

# Un vaccino contro la disinformazione

Andrea.Negri@unipv.it

Pavia, 11 Giugno 2024



# Quiz



# Wooclap



1

Go to [wooclap.com](https://wooclap.com)

2

Enter the event code in the top banner

Event code  
**OZJGUS**

# Q: Radioattivo

Quali di questi è **radioattivo**?

- A. L'uranio
- B. Paolo Montagna
- C. Una banana
- D. Il caffè

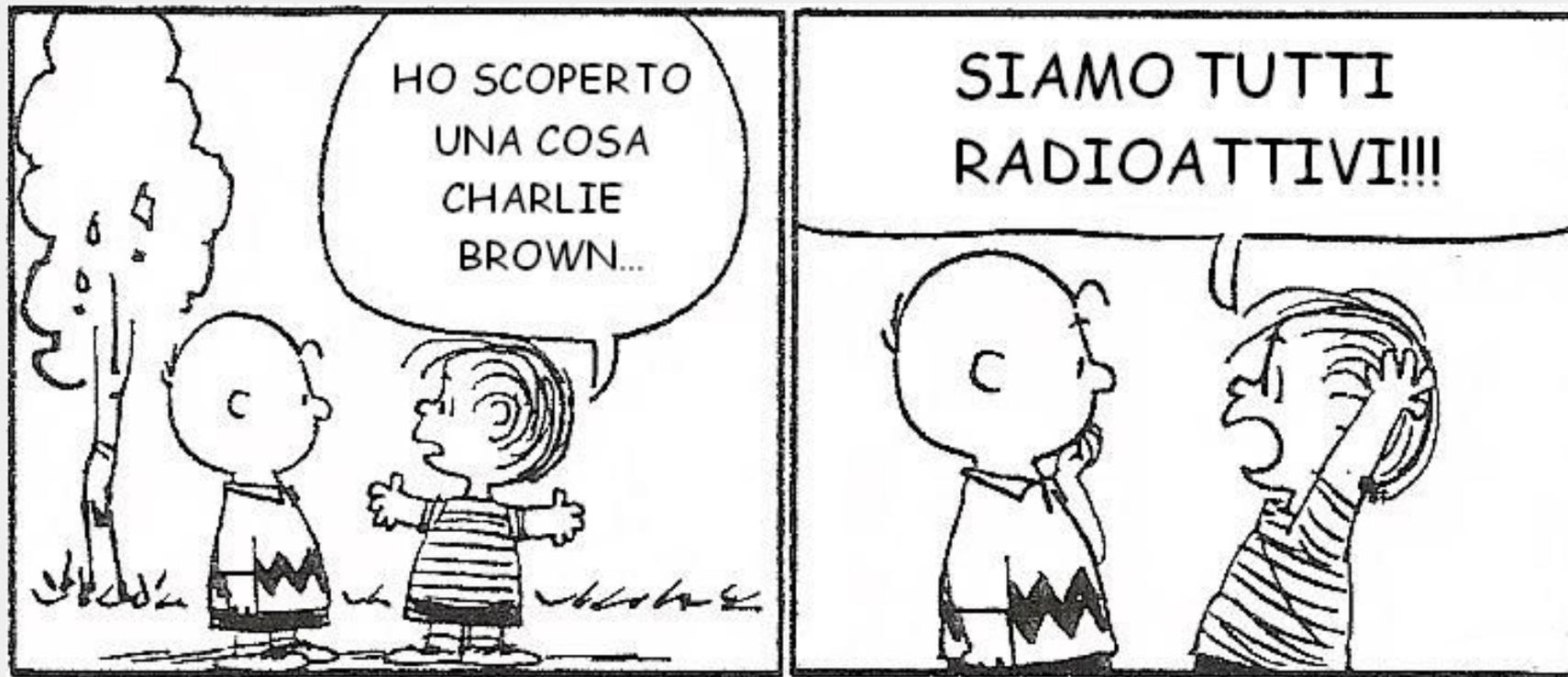


# Q: Radioattivo

Quali di questi è **radioattivo**? **Tutti**

- |                   |                |
|-------------------|----------------|
| A. L'uranio       | 25000000 Bq/kg |
| B. Paolo Montagna | 100 Bq/kg      |
| C. Una banana     | 100 Bq/kg      |
| D. Il caffè       | 1000 Bq/kg     |

# Tutto è radioattivo



# Q: Radioattività e ambientale

Chi è **responsabile** della radioattività ambientale?

- A. Paolo Montagna
- B. Chernobyl e Fukushima
- C. Radionuclidi in fisica sanitaria
- D. Collassi gravitazionali dovuti all'esaurimento di fonti termonucleari





D. Collapsi gravitazionali dovuti  
all'esaurimento di fonti termonucleari

# Q: candidato presidente USA

Per ottenere la licenza di commercializzazione, l'**etanolo** deve passare un test di **radioattività**. Il numero di disintegrazioni radioattive misurate per ogni litro deve essere

- A. Zero
- B. Meno di 12 per minuto
- C. Più di 4000 per minuto



# Q: candidato presidente USA

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## Q: Alimenti

La pasta italiana

- A. E' un prodotto OGM
- B. E' fatta da grano ottenuto per esposizione a radiazioni ionizzanti
- C. E' un prodotto naturale



# Q: Alimenti

La pasta italiana

- A. **E' un prodotto OGM**
- B. **E' fatta da grano ottenuto per esposizione a radiazioni ionizzanti**
- C. E' un prodotto naturale



## Q: pericolosità delle fonti

Statisticamente, qual è la fonte energetica responsabile del maggior numero di **vittime** per kWh prodotto?

- A. Il nucleare
- B. Il gas naturale
- C. Il carbone (le fonti fossili)
- D. L'idroelettrico



## Q: pericolosità delle fonti

Statisticamente, qual è la fonte energetica responsabile del maggior numero di **vittime** per kWh prodotto?

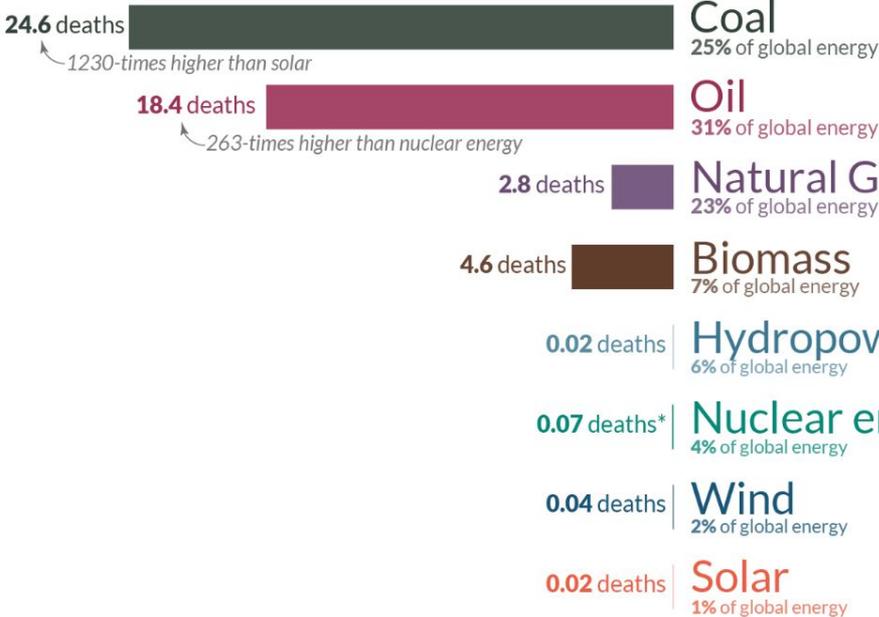
- A. Il nucleare
- B. Il gas naturale
- C. Il carbone (le fonti fossili)**
- D. L'idroelettrico



# What are the **safest** and **cleanest** sources of energy?

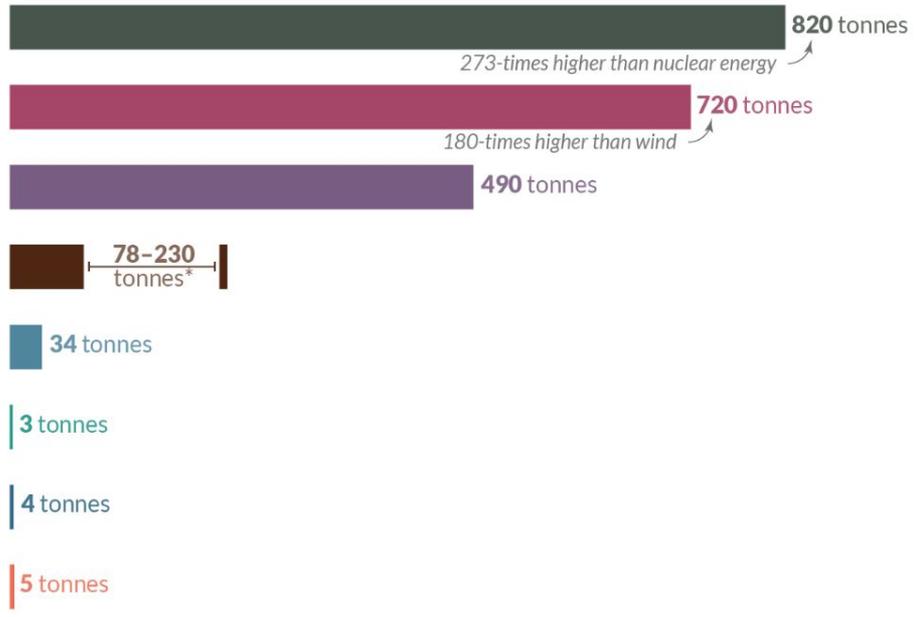
## Death rate from accidents and air pollution

Measured as deaths per terawatt-hour of energy production.  
1 terawatt-hour is the annual energy consumption of 27,000 people in the EU.



