

A cinematic background image of a film set. In the foreground, a person's hands hold a clapperboard. The clapperboard has 'CIAK CIAK' at the top, followed by 'TAKE 10', '4988' in red, and '338' in red. Below these are fields for 'SCENE', 'N.', 'OM.', and 'CLOSER'. The background shows a dimly lit studio with various lights, a boom microphone, and a person standing in the distance.

Data Storytelling Principles

Angelica Lo Duca

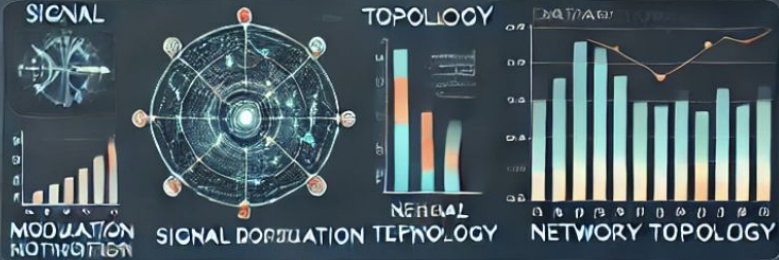
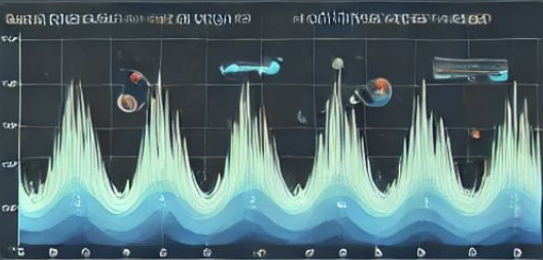
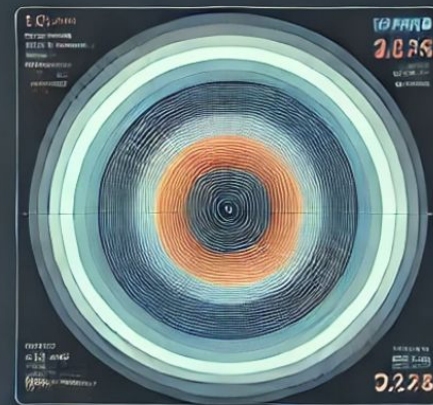
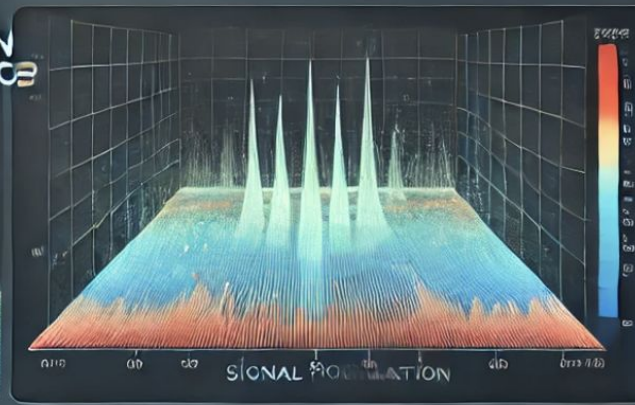


Bonn 2011

UNDERWATER ACOUSTIC NETWORKS

SIGNAL ATTENUATION OVER DISTANCE

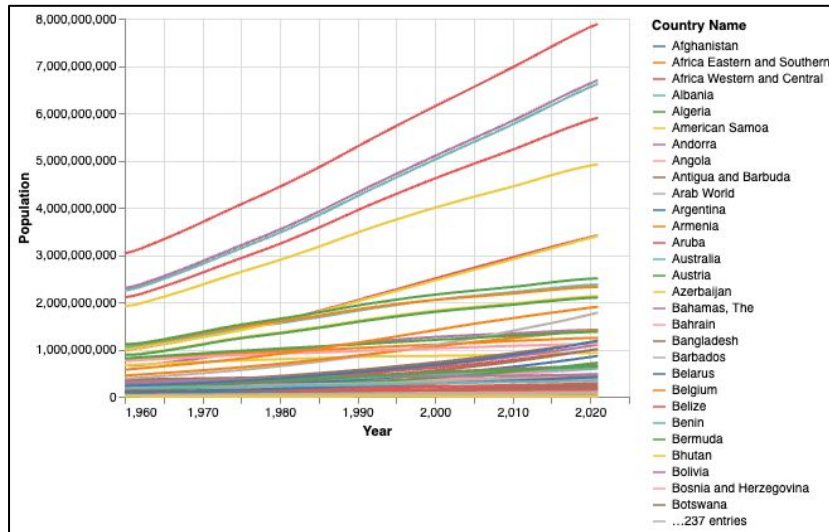
THE CHALLENGE OF UNDERWATER COMMUNICATIONS IS NOT ONLY THE PHYSICAL DISTANCE BUT ALSO THE NATURE OF THE MEDIUM. SOUND WAVES TRAVEL SLOWER IN WATER THAN IN AIR, AND THEIR SIGNALS ARE WEAKENED BY THE OCEAN'S THERMAL LAYERING AND ABSORPTION. THIS RESULTS IN A SIGNAL THAT IS BOTH WEAK AND DISTORTED, MAKING IT DIFFICULT TO RECEIVE AND INTERPRET. THE CHALLENGE IS TO DESIGN A NETWORK THAT CAN COMPENSATE FOR THESE LOSSES AND MAINTAIN A RELIABLE CONNECTION OVER LONG DISTANCES.

[illegible]

1 minute. Tons of charts.
No one cared.
No one came to my poster.

Data is not enough.

Data



Chart



Audience

Data



Story



Audience

Stories speak at three levels



1

Stomach

Corresponds to the *instinctive* level: the audience understands the story without a detailed reflection.



2

Heart

Corresponds to the *affective* level: the audience engages with the story.



3

Brain

Corresponds to the *behavioral* level: the audience acts based on the story.

How can we tell
Data
Driven
Stories?



Data Storytelling is communicating the results of your data analysis process to an audience through a **story**.



Behind every data point, there are people.
People have stories to tell.

10

A number.

Numbers do not tell stories.

10 apples

A data point.

Data tells stories.

*This year my apple tree has ten more
apples than last year.*

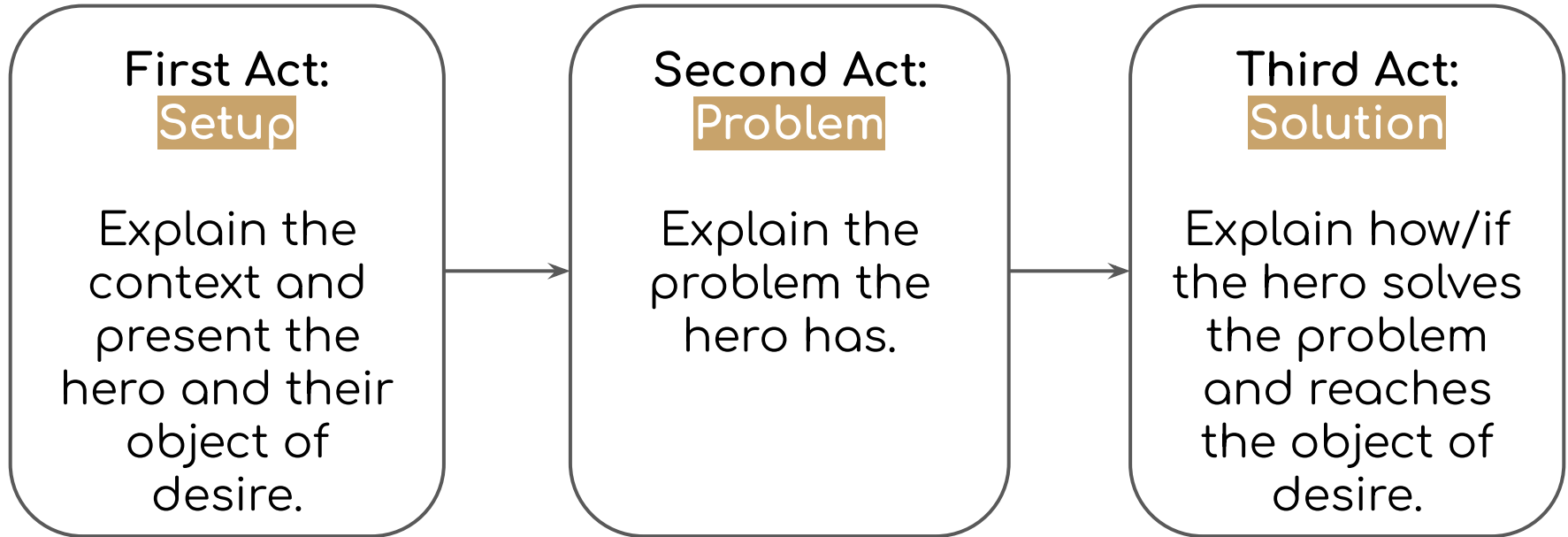
How can we structure
a data-driven story?

Let's borrow the structure of a story
from the cinema.

Every story is about
a hero wanting something
but a problem prevents them
from reaching it.

Every story is about
a hero wanting something (object of desire)
but a problem prevents them
from reaching it.

