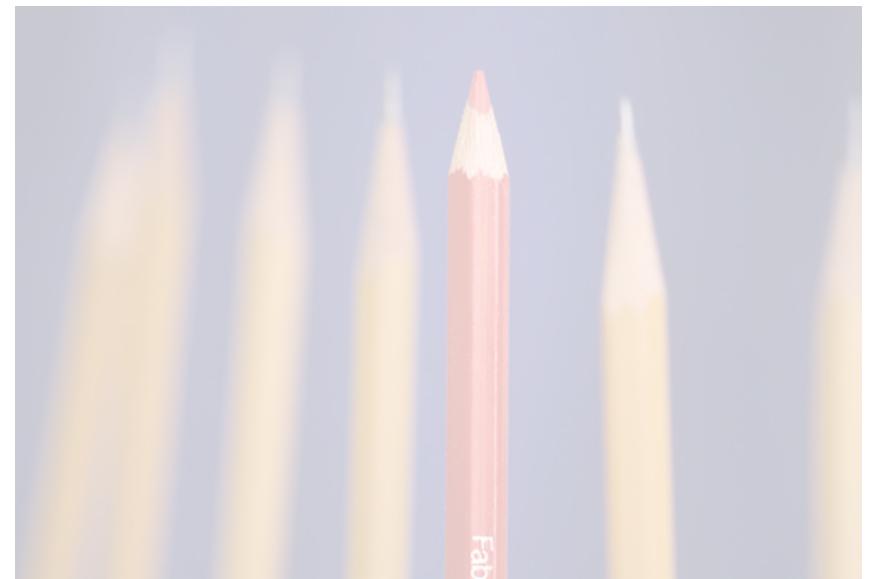
normal / exceptional

do not choose a viewpoint hoping for
someone find the relevance

angle



focus



framing

Stage 3

Establishing your
editorial thinking

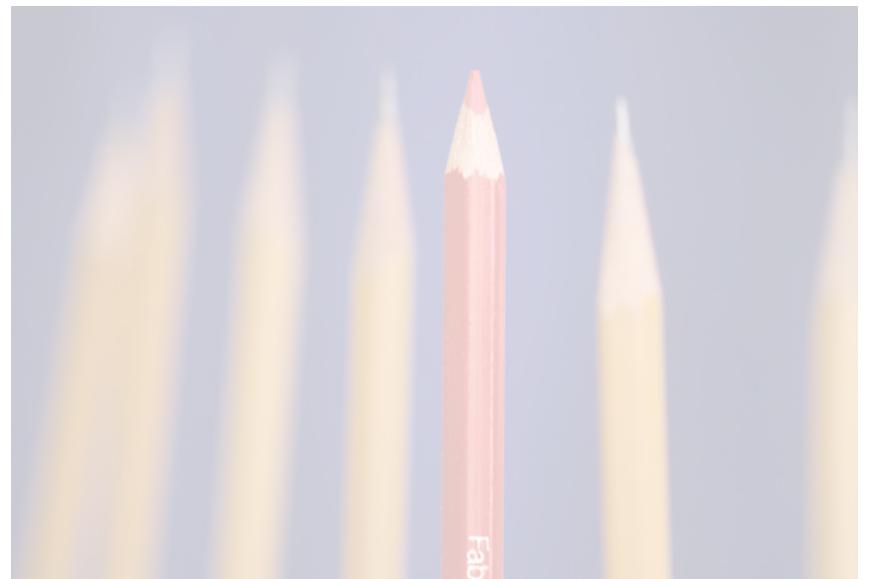
angle

sufficient

how many angles you need?

are they sufficiently representative?

focus



different angles across space / time

not too many: need to select



angle



framing

Stage 3

Establishing your
editorial thinking

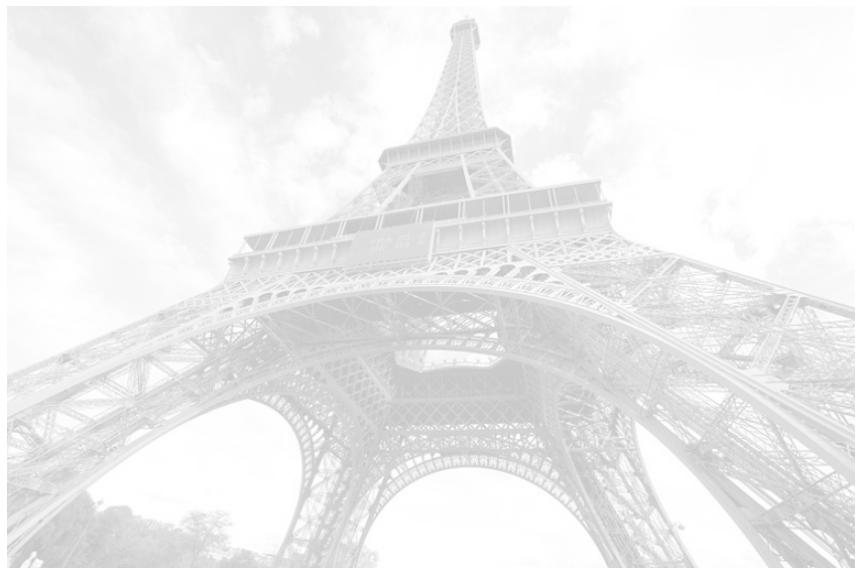
filtering which data to include or to
exclude