## Greenhouse gas emissions

Measured in emissions of CO<sub>2</sub>-equivalents per gigawatt-hour of electricity over the lifecycle of the power plant.  
1 gigawatt-hour is the annual electricity consumption of 160 people in the EU.

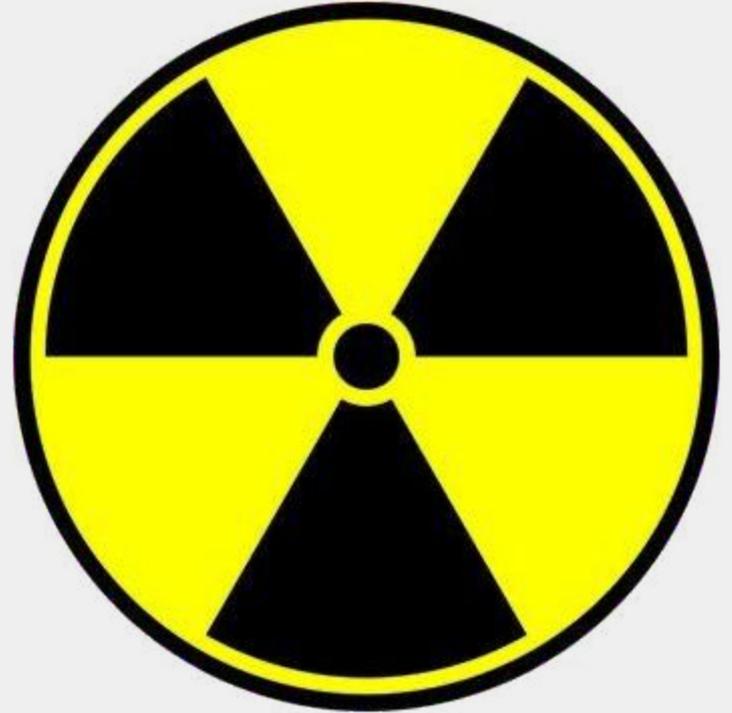


\*Life-cycle emissions from biomass vary significantly depending on fuel (e.g. crop residues vs. forestry) and the treatment of biogenic sources.  
\*The death rate for nuclear energy includes deaths from the Fukushima and Chernobyl disasters as well as the deaths from occupational accidents (largely mining and milling).  
Energy shares refer to 2019 and are shown in primary energy substitution equivalents to correct for inefficiencies of fossil fuel combustion. Traditional biomass is taken into account.

## Q: Scorie

Se usassi per tutta la mia vita solo energia **nucleare** produrrei una quantità di **scorie** a lunga durata pari a

- A. Una lattina di birra
- B. Un Paolo Montagna
- C. Una stanza d'hotel
- D. Un vagone ferroviario



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**Q: Uomo e natura**

Dove è stata scattata  
questa foto del 2016?

- A. Yellowstone
- B. Chernobyl
- C. Parco del Ticino



## Q: Uomo e natura

Dove è stata scattata questa foto del 2016?

- A. Yellowstone
- B. **Chernobyl**
- C. Parco del Ticino



# Q: Tecniche diagnostiche

Qual è più sicura per la salute?

- A. **T**omografia  
**A**ssiale  
**C**omputerizzata
- B. **R**isonanza  
**M**agnetica  
**N**ucleare



# Q: Tecniche diagnostiche

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Assiale  
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# Parole tabù

- **Nucleare**
  - Utilizzata per creare **paura**
  - Un modo sicuro per perdere voti
- **Radiazioni**
  - Che sono ovunque
  - E spesso utili



# Parole tabù

- **Nucleare**

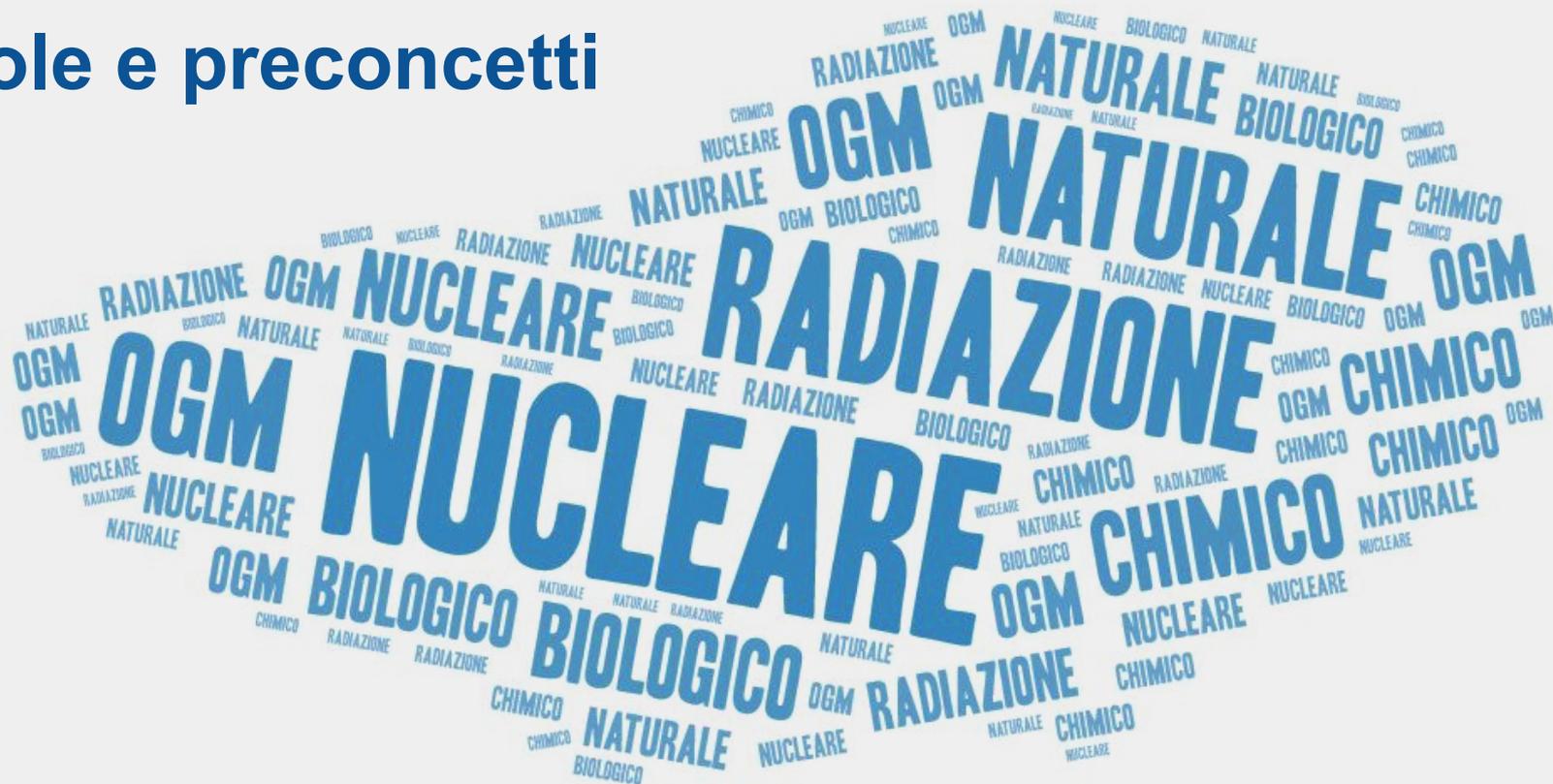
- Utilizzata per creare **paura**
- Un modo sicuro per perdere voti

- **Radiazioni**

- Che sono ovunque
- E spesso utili



# Parole e preconcetti



**Parole** che segnalano **preconcetti** sedimentati nella nostra mente

- Dovuti all'ecosistema informativo

# Parole e preconcetti

- La parola **naturale** è associata a “buono”
  - Ma la natura non è né buona né cattiva
    - Biologicamente @FB
- E tutto è natura
  - vs antropocentrismo



# Parole e preconcetti

- La parola **biologico** è associata a “sano” e “sicuro”
  - Ma è solo un’operazione di marketing per far pagare più caro un prodotto come gli altri
- NB: per definizione tutto è biologico
  - Appropriazione indebita di una parola

ARMATI

ELENA CATTANEO DI

SCIENZA



# Parole e preconcetti

- La parola **OGM** è ostracizzata
  - Ma gli organismi geneticamente modificati sono **meno** tossici dei cosiddetti “biologici”
- La parola **chimica** ha assunto connotati negativi
  - Ma l’acqua è un elemento chimico

Podcast de **il Post**: “*Ci vuole una scienza*”

**DARIO BRESSANINI**  
**BEATRICE MAUTINO**

**CONTRO  
NATURA**



Dagli OGM al “bio”, falsi allarmi e verità nascoste del cibo che portiamo in tavola

Rizzoli

# Preconcetti antiscientifici

- Società italiana storicamente **antiscientifica**
  - G. Gentile, B. Croce, ecc
  - La chiesa e il PCI
  - ...
- Comunicazione e propaganda
  - Informazione e disinformazione
  - Fake news



# Fake News

**Narrazioni** non conformi ai fatti,  
che si diffondono in modo **virale**,  
sfruttando i **pregiudizi** cognitivi  
tipici degli umani



# Fake News



Rob Brotherton,  
*Menti Sospettose*

**Fabbricate** ad arte od **emergenti**

Sono **sempre** esistite

**Resilienti** alle prove (debunking)



637 e 31  
Da sempre

Великое

ВЪ МАЛОМЪ

И

АНТИХРИСТЪ,

какъ близкая политическая возможность.

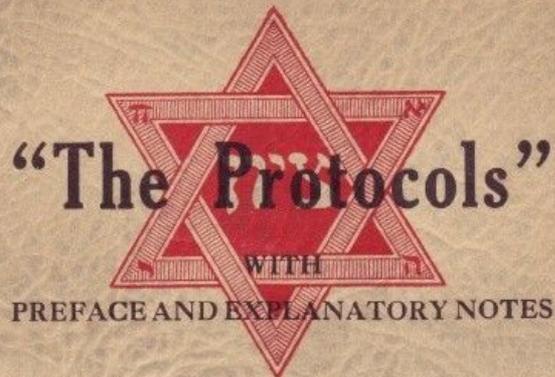
ЗАПИСКИ ПРАВОСЛАВНАГО.