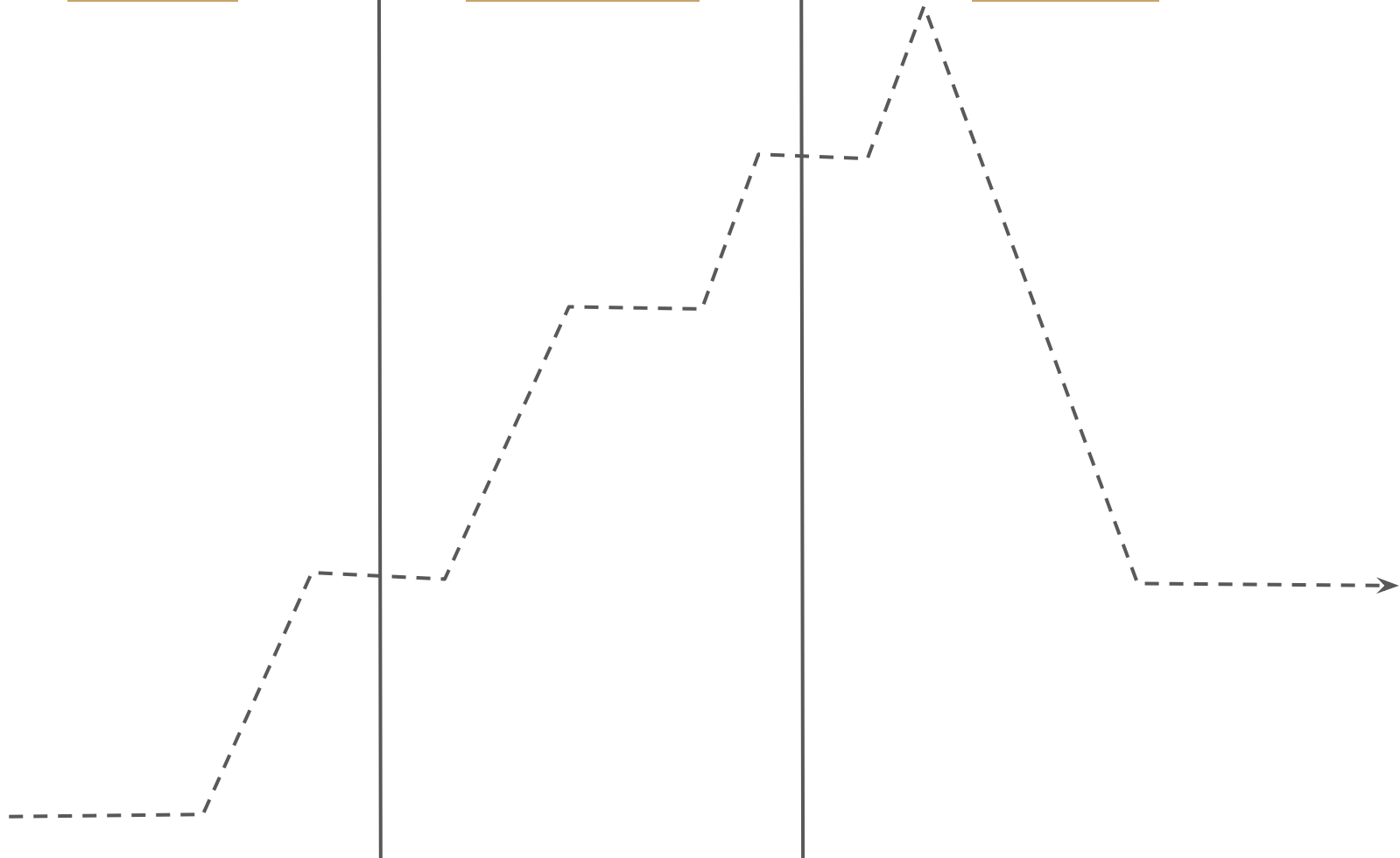
The Three-Act Structure



First Act

Second Act

Third Act





Antonio

First Plot Point

Antonio wants to ride a bike without training wheels.

The Dark Night

Antonio fights against fear and ultimately decides that he will make it.

Second Plot Point

Antonio meets his antagonist: fear of falling.

Climax

Antonio rides the bike without training wheels.

Who is the hero in a data-driven story?

The audience is not the hero.

The data storyteller is not the hero.

The hero is extracted from the data.

Heroes in data-driven stories

Human

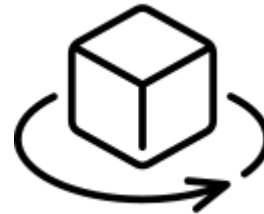
Directly connected
to people



Students
Patients
Organizations
Countries
...

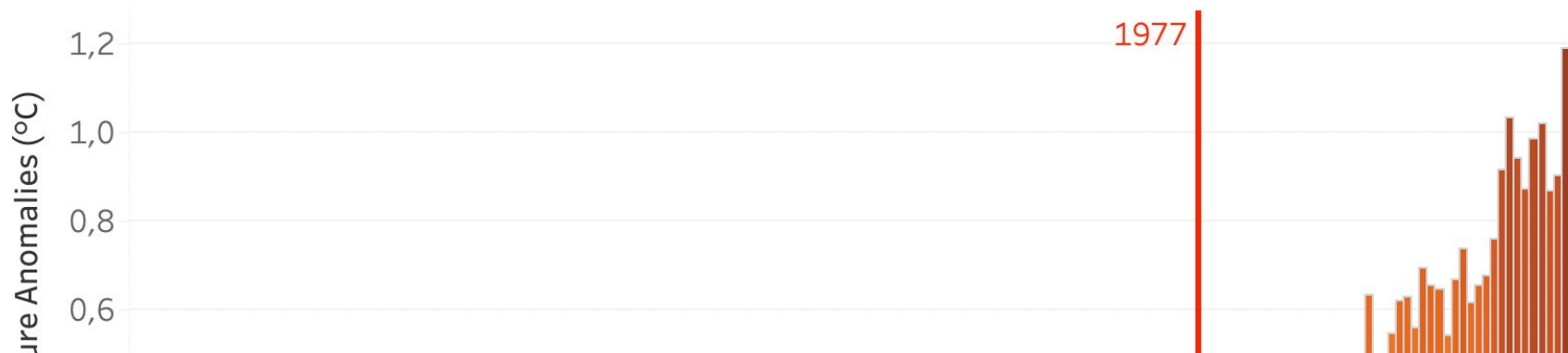
Nonhuman

Indirectly
connected to
people

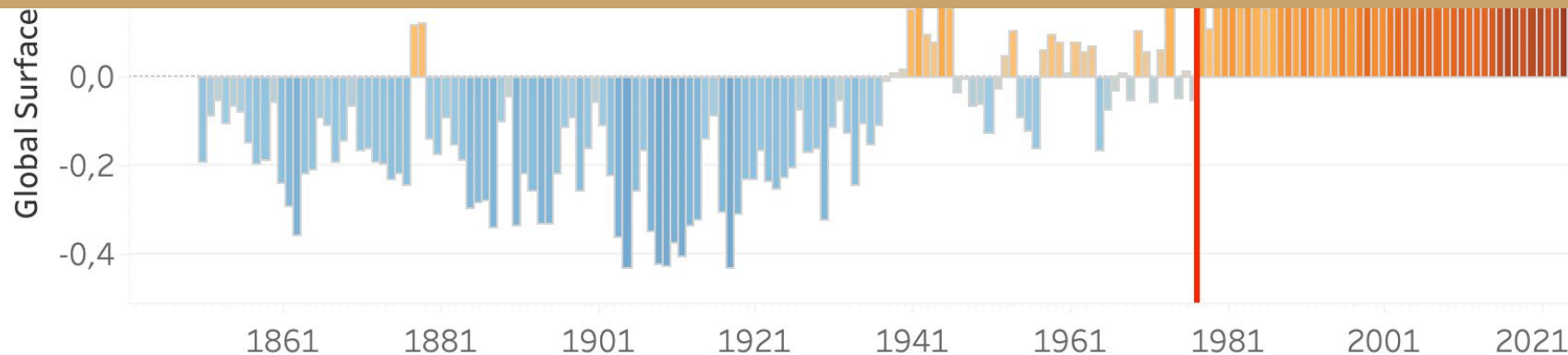


Products
Temperature
Trains
...

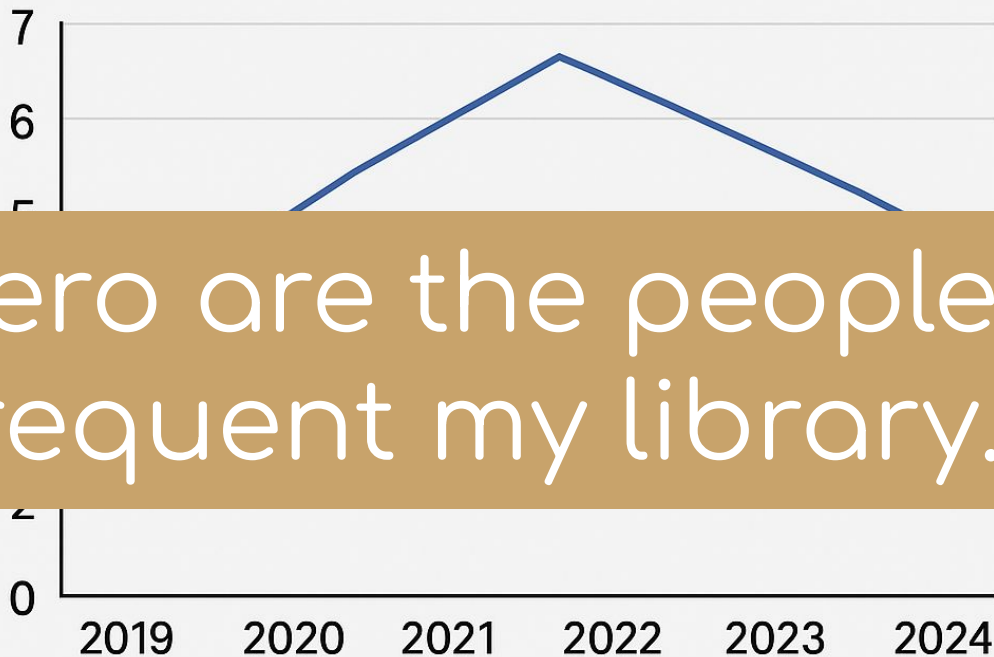
A Worrying Situation: Global Warming Since 1977



The hero is the temperature!



Average Number of Books Read Per Person in My Library in a Year



The hero are the people who
frequent my library.