remove unnecessary clutter

how much content the audience can
process

hard to balance

angle



focus



framing

Stage 3

Establishing your
editorial thinking

focus

emphasising what is more important

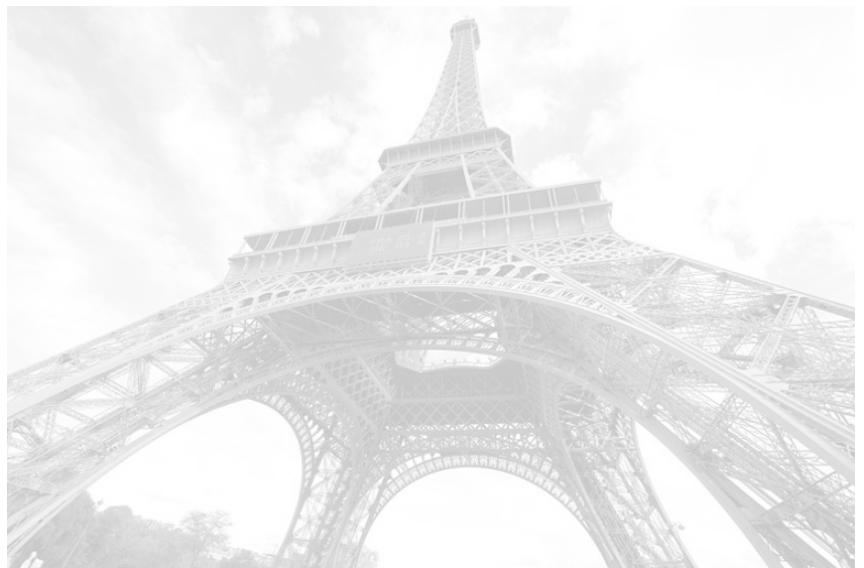
provide a visual hierarchy
choosing fore-/mid-/back-ground