(ИЗДАНИЕ ВТОРОЕ, ИСПРАВЛЕННОЕ И ДОПОЛНЕННОЕ).

ЦАРСКОЕ СЕЛО.

Типография Царскосельскаго Императора Краснаго Креста.

1908



The possession of these documents  
in Soviet Russia is punishable  
by immediate death.  
WHY?

EVERY PATRIOTIC AMERICAN  
MUST READ THESE  
PROTOCOLS

Issued by

THE PATRIOTIC PUBLISHING CO.  
(NOT INCORPORATED)

P. O. Box 526

Chicago, Ill.

L'INTERNAZIONALE EBRAICA

“PROTOCOLLI”  
DEI  
“SAVI ANZIANI” DI SION

VERSIONE ITALIANA  
CON APPENDICE E INTRODUZIONE

Quinta edizione

ROMA  
“LA VITA ITALIANA”  
RABBONA MENSILE DI POLITICA  
Direttore GIOVANNI PREZIOSI

SUNDAY, SEPTEMBER 1921

IX

# PROOF THAT THE "JEWISH PROTOCOLS" WERE FORGED

## London Times Publishes an Exposure Showing How They Are a Paraphrase of a French Book Attacking Governmental Abuses Under Napoleon III., Published in 1865

### *Collapse of the Charges, Originating in Russia and Spread Broadcast, That Jews Plotted to Seize World Power*

By the Constantinian Correspondent of the London Times.

NEWARK, N. J., in the United States, by The New York Times Company.

THESE is one thing about Constantinian proof that is worth you wide to remember," said a diplomat to the writer in 1908. "If you stay here long enough, you will meet many such matters, and you may find the key to many strange secrets." Yet I must confess that when the diary which is the basis of these articles was communicated to me I was at first incredulous. Mr. X, who brought me the evidence, was convinced. "I read this book through," he said, "and you will find irrefutable proof that the 'Protocols of the Learned Elders of Zion' is a forgery."

Mr. X, who does not wish his real name to be known, is a Russian born, well-to-do English connections. Orthodox by religion, he is in political opinion a Constitutional Monarchist. He came here as a refugee after the fall

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In the first of "Genera Dialogue" Montesquieu is given a chance of argument, of which he avails himself. In the seventh dialogue, which corresponds to the fifth, sixth, seventh, and part of the eighth "Protocols," he gives Machiavelli a lesson in despatch at length how he would solve the problem of stabilizing political societies "necessarily disturbed by the spirit of activity and revolution." Montesquieu's Machiavelli, or in reality Napoleon III., speaking through Machiavelli, has the word of the dialogue. Montesquieu's conclusions there become more and more explicit, and he is profoundly shocked by Machiavelli's Napoleonic doctrine of an able and ruthless despotism, but

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### Story of How the "Protocols" Were Spread Here and Abroad

ON Aug. 15, 17 and 18 the London Times published the accompanying exposure of how the "Jewish Protocols" were a paraphrase of an old French book. The writer of the exposure is the newspaper's Constantinian correspondent. The reported story of the book is forwarded to the London Times.

Investigation disclosed that a complete copy was in the British Museum. It is entitled "Discourses and Exorts unto Machiavel of Montesquieu, in a Political Dialogue, on the Principles of the Government of the French Nation, by a Constantinian." (Discourses in 1864 between Montesquieu and Machiavelli, or the History of the Government of the French Nation, by a Constantinian.) This copy of the book was published at Brussels in 1865. Its author was discovered to be Maurice Joly, a Paris lawyer and politician, who shortly after its publication was arrested by the Police of Napoleon III., against whose administration the book was said to have been directed, and sentenced to eighteen months' imprisonment.

As far as is known, the "Protocols" were first published in 1902 at Tver in the Russian book entitled "The Great in the East," written by Baron Nihil, originally described as a well-known Russian author, a member of the Holy Synod, and a member of the Duma, or Imperial Political Council.

Later in the year a Russian publisher used the text of the Russian 1902 edition, and a New York book publisher used a fresh translation from the same edition. Late last year there was published both in London and New York a book called "The Cause of the World's Catastrophe" based on the "Protocols" and attempting to show how a great world conspiracy had been developed and was being carried out by Freemasonry, by Sublimism, and by other secret societies.

Before this, however, at least three typewritten copies of the "Protocols" had been obtained in America, together with notes in various hands and with newspaper clippings intended to establish the existence of a Jewish conspiracy for world-domination. These notes were added to the British Museum as evidence of this existence.

On the European Continent the "Protocols" were invariably made from the first Russian edition. They were sold by publishers and editors to spread the matter, and they were intended to make of the document. In Germany it was frankly anti-Semitic propaganda, in France the anti-Semitism was stragglingly embodied by anti-Machiavelli and anti-Constantinianism.

In Mr. Joly's comments there are at least three expressions as to how he came into possession of the "Protocols" four years before he published them. One statement, Theodore Herzl stated that certain confidential informants, not of standing the admission, had not been kept secret, and had been given undesirable publicity.

The summaries as plain. Yet, everybody knows, who would anything about Herzl and those who gathered with him at the Swiss town in 1895, that they were out of the staff conspirators and made of. There was no Council of Elders, no confidential informants, no admission for secrecy.

It was discovered a year ago that the "Protocols" have a striking resemblance to a chapter entitled "In the Jewish Cemetery of Prague," to be found in a novel of several volumes called "Merrill," the writing and publication of which were begun in 1865 and were continued for ten years. The author was Hermann Goedsche, formerly in the Prussian postal service, who he also acted as a spy for the Royal Police and the Royal East Prussian party. He had been charged with subversion of Germany in connection with the Franco-German war and had been dismissed from office. This Goedsche also wrote under the pseudonym "de Jahn Mollath," and it is that name which is attached to most of his books. In "Merrill" there is a twilight gathering in the Prague cemetery of the Elders of the Temple, their who are represented as coming from all parts of the world to report on the progress and out-

come of a striking resemblance to the "Protocols" was Reflections of a Russian Statesman," by M. Polyanski, the Professor of the Holy Synod. Machiavelli's "Prince" was also shown to have made its contribution. All the evidence collected to regulate the authenticity of the "Protocols," as Joly appended them at length, permitted students of forged documents to make this hypothesis. That they had been fabricated from several sources with the intention of furthering anti-Semitic propaganda in Russia, and at the same time with the idea of exhibiting the anti-Semitic papers of the Com, as the one man who could save the world from the "Jewish Plot."

And now that most formidable piece of reputation has come to light in the shape of St. Joly's authentic disclosure, it appears to be the main basis of the forgery on which was based, material from other sources, together with a certain amount of original matter concocted by the forger with the idea of bringing the whole matter up to date.

It will be observed that the Constantinian correspondent accounts for the presence of the July Book in Russia, where he imagines the "Protocols" were put together, Princess Catherine Radzivil, in the American Edition of Feb. 25, 1902, has another explanation. In

which story? Theodore Herzl is dead; Bismarck is dead, and where are the signatures of the Jewish representatives of the Holy Synod? Turning to the text of the Protocols, and comparing it with that of the Geneva Dialogue, one is struck by the absence of any effort on the part of the plagiarist to conceal his plagiarism. The paraphrasing has been very careless; parts of sentences, whole phrases at times, are identical; the development of the thought is the same; there has been no attempt worth mentioning to alter the order of the Geneva Dialogue. The plagiarist has introduced Darwin, Marx and Nietzsche in one passage in order to "up to date"; he has given a Jewish name "Machiavelli" a sentence for distasteful, but he has utterly failed to conceal his indebtedness to the Geneva Dialogue. This gives the impression that the real writer of the Protocols, who does not seem to have had anything to do with Joly and may have been some quite unimportant Parisian writer employed by the Court or by the Duma, was obliged to paraphrase the original at short notice. A proof of Jewish conspiracy was required at once as a weapon for the Conservatives against the Liberal elements in Russia.

Mr. X, the discoverer of the Protocols, informs me that the plagiarist, shortly after their discovery in 1901, four years before their publication by Vladimir Nihil, served a similar ruler in the place of Machiavelli-Napoleon III., and the British paper (Globe) substituted for the whole masses, "stripped in a vice by poverty, hidden by semi-darkness, surrounded by darkness," when Machiavelli intends to win!