The Data-Hero-Humanity Matrix

Data {			
	Qualitative		
	Quantitative		

The Data-Hero Humanity Matrix

Data {	Qualitative	Experiences, opinions, perceptions, or behaviors of people	
	Quantitative		

The Data-Hero Humanity Matrix

Data {			
	Qualitative	Experiences, opinions, perceptions, or behaviors of people	Description of objects, environments, events, processes, or systems
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The Data-Hero Humanity Matrix

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	Quantitative	Performance measures, test results, or demographic statistics	

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Data	Qualitative	Experiences, opinions, perceptions, or behaviors of people	Description of objects, environments, events, processes, or systems
	Quantitative	Performance measures, test results, or demographic statistics	Measurements of phenomena

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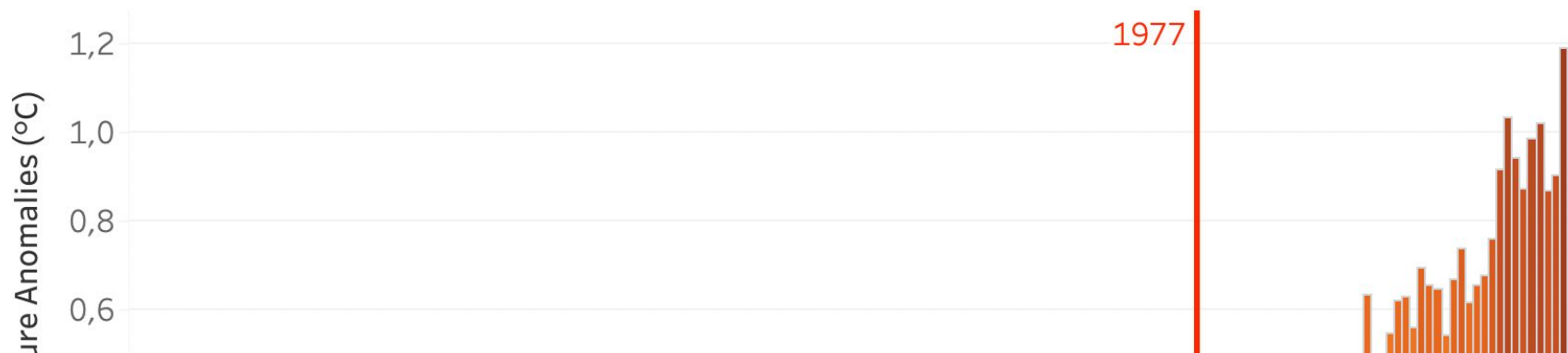
The Data-Hero Humanity Matrix

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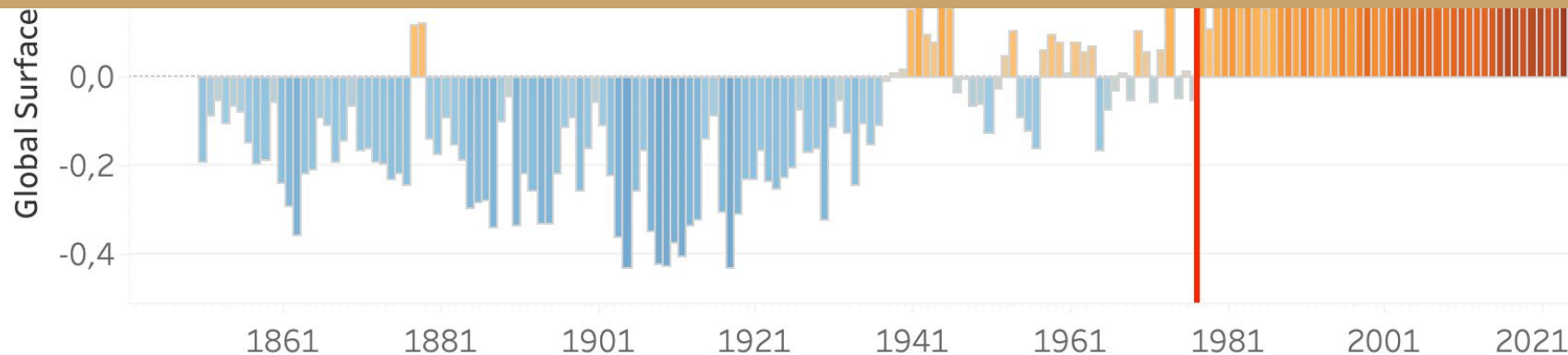
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A Worrying Situation: Global Warming Since 1977



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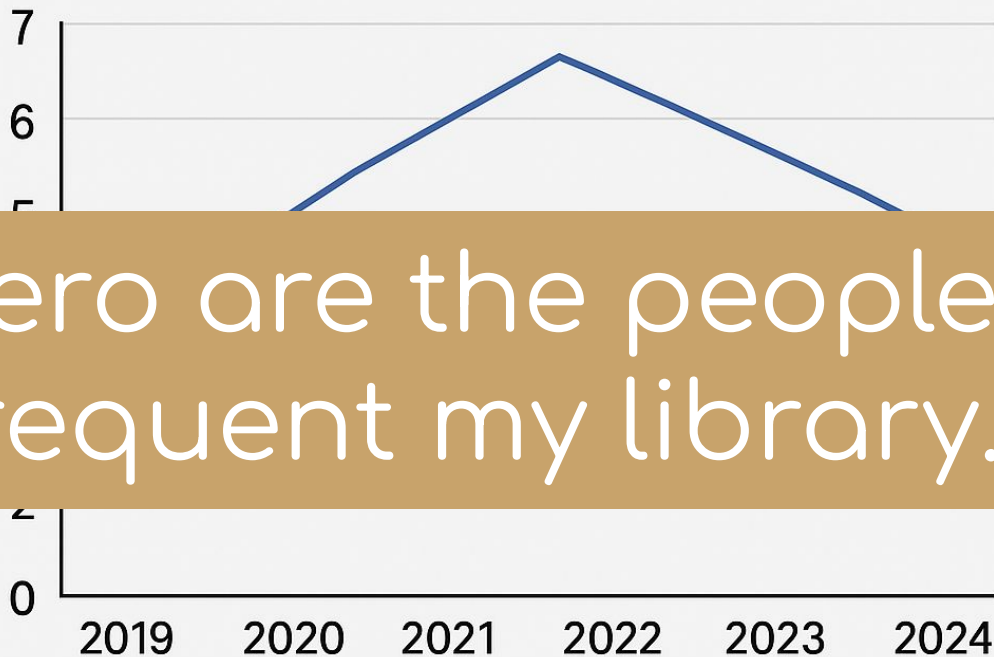
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Average Number of Books Read Per Person in My Library in a Year



The hero are the people who
frequent my library.

The Data-Hero Humanity Matrix

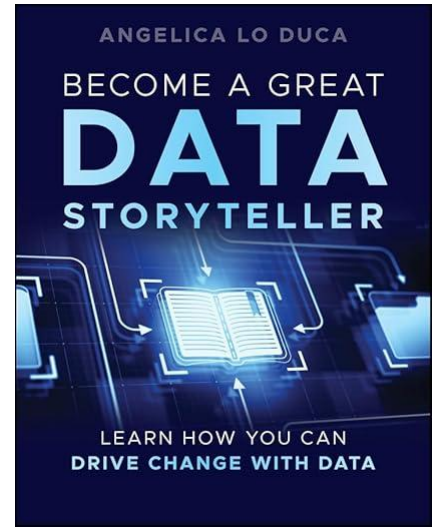
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Who specifically is the hero?
A single person?
A group of people?
An organization?

Use the Data-Hero-Concreteness
Matrix.



Every hero has a sidekick who reinforces the hero's presence.

The sidekick is the human case behind your data.

A Worrying Situation: Global Warming Since 1977

1,2

1977

A sidekick can be a climate change expert or your friend experiencing temperature changes (floods, too high temperatures,...)

-0,4

1861

1881

1901

1921

1941

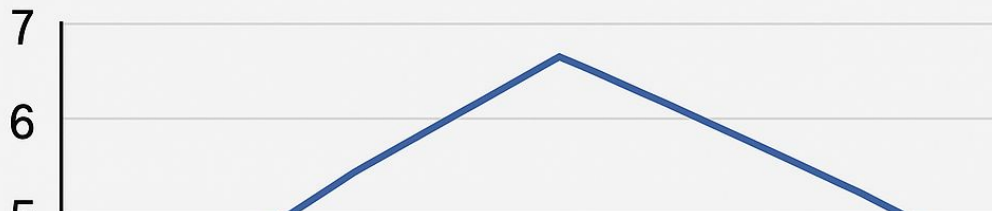
1961

1981

2001

2021

Average Number of Books Read Per Person in My Library in a Year



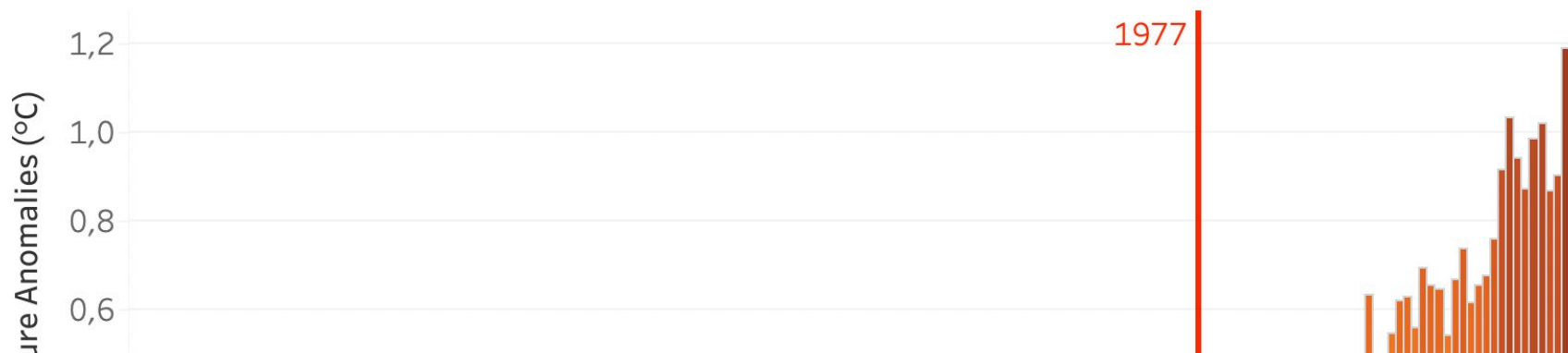
The sidekick could be a real reader who frequents the library.