select size, color, location

focus



angle



framing

Stage 3

Establishing your editorial thinking

► angle

relation between 2 measures

relevant: key indicator of wealth distribution

sufficient: to support the article

► framing

space: u.s. / time: 1917-2012

► focus

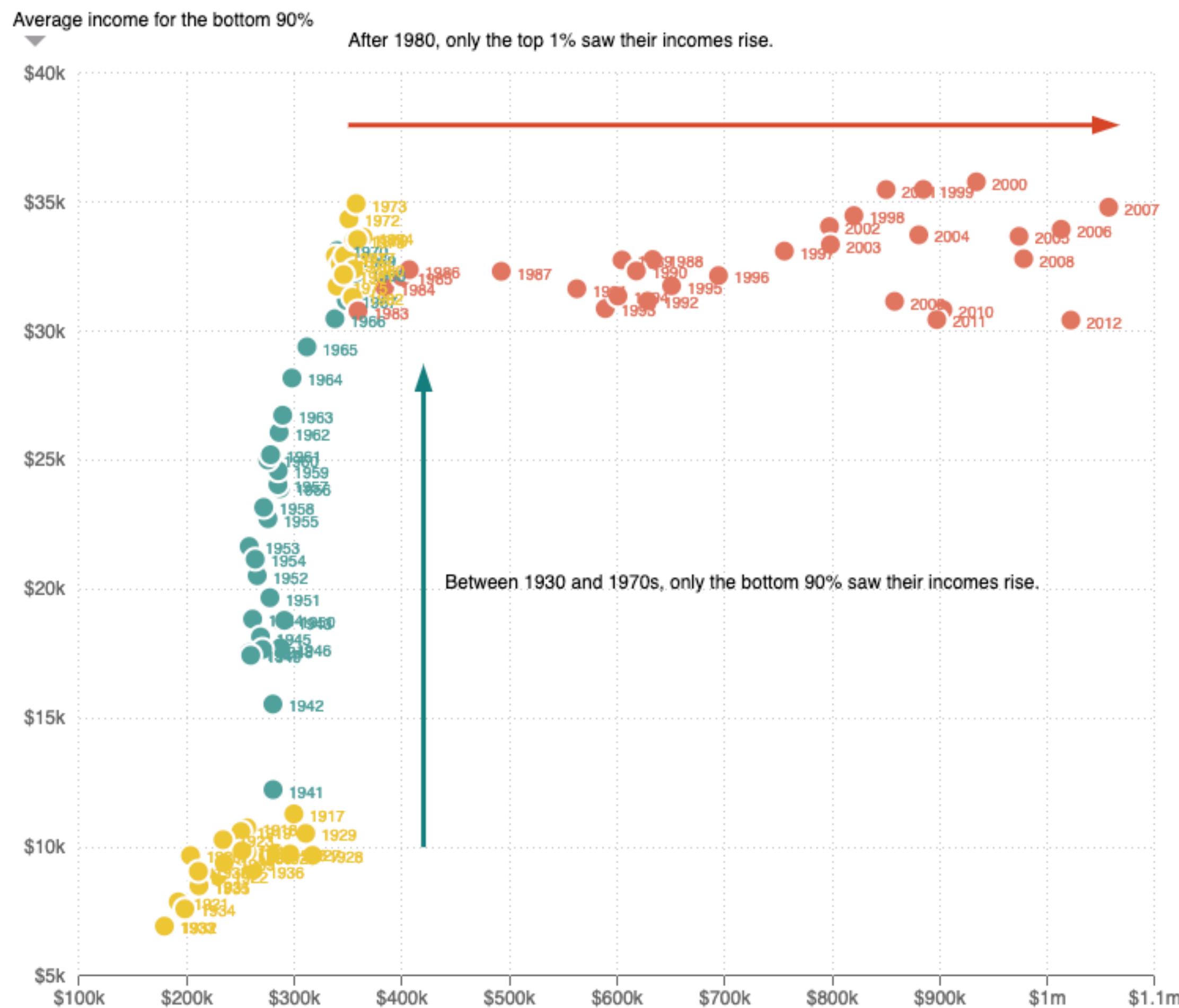
highlighted by colours

time slider available to user

editorial choices

example #1

the rise & fall of u.s. inequality



Notes

Income is inflation adjusted in 2012 dollars.

Source: World Top Incomes Database
Credit: Quoctrung Bui/NPR

Average income for the top 1%

Stage 3

Establishing your
editorial thinking

► angle

“how quantitative values
broken down by category
changed over the year?”

relevant: p. manning setting
a new record

sufficient: not by its own

► framing

1930 - 19 oct 2014

≥ 30 touchdown passes

editorial choices

example #2

why manning's record will be hard to beat

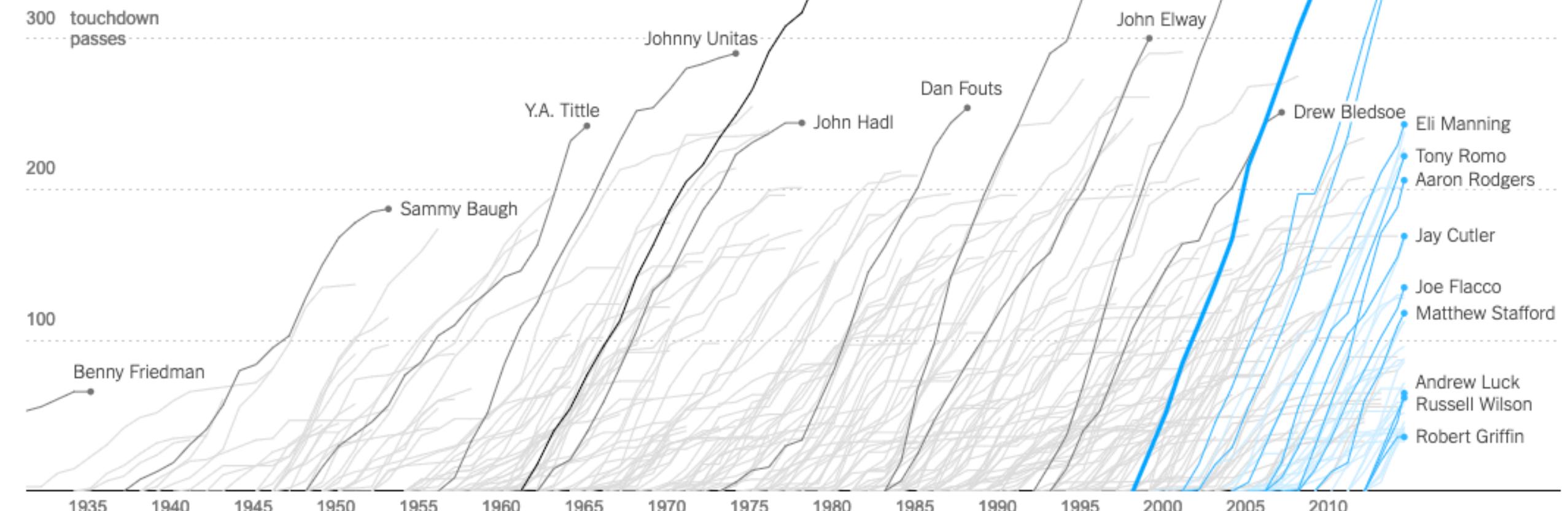
Why Peyton Manning's Record Will Be Hard to Beat