The questions now arise, how did

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# Fake News



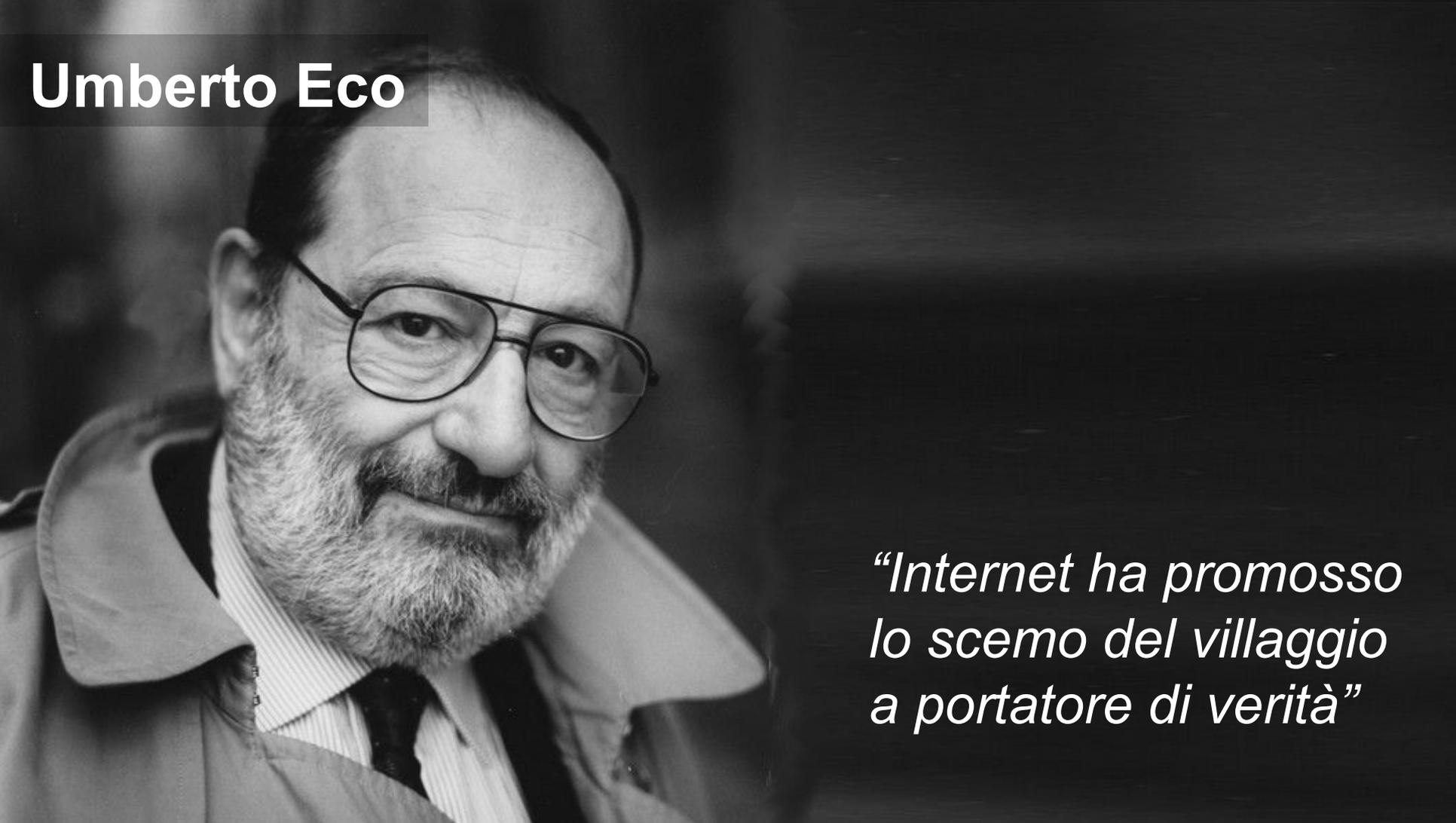
Rob Brotherton,  
*Menti Sospettose*

**Fabbricate** ad arte od **emergenti**

Sono **sempre** esistite → la **rete**

**Resilienti** alle prove (debunking)



A black and white portrait of Umberto Eco, an elderly man with a full beard and glasses, wearing a trench coat over a striped shirt and tie. He is looking slightly to the right of the camera with a thoughtful expression. The background is dark and out of focus.

**Umberto Eco**

*“Internet ha promosso  
lo scemo del villaggio  
a portatore di verità”*

A black and white portrait of Umberto Eco, an elderly man with a full beard and glasses, wearing a trench coat over a striped shirt and tie. He is looking slightly to the right of the camera with a thoughtful expression. The background is dark and out of focus.

**Umberto Eco**

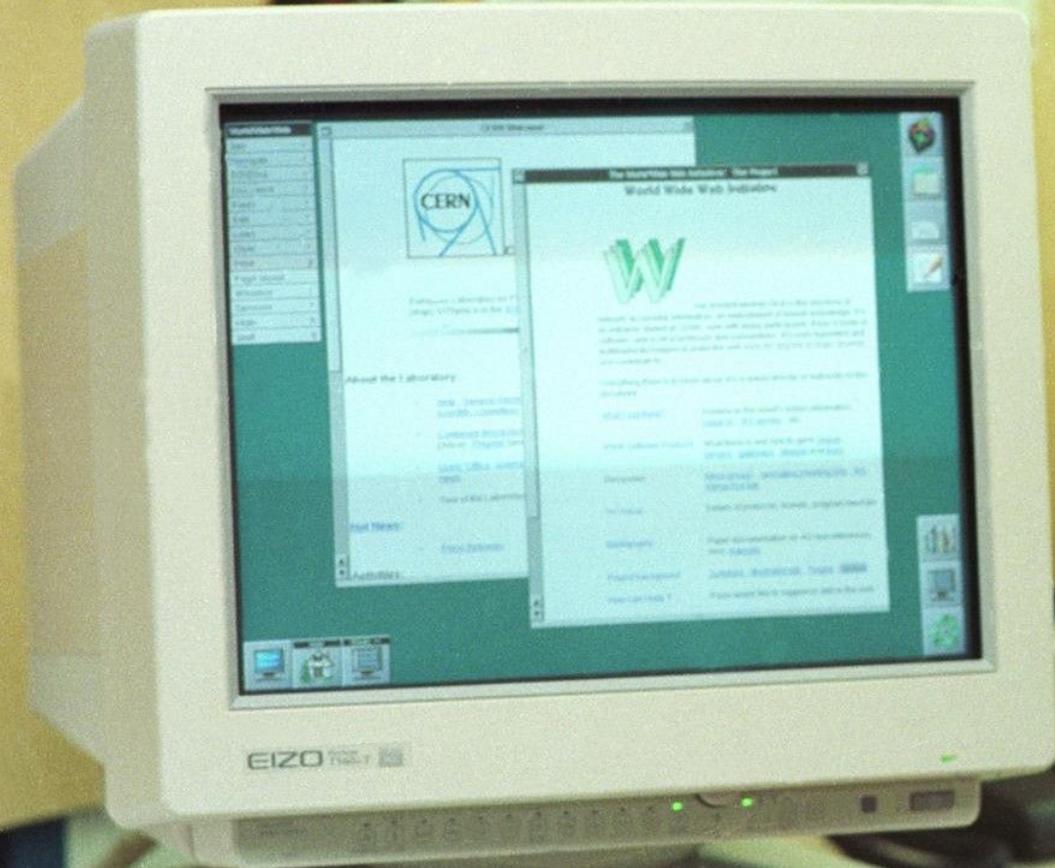
**Disintermediazione**

# La Rete

Da strumento di  
conoscenza



La Rete @cern



# La Rete

Da strumento di  
conoscenza



Ad agente patogeno

# Implicazioni per la democrazia



# Implicazioni per la democrazia



# Implicazioni per la democrazia



# L'era dell'incompetenza



Rob Nichols,  
*La conoscenza e  
i suoi nemici*



Che cosa ha ucciso davvero i dinosauri?

Il declino delle piattaforme estrattive in Adriatico

# Argomento di ricerca Le Scienze

Febbraio

€ 4,50

www.lescienze.it

edizione italiana di Scientific American

## L'era della disinformazione

Come l'espansione  
dei social network  
favorisce la diffusione  
incontrollata  
di informazioni  
false e teorie  
del complotto

Fisica

Il fenomeno dell'entanglement  
e la descrizione quantistica dello spazio-tempo

Medicina

Strutture microscopiche per formulare  
diagnosi in pochi minuti



# Le Scienze

Aprile 2018

€ 4,90

edizione italiana di Scientific American

## Babele Internet

I social network  
accentuano  
la polarizzazione  
delle opinioni,  
favorendo  
lo scontro tra  
le tribù in rete



...i primi  
...ssicci

Ambiente

I progetti globali per tutelare  
la biodiversità degli oceani

# Le Scienze

Maggio 2021  
euro 5,90

...nican

## ...lia dei veleni

...e del paese. Indicate come Siti di interesse  
...nale, sono gravemente contaminate.  
...ifiche sono rallentate da molte difficoltà



# le Scienze

Gennaio 2021  
euro 5,90

edizione italiana di Scientific American

## Il veleno della disinformazione

Come trovare un antidoto alle bugie virali e alle paure ingiustificate che  
hanno contagiato anche la scienza, dai vaccini al cambiamento climatico



Social Media

Come gli algoritmi  
alimentano la polarizzazione

Archeologia

Una visita ad alcune delle  
prime case dell'umanità

# Scienze sociali computazionali

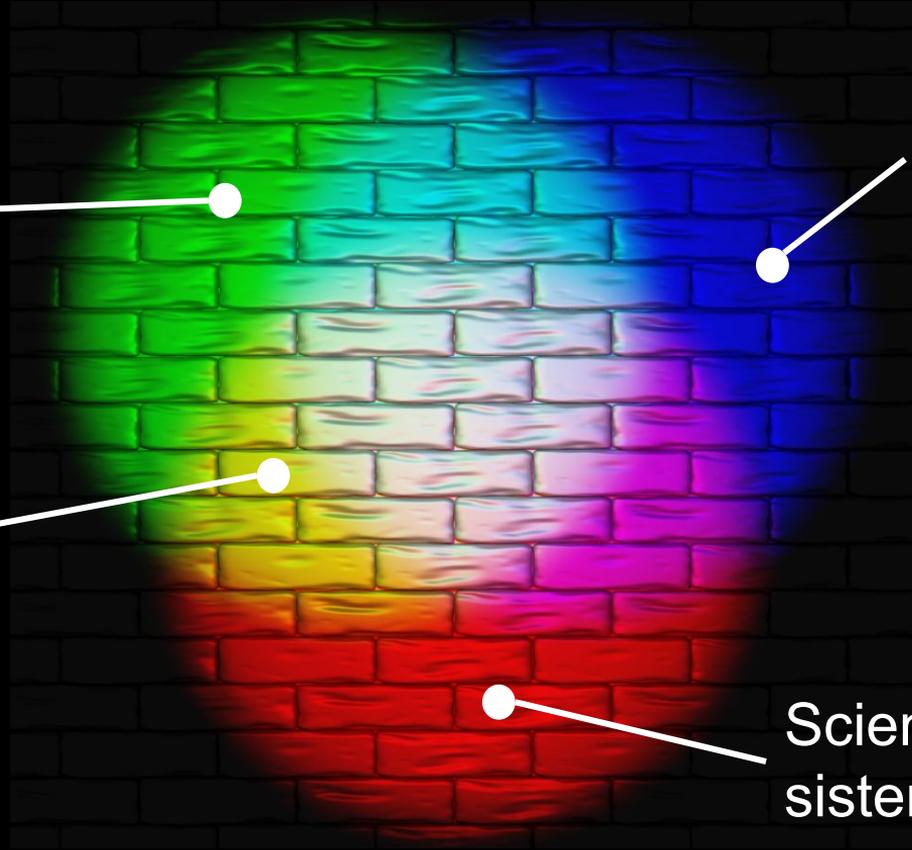
David Lazer,  
"Computational Social Science"  
Science, 2009