2019 2020 2021 2022 2023 2024

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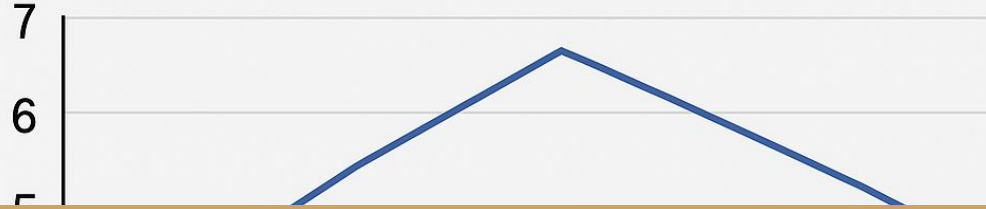
A Worrying Situation: Global Warming Since 1977



The object of desire is keeping temperature values constant over the years.



Average Number of Books Read Per Person in My Library in a Year



The object of desire is increasing the average number of read books per person.

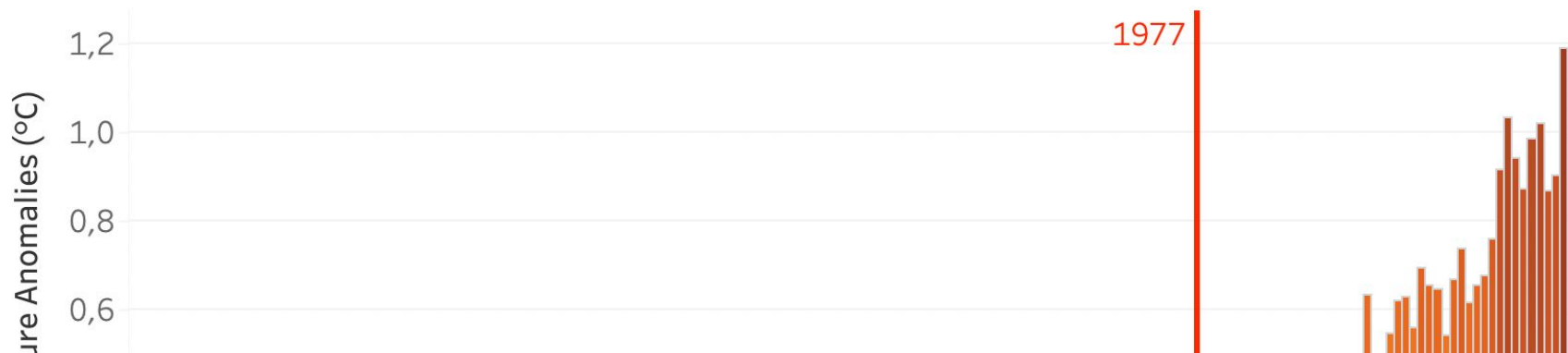
2019 2020 2021 2022 2023 2024

Every story is about
a hero wanting something (object of desire)
but a problem prevents them
from reaching it.

The problem is the **insight** extracted from your data.

The insight is what you have discovered analyzing your data.

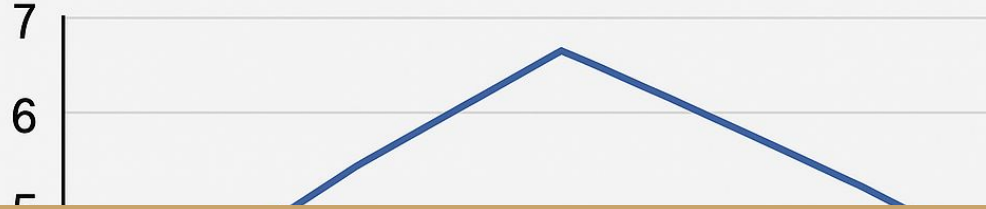
A Worrying Situation: Global Warming Since 1977



The problem is that the temperature is increasing over the years.



Average Number of Books Read Per Person in My Library in a Year

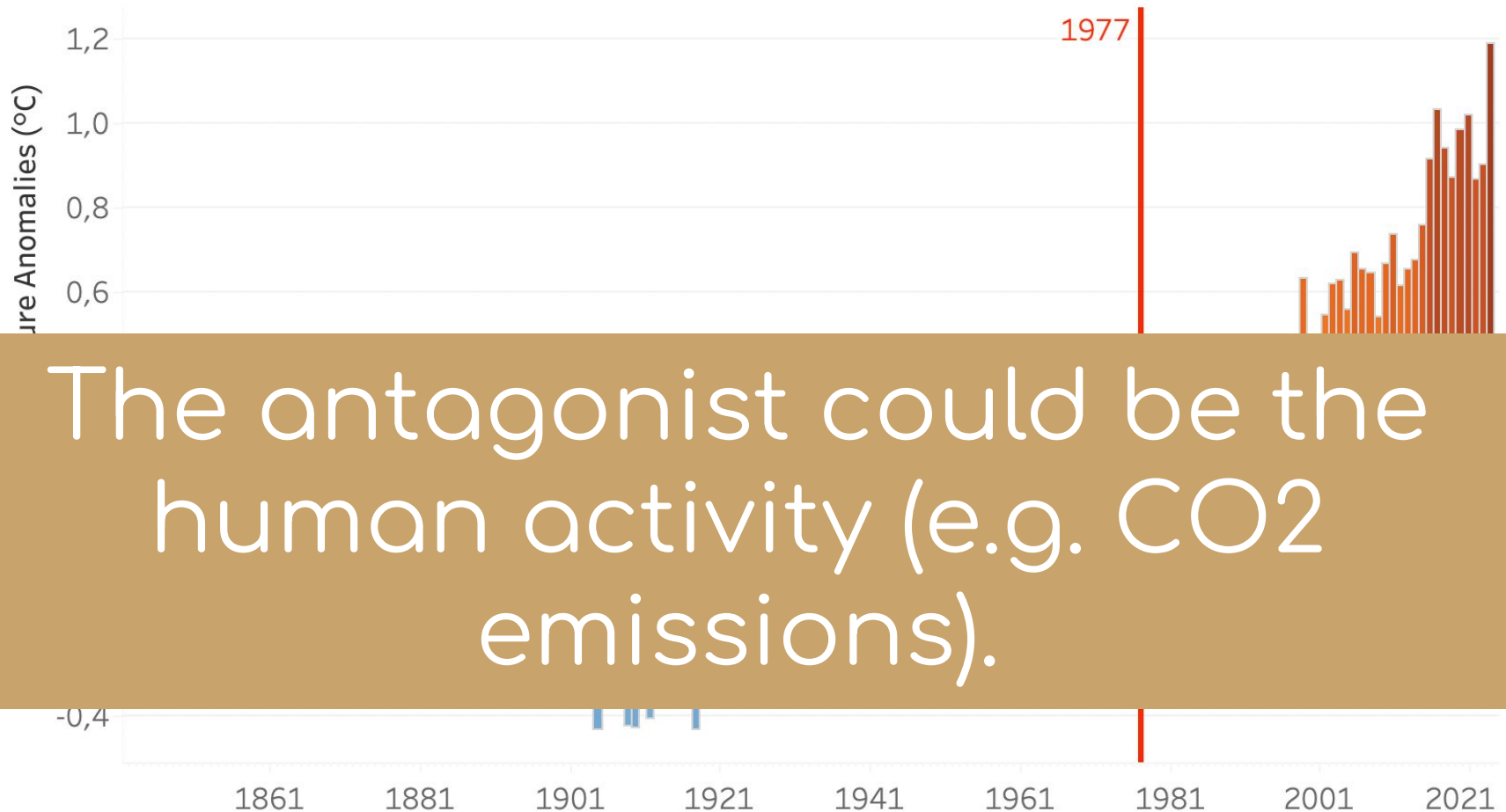


The problem is that since 2022 the average number of books read per person is decreasing.

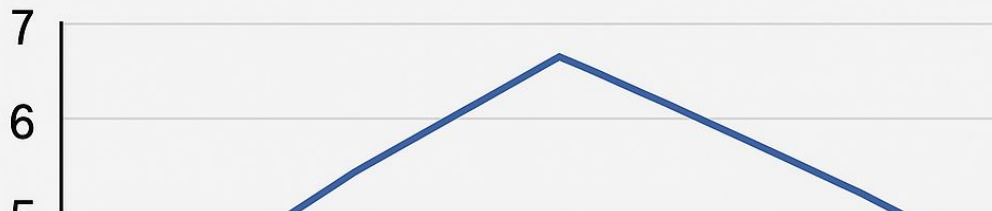
2019 2020 2021 2022 2023 2024

The problem is caused by the
antagonist.

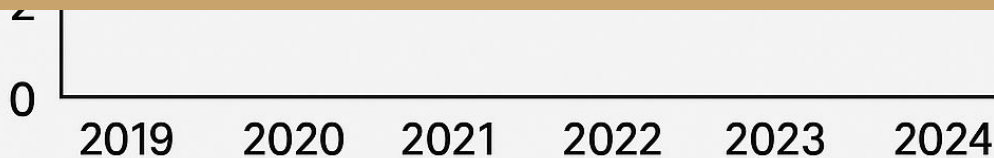
A Worrying Situation: Global Warming Since 1977



Average Number of Books Read Per Person in My Library in a Year



The antagonist could be a rising interest towards movies.



Structuring your data as a story
enables you to better understand your
data!

Hook

The opening moment in the story.

Hero

Present hero, their goals, and their object of desire.

Context

Describe where the hero lives.

Inciting Event

A turning point preparing the problem.

Buildup

Prepare the final pieces for the first plot point.

First Plot Point

Introduce the main problem the hero has.

First Act

Second Pinch Point

Reinforce the contrast between the hero and the antagonist.

Action

Describe how the antagonist causes the problem.

Second Plot Point

Show the contrast between the hero and the antagonist.

First Pinch Point

Present the antagonist.

Reaction

Reinforce the problem by showing the effects.