By GREGOR AISCH and KEVIN QUEALY OCT. 19, 2014

The Broncos quarterback set the all-time N.F.L. touchdown passing record — and is still going strong.

RELATED ARTICLE

300 touchdown passes



► focus

record holder vs. other players
previous record holder
careers evidenced by mouseover

Stage 3

Establishing your **editorial** thinking

editorial choices

example #2

why manning's record will be hard to beat

➤ angle

“how quantitative values broken down by category changed over the year?”

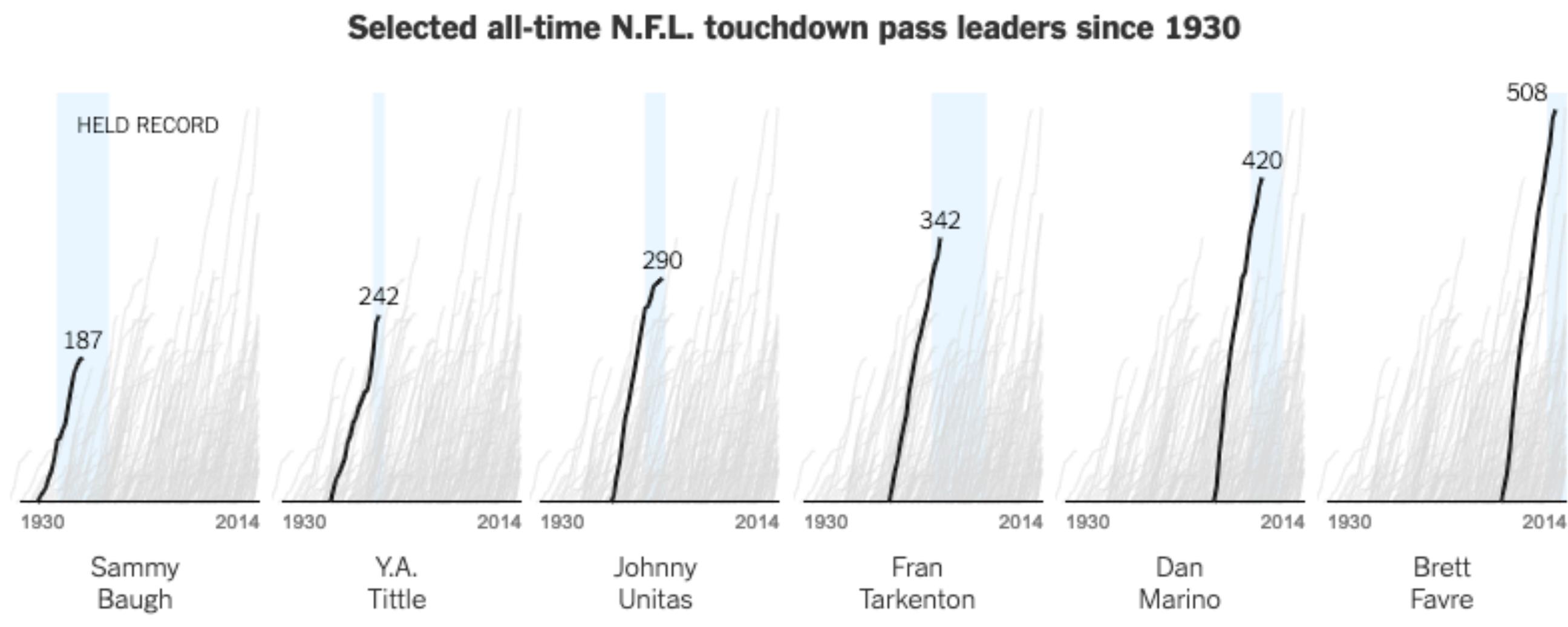
relevant: p. manning setting
a new record

sufficient: not by its own

► framing

1930 - 19 oct 2014

30 touchdown passes



► focus
on single careers
illuminated background banding
annotations

Stage 3

Establishing your
editorial thinking

► angle

“how *cumulative* quantitative values broken down by category changed over the year?”