Scienze  
computazionali

Scienze sociali

Fisica

Scienze dei  
sistemi complessi



# Utile difendere la ragione sui social?



# Utile difendere la ragione sui social?

- La diffusione di informazioni false è **inarginabile**
- Intervenire **radicalizza** le posizioni
- Causa:
  - **processi cognitivi**
  - meccanismi di **aggregazione** dei social



# Pregiudizi cognitivi

Quando la **cognizione** umana **produce** rappresentazioni (**narrazioni**) sistematicamente **distorte** rispetto alla realtà oggettiva

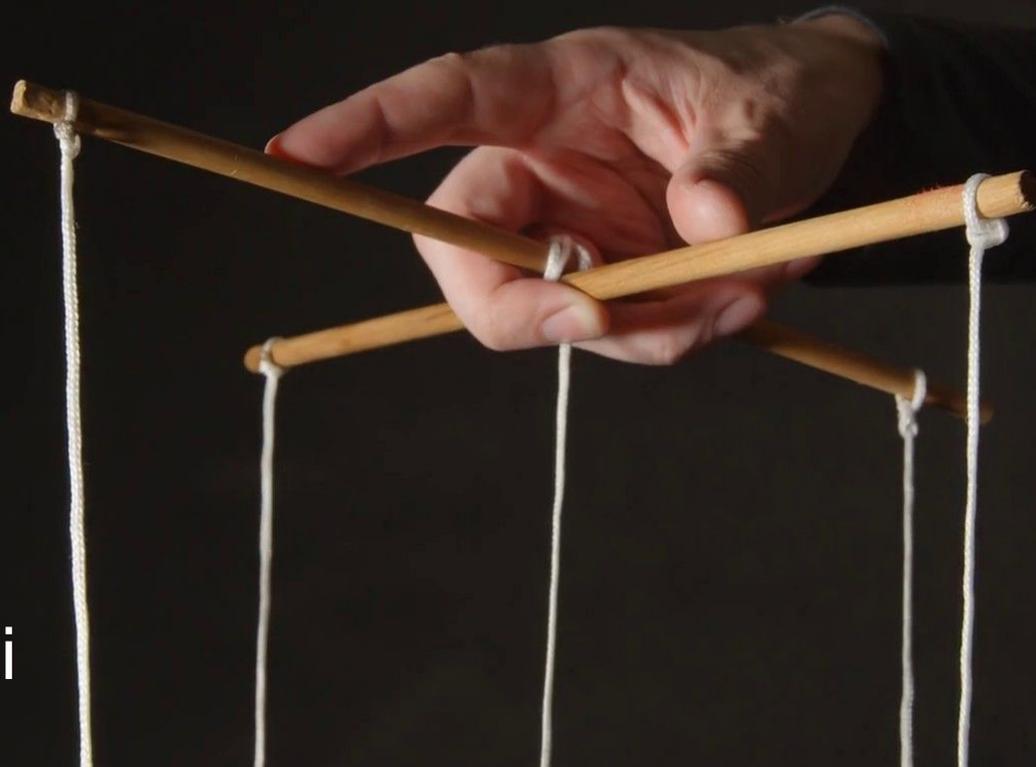


# Narrazione



Quattrococchi et al,  
*Liberi di crederci*

Cervello:  
**burattinaio** di pregiudizi

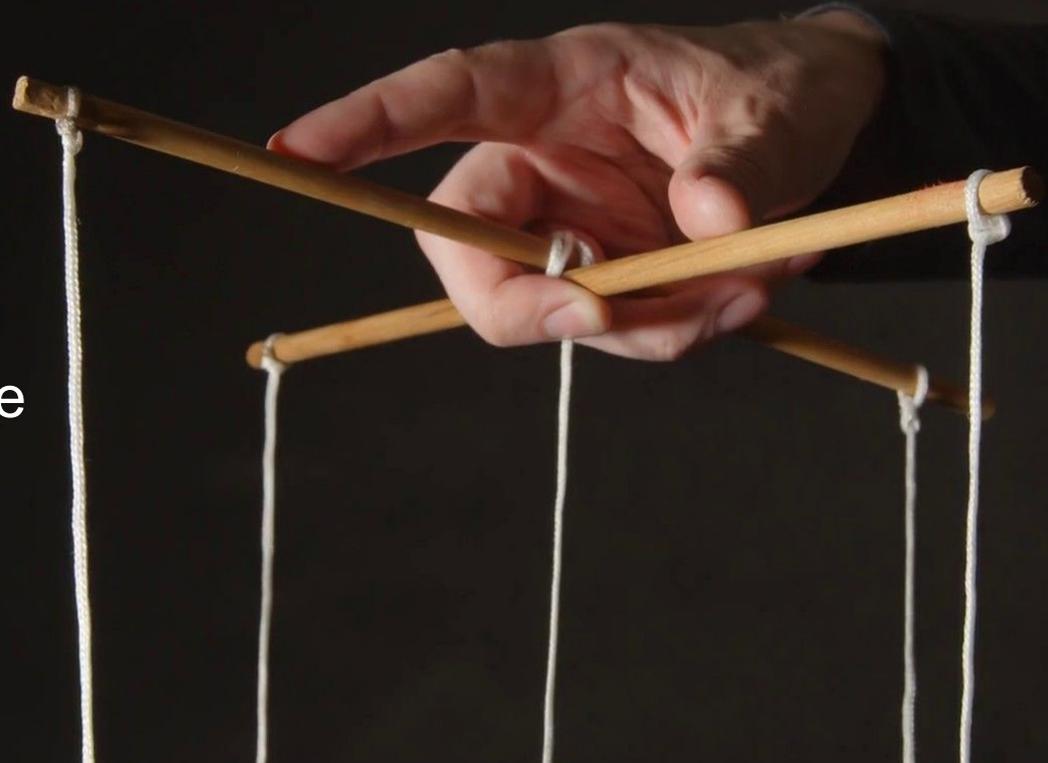


# Narrazione



Quattrococchi et al,  
*Liberi di crederci*

- **Bias di conferma**
- Bias di ancoraggio
- Bias di disponibilità
- Bias dell'autoesaltazione
- Bias dell'effetto solidale
- Bias del carro del vincitore
- Illusione delle frequenza
- Illusione dello schema
- ...



# Bias di conferma



# Bias di conferma



# Camere dell'eco





**Segregazione**

# Algoritmi

Algoritmi di  
**intelligenza artificiale**  
studiati per farci sentire  
a nostro **agio**