Second Act

**Dark Night or
Third Plot Point**
Knowledge

Climax

The moment where the hero's goal is met (or lost)

Next Steps
Objective

Third Act

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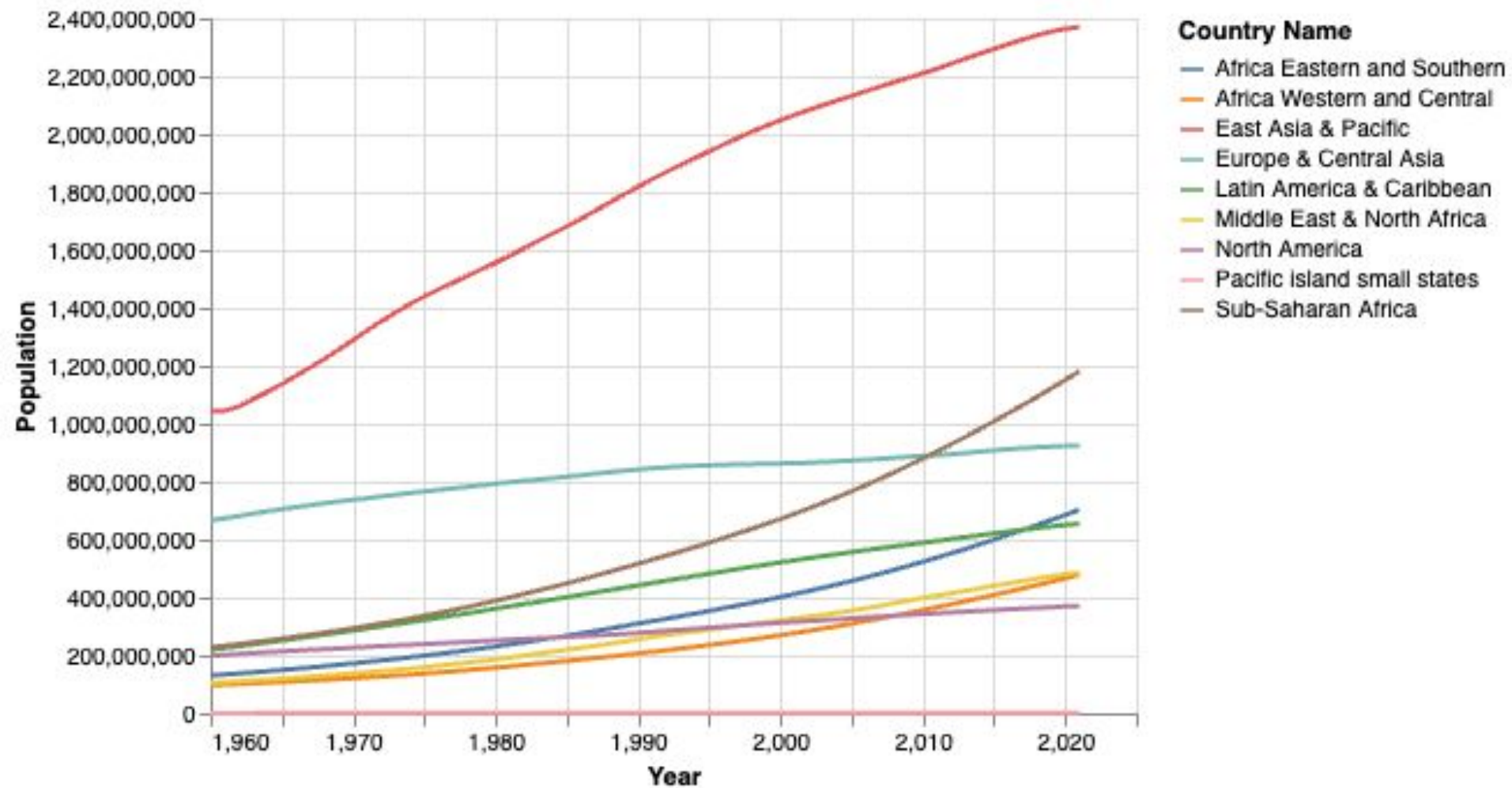
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Third Plot Point
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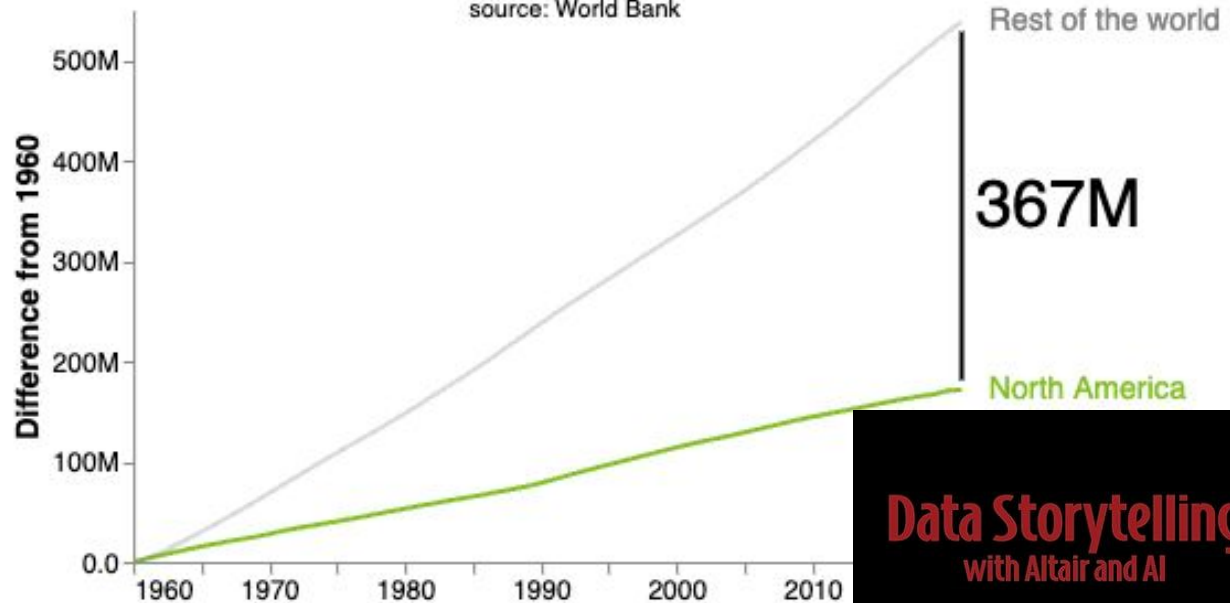
Third Act

If I had more time, I would have written
you a shorter letter. (Blaise Pascal)
Brevity takes time. (Matthew Dicks)



Population in North America over the last 50 years

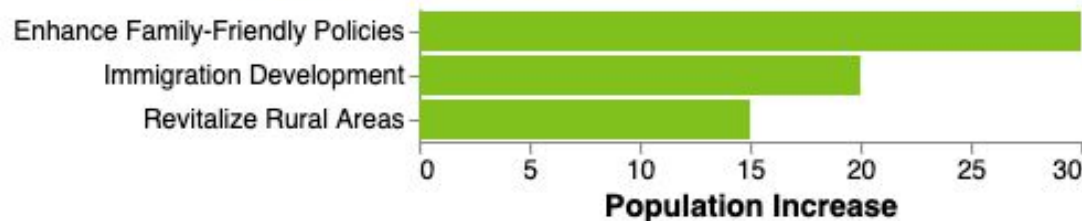
source: World Bank



Why this gap?