relevant: age providing a new viewpoint

sufficient: all 3 charts

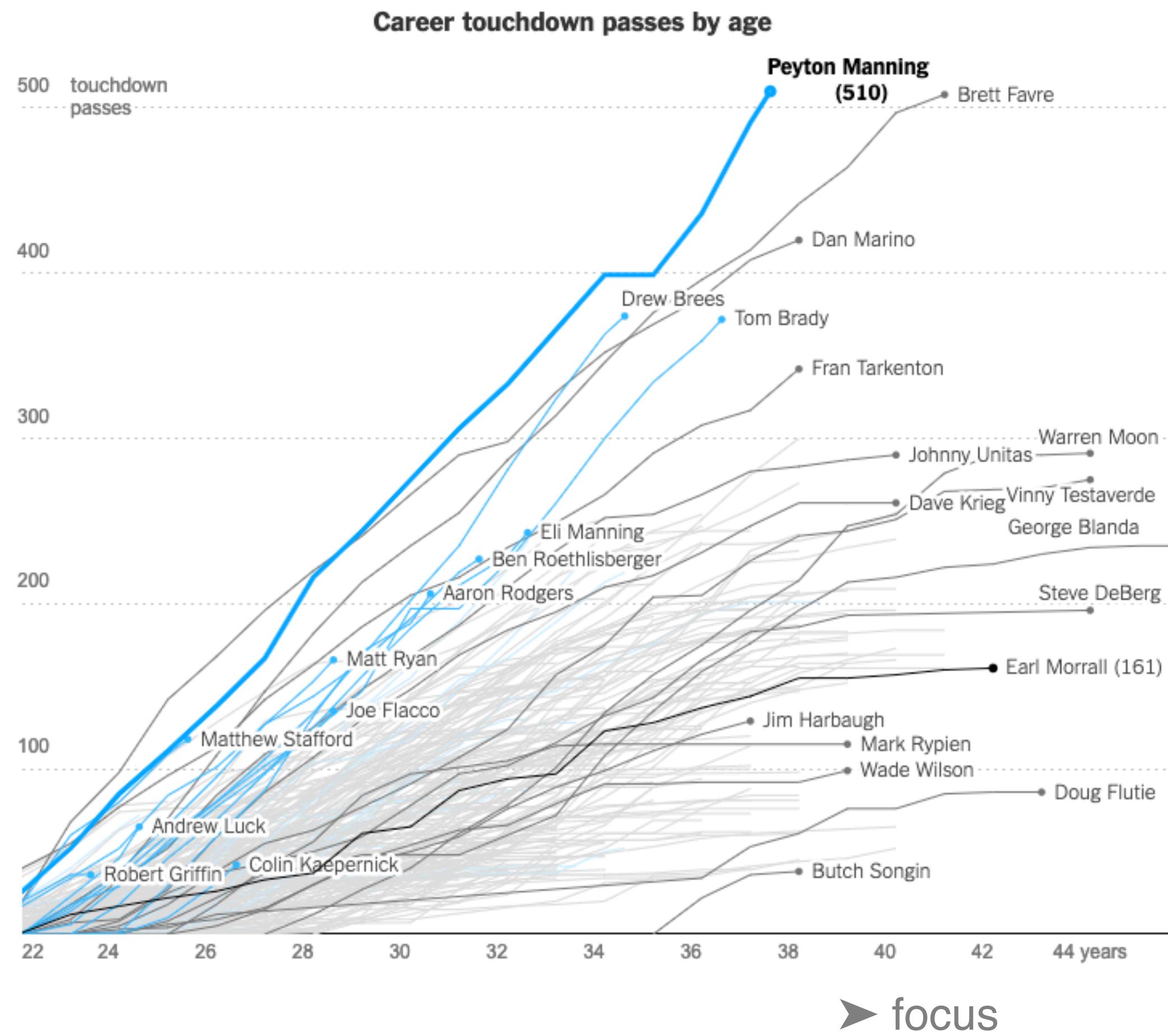
► framing

1930 - 19 oct 2014
≥ 30 touchdown passes

editorial choices

example #2

why Manning's record will be hard to beat



► focus

record holder vs. other players
previous record holder
careers evidenced by mouseover

Stage 4

Developing your
design **solution**

solution

➤ data representation

+annotations

+colors

+interactivity

+composition