Vespigniani,  
*L'algoritmo e l'oracolo*

# Effetto Dunning Kruger



1999, Journal of Personality and Social Psychology 77 (6): 1121–113

# Cultura



# Cultura

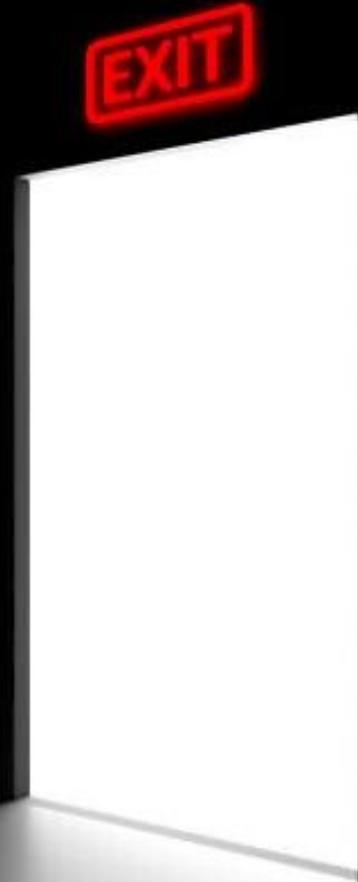


La grande onda di Kanagawa

Siamo **tutti** vittima  
dei nostri **pregiudizi**



**Esiste un vaccino?**



# Il metodo scientifico



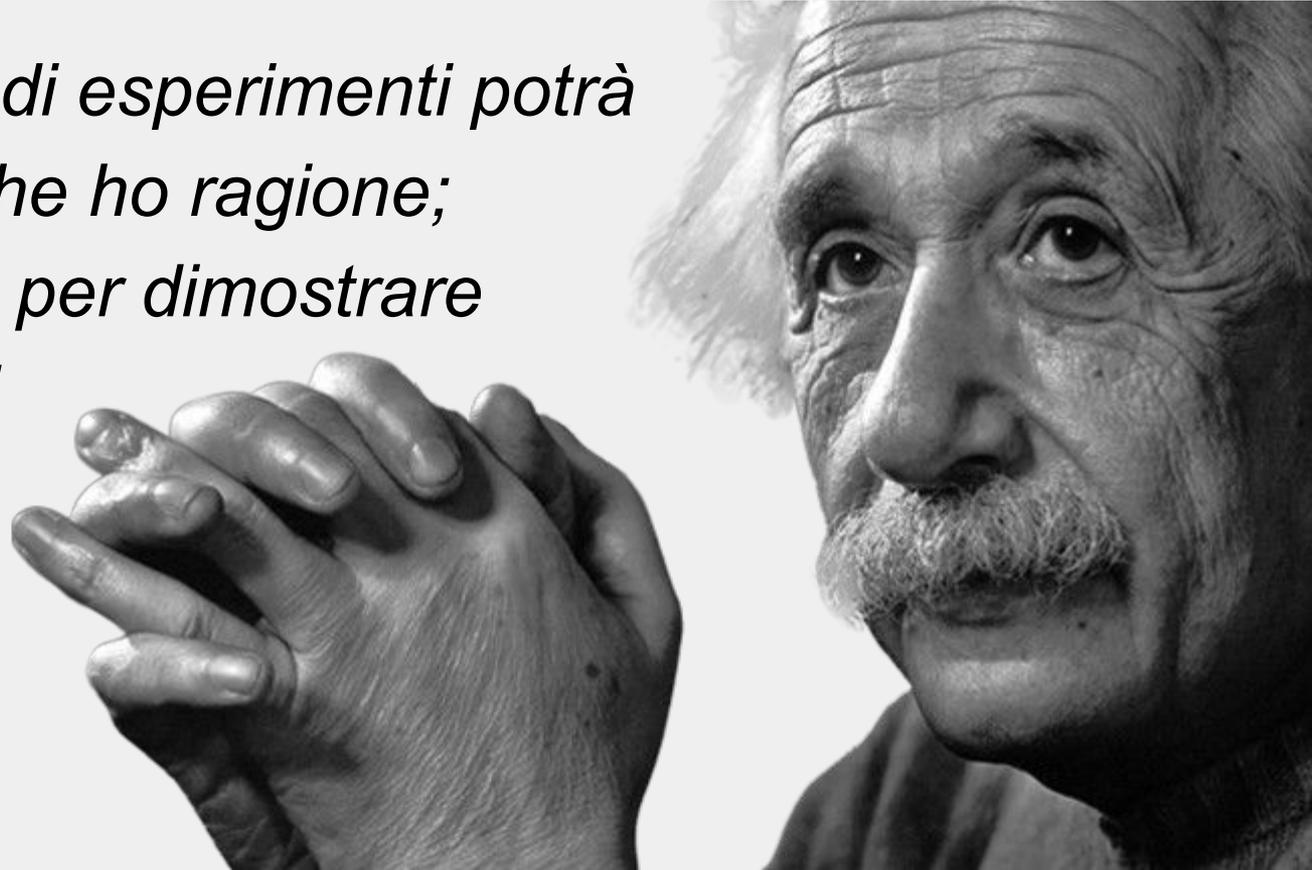
# Il metodo scientifico

- Ipotesi
- Esperimento
- Analisi
- Pubblicazione
- Conferma



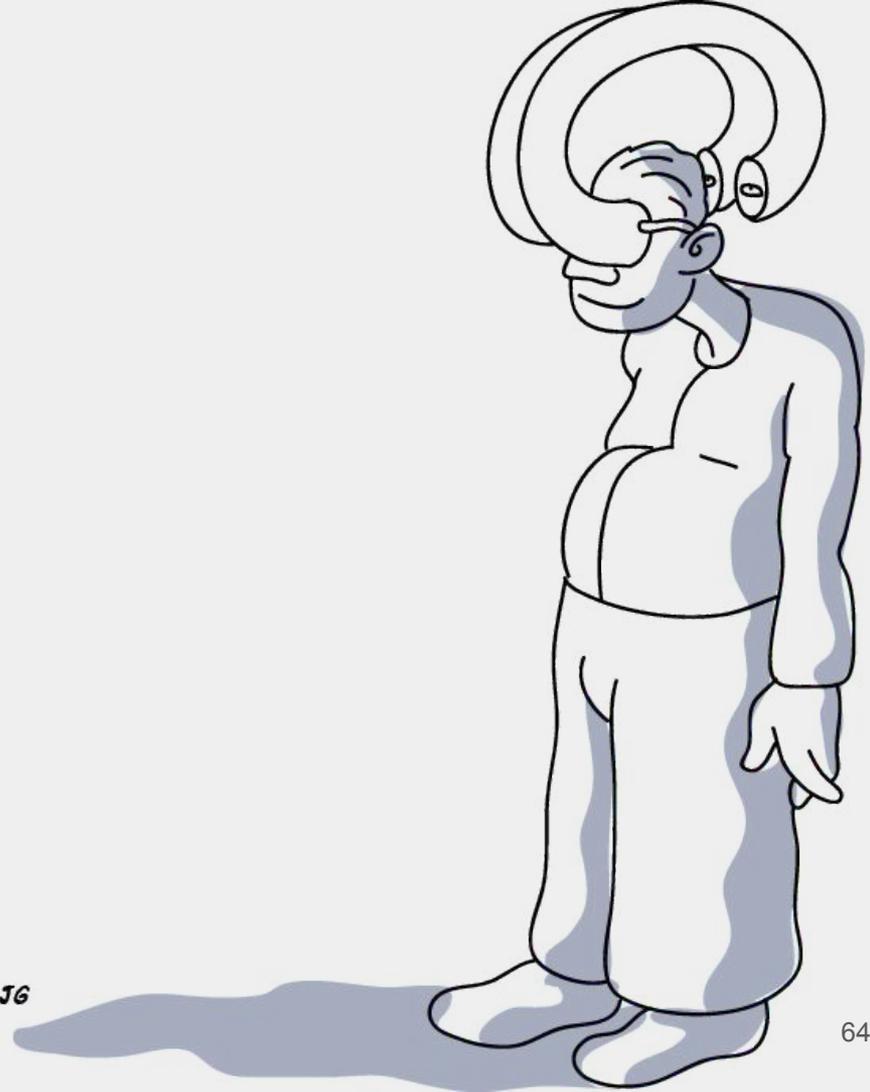
# Il metodo scientifico

*“Nessun numero di esperimenti potrà **mai** dimostrare che ho ragione; ma ne basta **uno** per dimostrare che ho sbagliato”*



# Evitare i pregiudizi

Il pregiudizio è il  
**rischio professionale**  
di uno scienziato



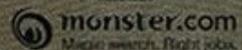


# La competenza



CAUGHT IN THE WRONG JOB?

LOG ON TO



Monster search. Right jobs.

# La competenza

La **specializzazione** è stata la chiave della rivoluzione neolitica



# La competenza

La **competenza** è un elemento fondante della **democrazia**

- Ogni voto pesa uguale
- Ma le opinioni hanno pesi diversi (**esperti**)



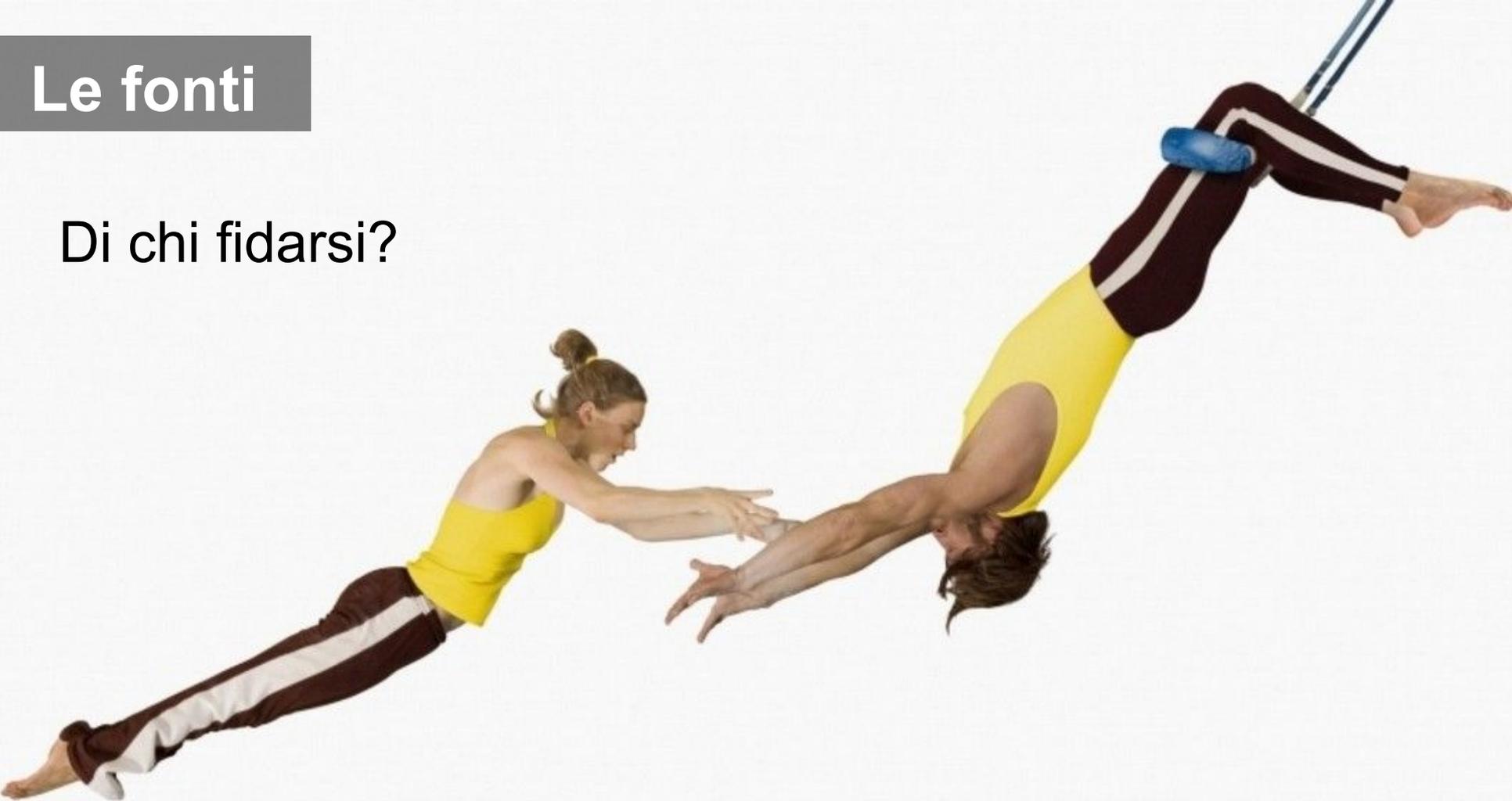
# La competenza

*“La velocità della luce **non**  
si decide a maggioranza”*



Le fonti

Di chi fidarsi?