1. Lower Fertility Rate
2. Lower Immigration Rate
3. Higher Average Age

Strategies for population growth in North America

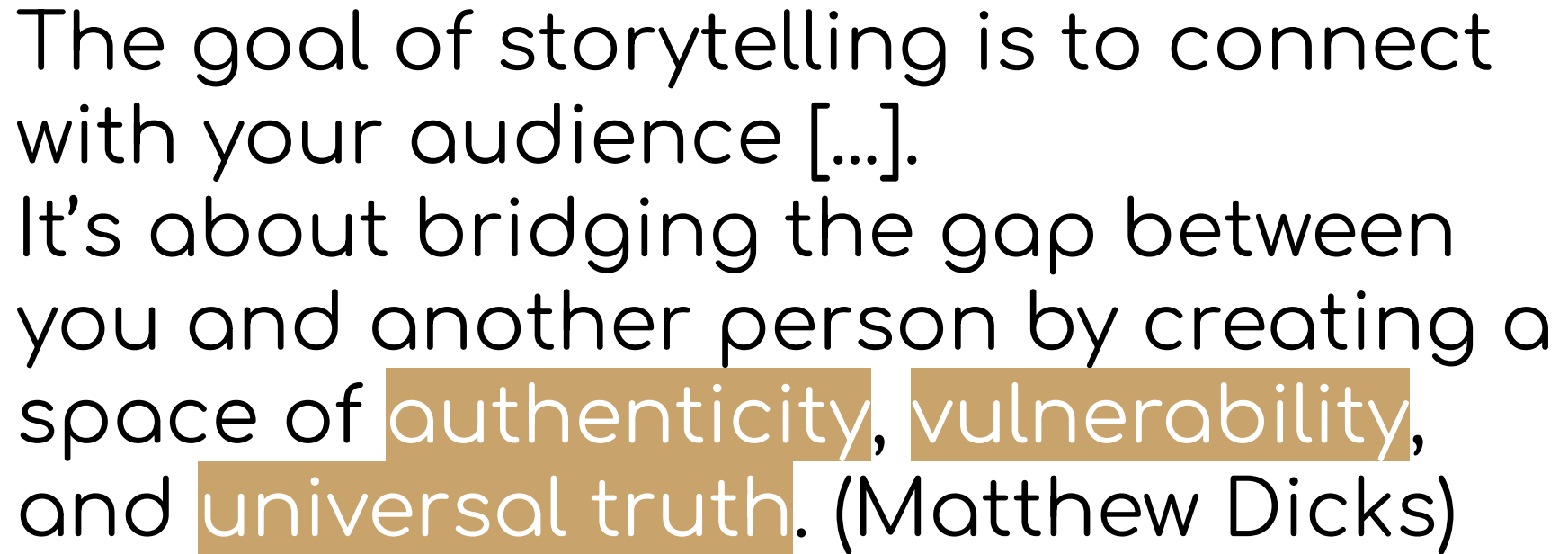


Data Storytelling with Altair and AI

Angelica Lo Duca

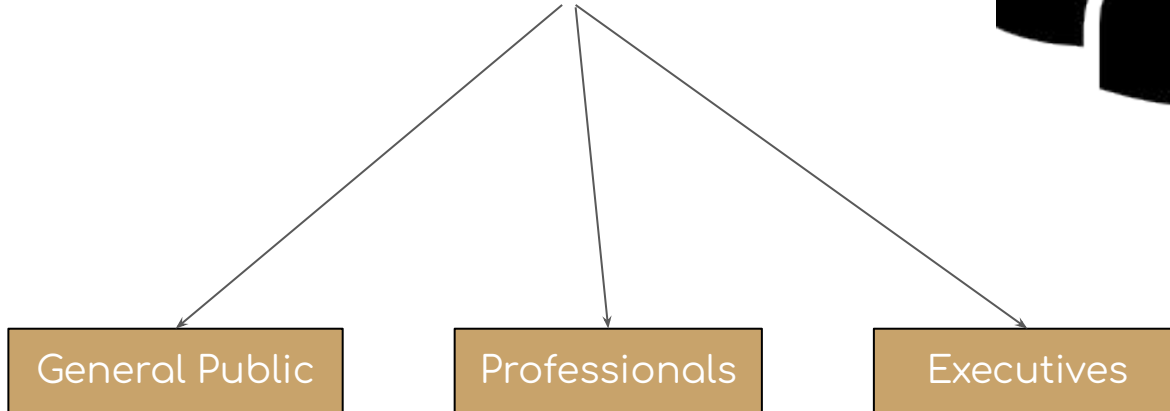
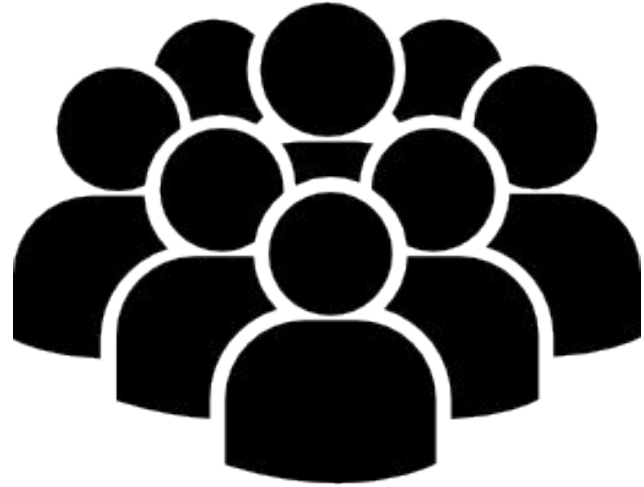


MANNING

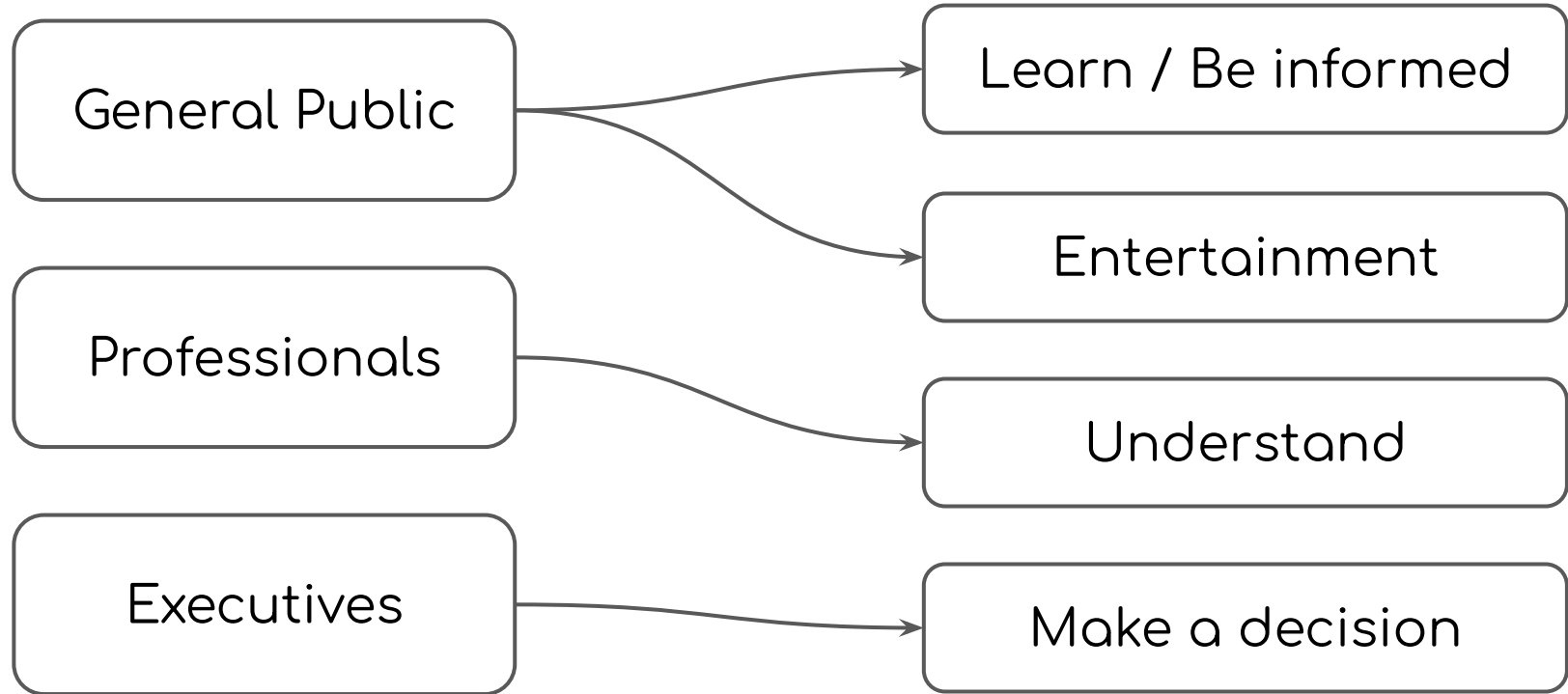


The goal of storytelling is to connect with your audience [...]. It's about bridging the gap between you and another person by creating a space of authenticity, vulnerability, and universal truth. (Matthew Dicks)

You always tell a story
to an audience



Each audience has a different goal



Based on your audience, you will choose an appropriate

Language and Tone

The set of words (language) and the emotional expression conveyed through them (tone)

Context

The level of details to add to your story, based on the cultural sensitivity of the audience

The story is always the same.
The way you convey it changes based
on the audience.

After the story is ended

And now? Leave a message for the audience

```
graph TD; A["And now? Leave a message for the audience"] --> B["Lesson learned"]; A --> C["Consequences of no action"]; A --> D["Next steps"];
```

Lesson learned

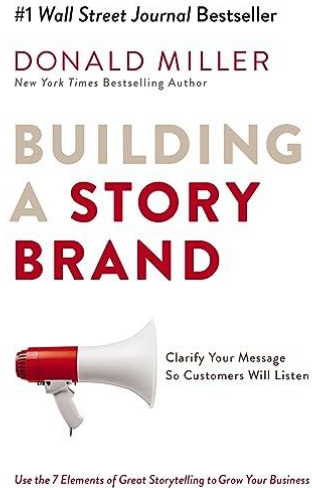
Consequences
of no action

Next steps

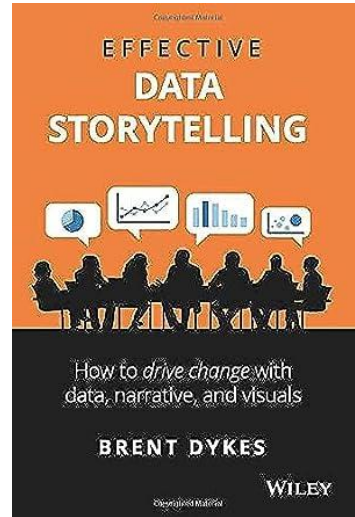
Next Step	Description	Purpose	Example
Ask for support	Ask the audience to support the story in some way	Leverage the audience's competencies to solve the problems highlighted in the story	Invite the audience to participate in a survey
Provide different options	Provide the audience with potential alternatives to proceed	Help the audience's decision-making process	A list of possible alternative next steps: A, B, C
Free interaction	Leave the audience the possibility to freely interact with the story	Let the audience analyze the data and draw conclusions	An interactive chart
Learn more	Encourage the audience to delve deeper into the topic or insights presented in the data story	Direct the audience to additional resources, articles, studies, or references for a more comprehensive understanding	A link to an in-depth analysis report
Propose a plan	Propose a plan outlining the sequence of actions to be taken	Let the audience continue working on the story after its end	A list of possible sequential next steps
Sharing	Encourage the audience to share the data story, for example, on their social networks	Leverage the audience's networks, foster discussions, and increase visibility to amplify the reach of the data story	Use social media buttons to share the story

Bibliography

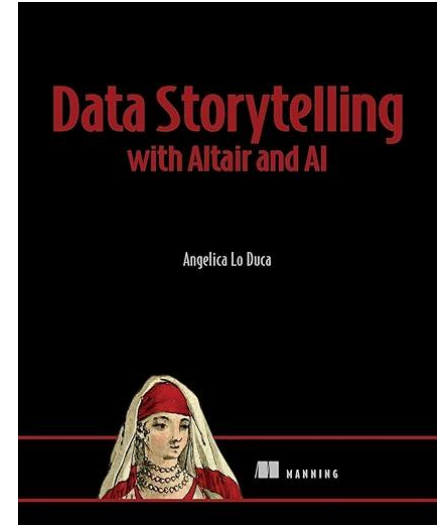
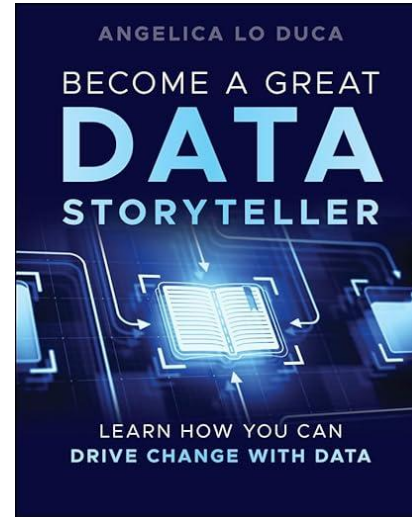
Books