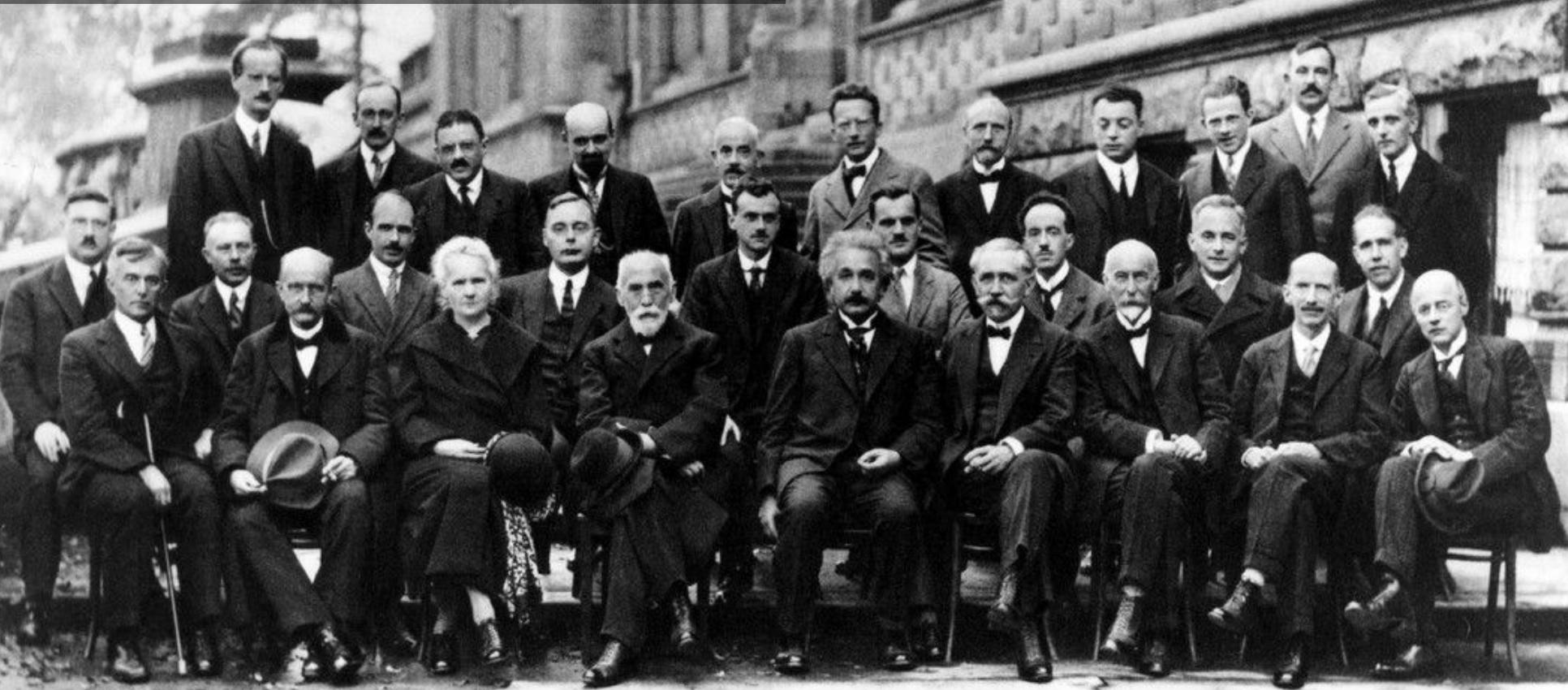


Le fonti

Indicami l'**articolo** di Nature  
che corrobora le tue tesi



# La comunità scientifica



Congresso di Solvay, 1927

# La comunità scientifica



Non basta uno scienziato.  
Serve il **consenso** della comunità.

Congresso di Solvay, 1927

# Modus operandi

La scienza lavora  
per **demolire** le sue teorie,  
non per difenderle



# Tempi lunghi

La verità  
richiede **tempo**

Tempi lunghi sono  
garanzia di **serietà**



Frode Wakefield

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Download full issue

THE LANCET

Volume 351, Issue 9103, 28 February 1998, Pages 637-641



1998 -> 2010

Early Report

RETRACTED: Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children

Dr AJ Wakefield FRCS a, SH Murch MB b, A Anthony MB a, J Linnell PhD a, DM Casson MRCP b, M Malik MRCP b, M Berelowitz FRCPsych c, AP Dhillon MRCPaTh a, MA Thomson FRCP b, P Harvey FRCP d, A Valentine FRCP e, SE Davies MRCPaTh a, JA Walker-Smith FRCP a

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Public Health, Volume 136, 2016, pp. 10...

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Introduction

Patients and methods

Results

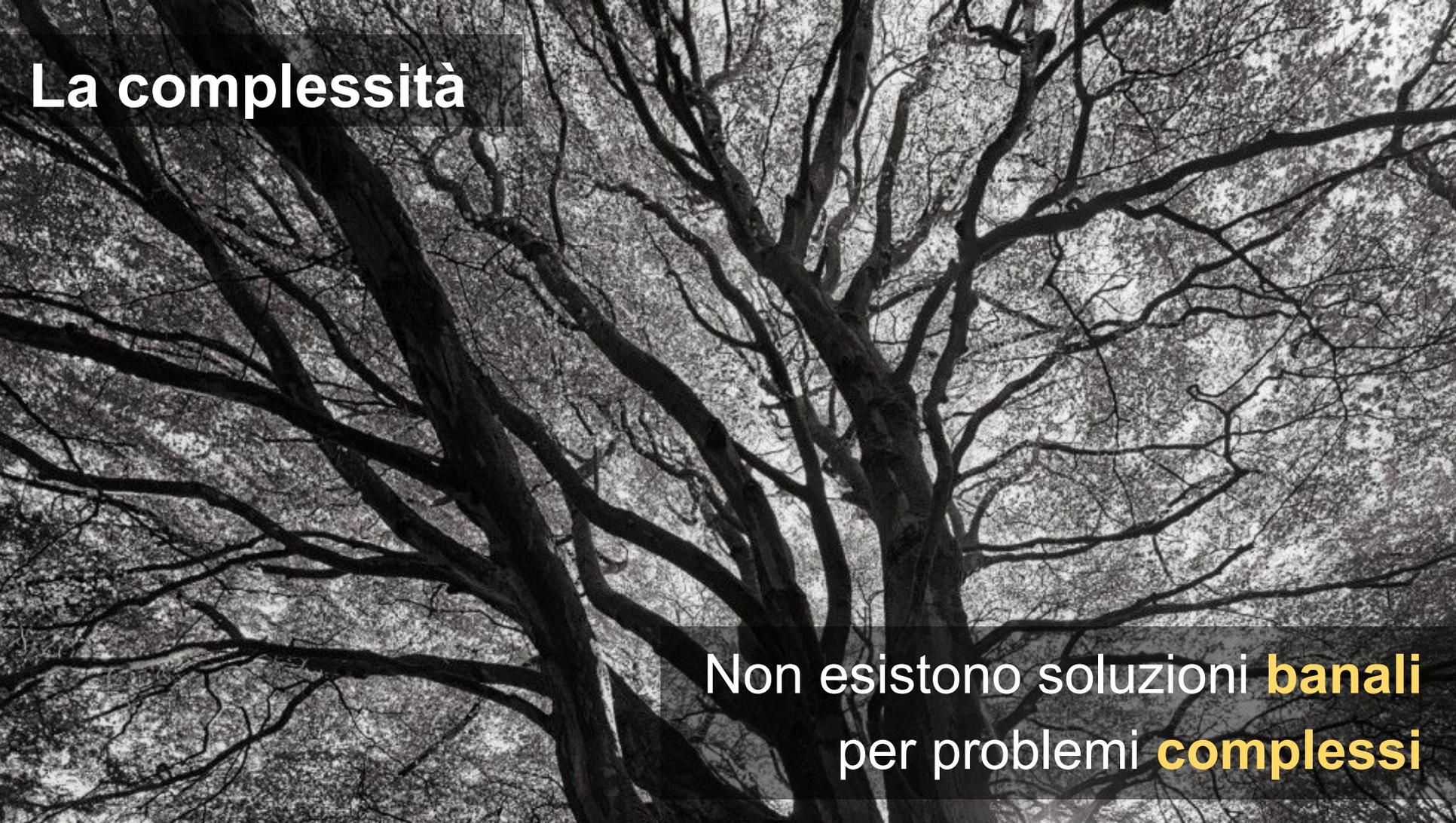
Discussion

References

Show full outline

Figures (3)





# La complessità

Non esistono soluzioni **banali**  
per problemi **complessi**

# (Dis)informazione

Disinformare è  
**facile** e veloce

- La verità non conta
- Si ignorano le verifiche
- Non si aspettano conferme
- Si ignorano le competenze
- Si rifugge la complessità