Storytelling



Conceptual perspective



Technical perspective

Influencers



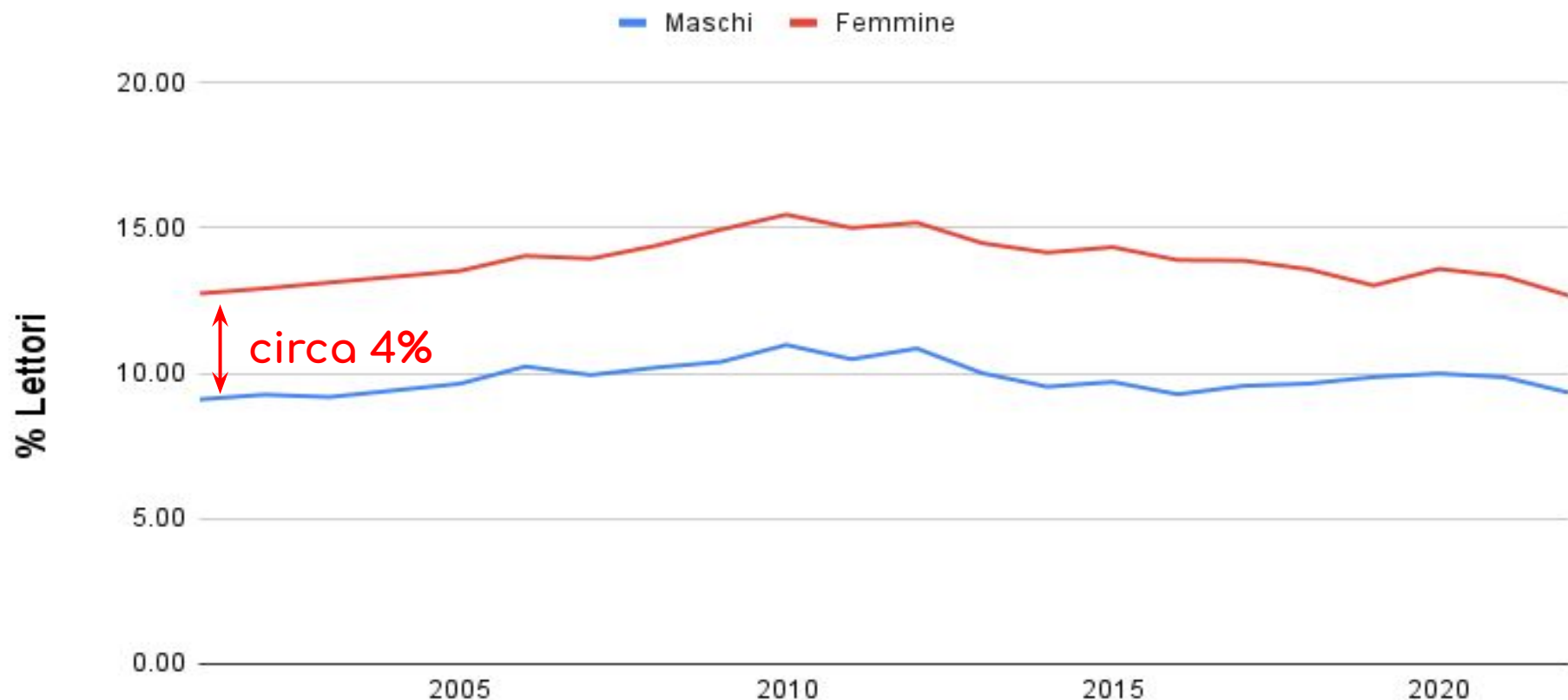
Brent Dykes



Salma Sultana

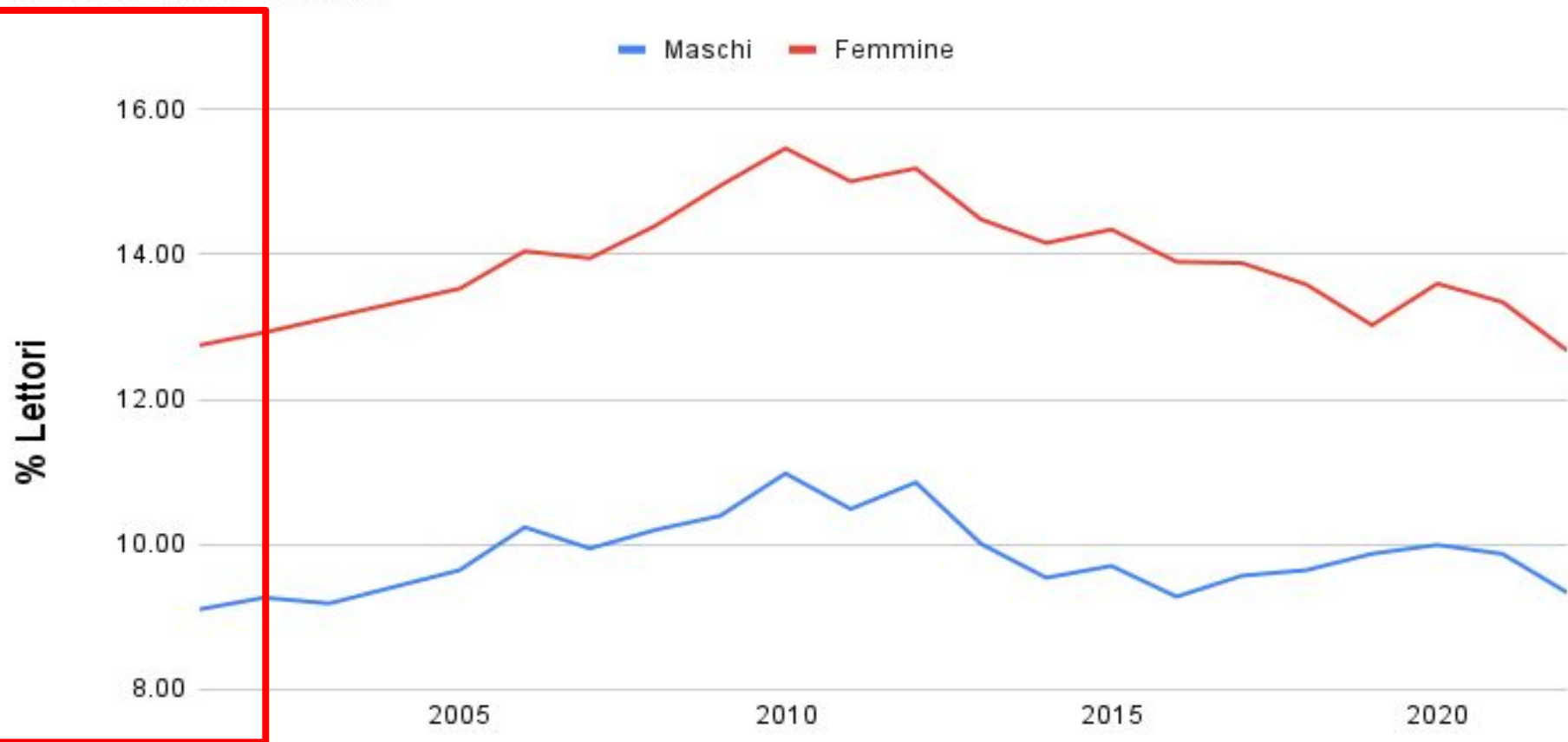
Manipolazione di dati

Percentuale di persone che hanno letto almeno un libro nell'ultimo anno



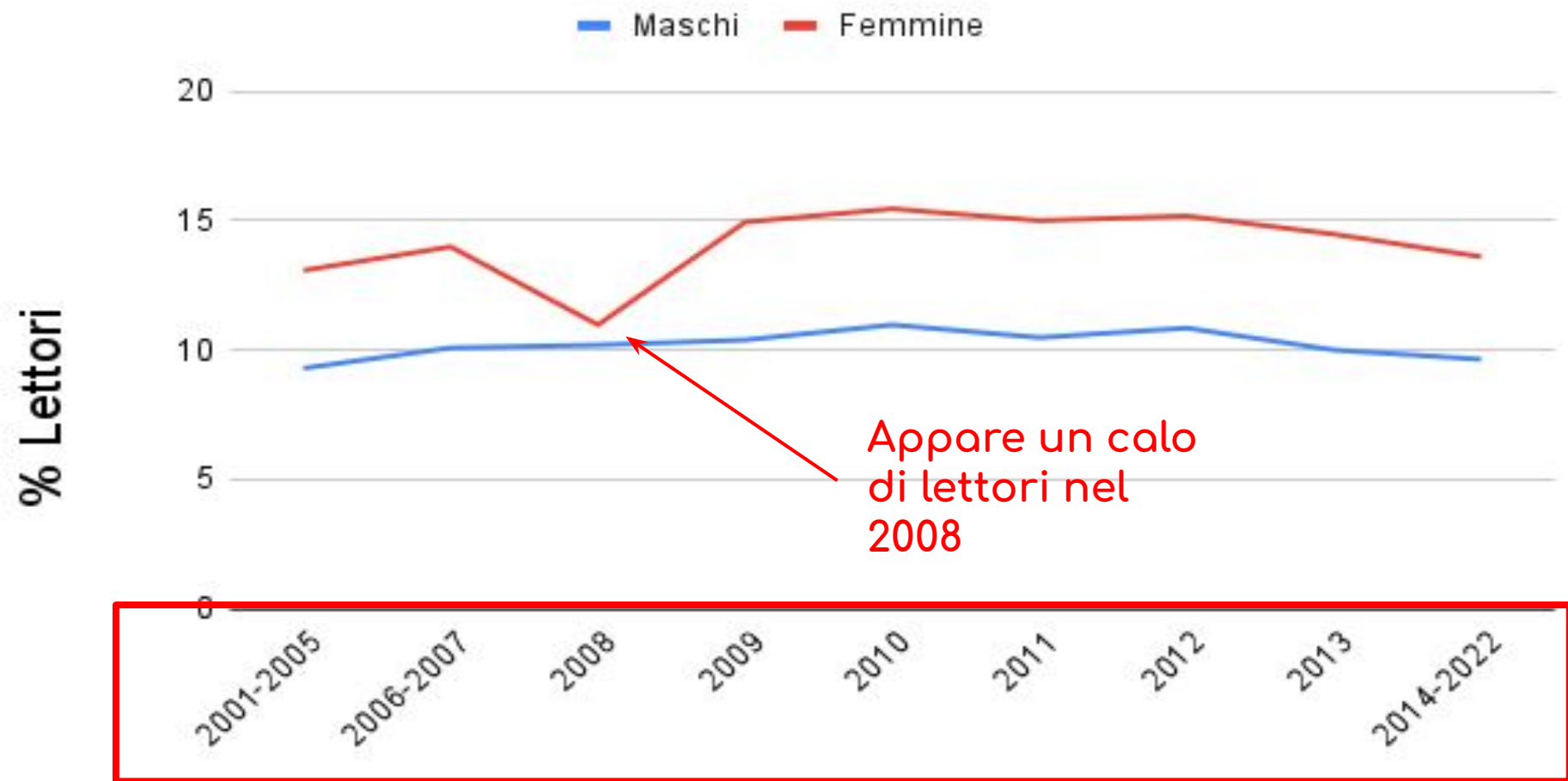
Leggere è da femmine? No,
ma i numeri dicono che loro
leggono di più.

Percentuale di persone che hanno letto almeno un libro nell'ultimo anno



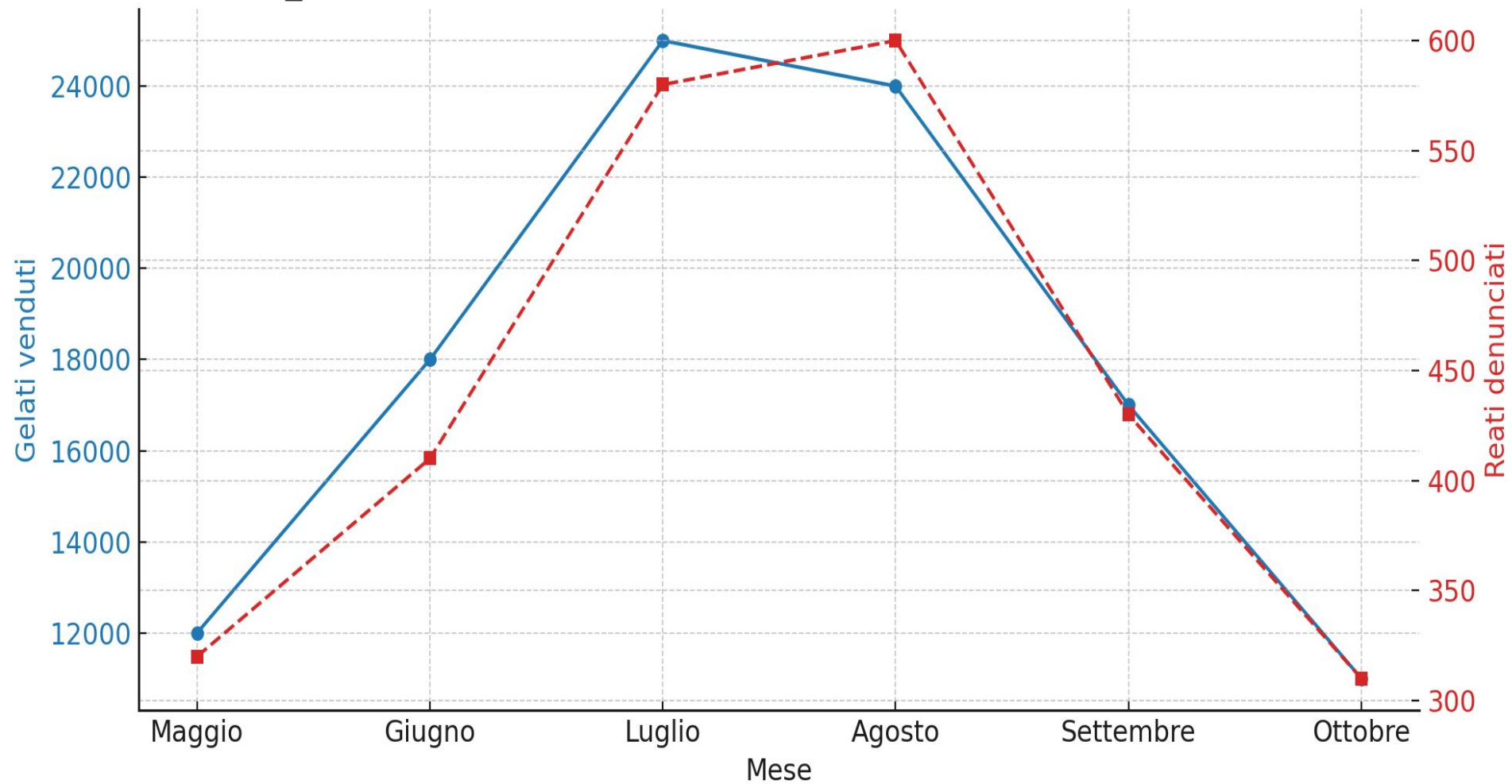
Leggere è da femmine: i numeri dicono che loro leggono molto di più.

Percentuale di persone che hanno letto almeno un



Il misterioso crollo del 2008:
quando i libri sparirono
dagli zaini

□ Più Gelati = Più Crimini? Coincidenza o verità scomoda?



Nei mesi in cui il consumo di gelato
aumenta... aumentano anche i reati.
Coincidenza? O il gelato rende le
persone più aggressive?

🔥 Più Gelati = Più Crimini?

Coincidenza o verità scomoda?

D'estate aumentano le vendite di gelato...

E aumentano anche i reati!

Quindi... forse il gelato provoca la criminalità? 🤔

Questo grafico è visivamente credibile, ma in realtà sfrutta una relazione apparente (correlazione spuria):

il vero fattore comune è l'estate!

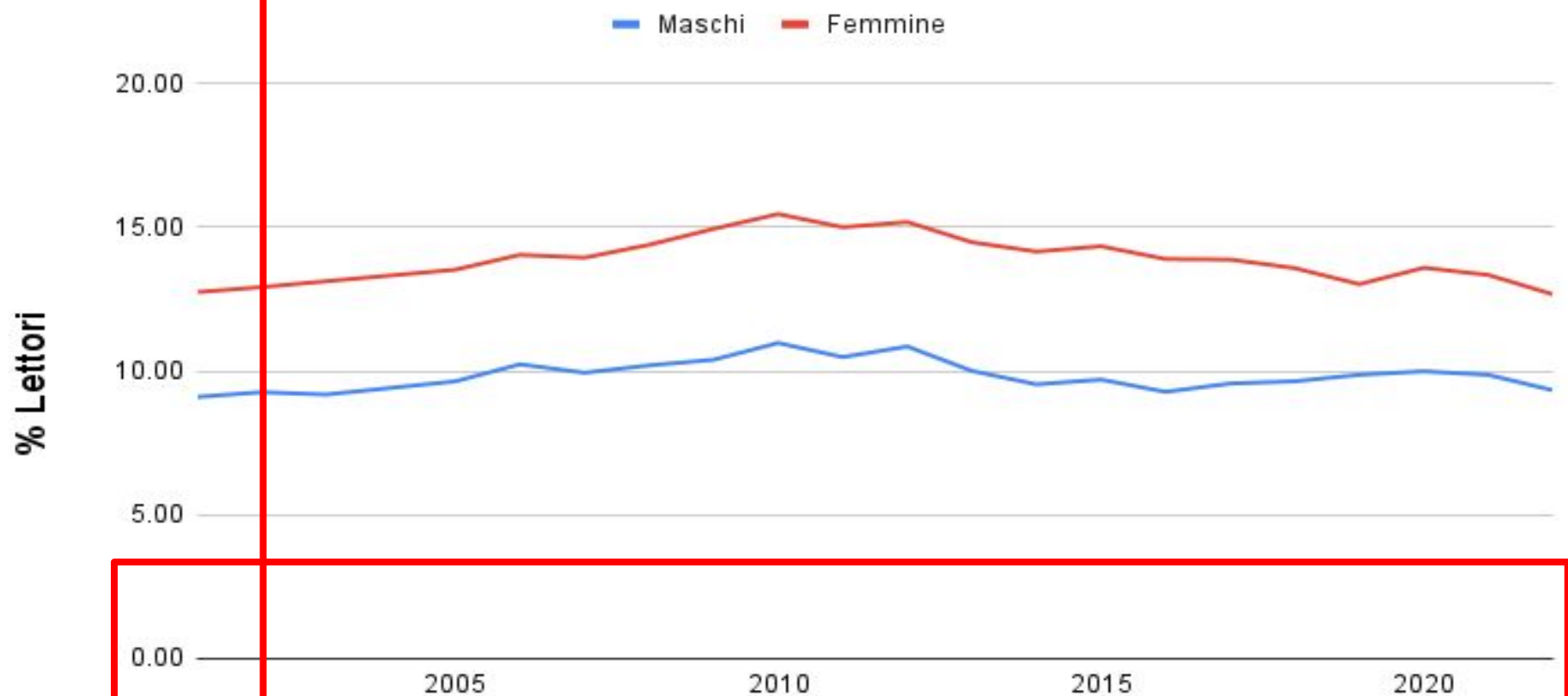
Fa caldo → più persone comprano gelati

Fa caldo → più persone sono in giro → più occasioni per commettere reati

ATTENZIONE!

I dati possono essere
raccontati in modo distorto!

Percentuale di persone che hanno letto almeno un libro nell'ultimo anno



New Hires' Psychological Safety Fades over Time

In a study of some 10,000 employees in a large U.S. organization, people who'd just joined the firm experienced higher psychological safety than their veteran colleagues but soon lost it.

Psychological safety (5: high, 1: low)
by length of service



La sicurezza psicologica dei nuovi assunti svanisce nel tempo

In uno studio condotto su circa 10.000 dipendenti di una grande organizzazione statunitense, le persone che si erano appena unite all'azienda hanno sperimentato un livello di sicurezza psicologica più alto rispetto ai colleghi veterani, ma lo hanno perso rapidamente.

Sicurezza psicologica (5: alta, 1: bassa) in base all'anzianità di servizio

Source: Harvard Business Review, January 2025, pp. 22.

Percentuale di persone che hanno letto almeno un libro nell'ultimo anno