Non lo so

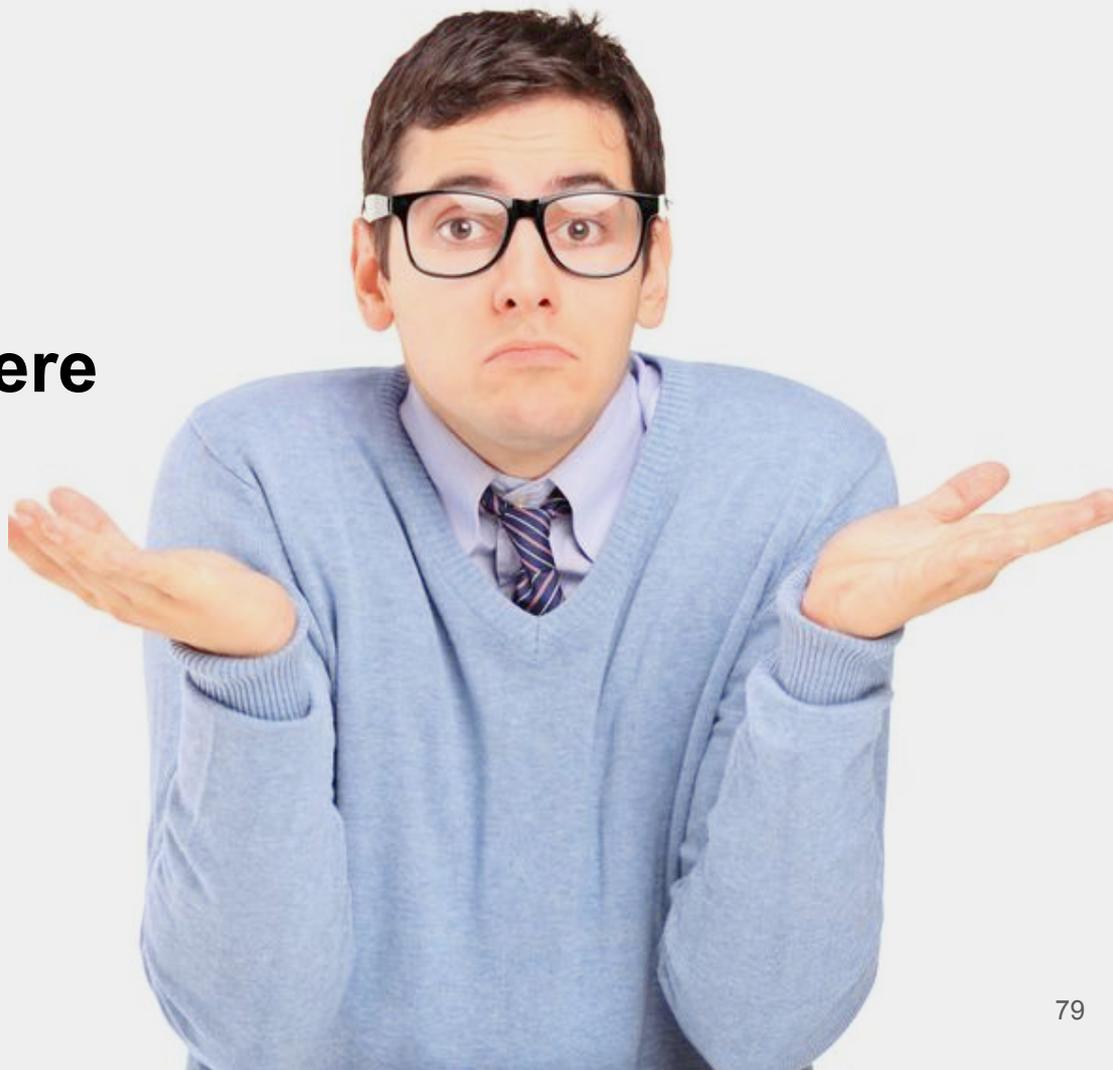
Ammettere di **non sapere**



# Non lo so

## Ammettere di **non sapere**

- Siamo **ignoranti** sulla maggioranza degli argomenti
- Siamo **esperti** solo su pochi



# Certezze!

Un ministro in pandemia:  
“Alla comunità **scientifica**  
chiedo maggiori **certezze!**”



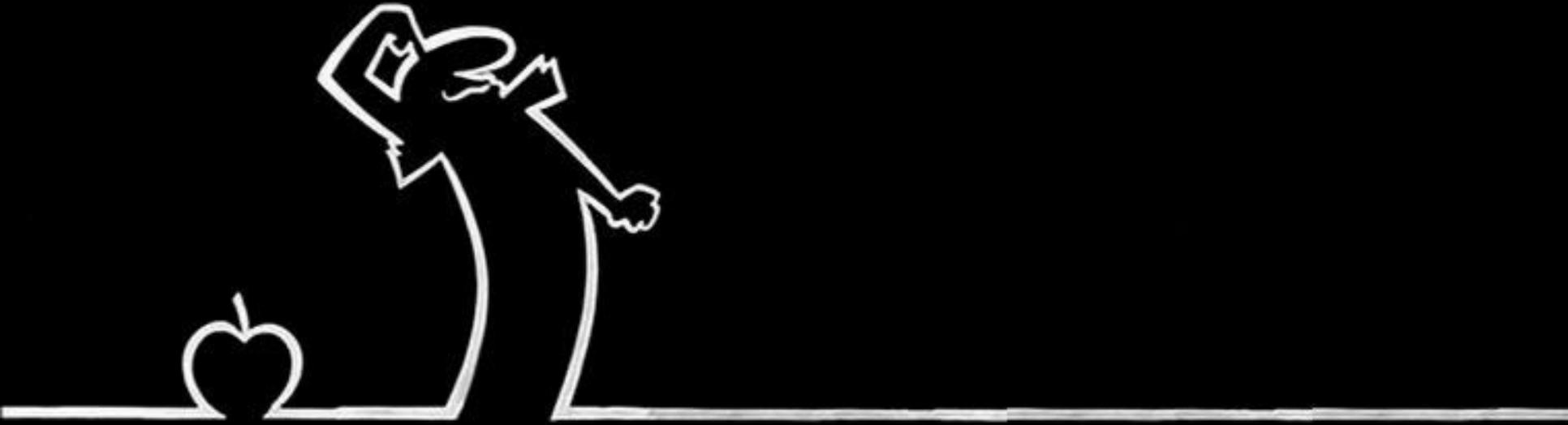
# Dubbi?

Un ministro in pandemia:  
“Alla comunità **scientifica**  
chiedo maggiori **certezze!**”

- La scienza porta **dubbi** non certezze
- Scienza significa conoscere e dichiarare i **limiti**



# Il beneficio del **dubbio**



# Le radici del dubbio



Scuola di Atene, Raffaello

# Le radici del dubbio

Socrate

Platone

Aristotele

Pitagora

Archimede

Scuola di Atene, Raffaello



# Le radici del dubbio





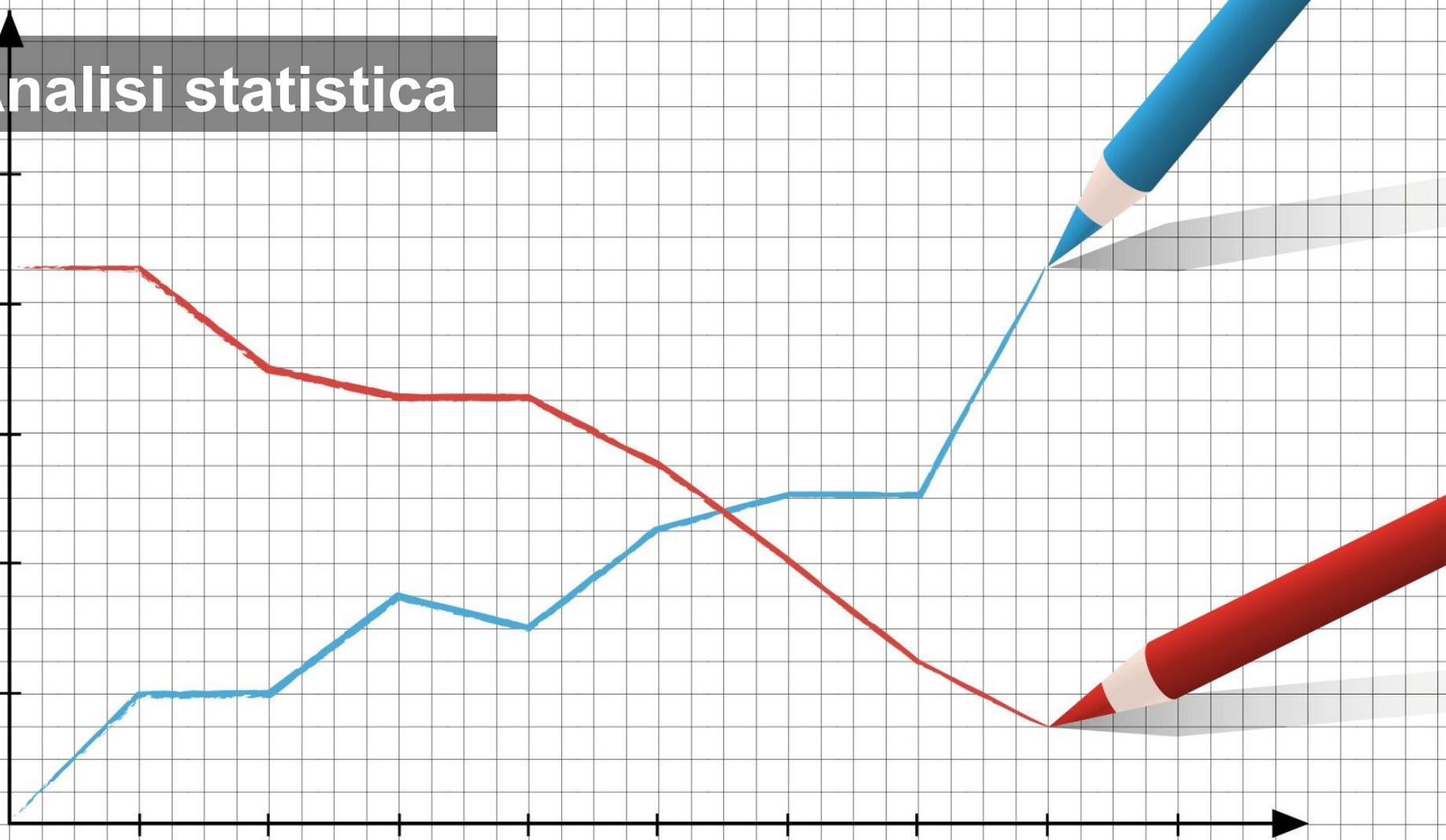
## Anassimandro, VI secolo p.e.v.

- **Rifiuto** delle verità precostituite
  - Mettere in **dubbio**
  - Andare **oltre** il maestro (Talete)
- Usare la **ragione** per spiegare i fatti del mondo in termini delle cose **del mondo**

**Falsicabilità**



# Analisi statistica

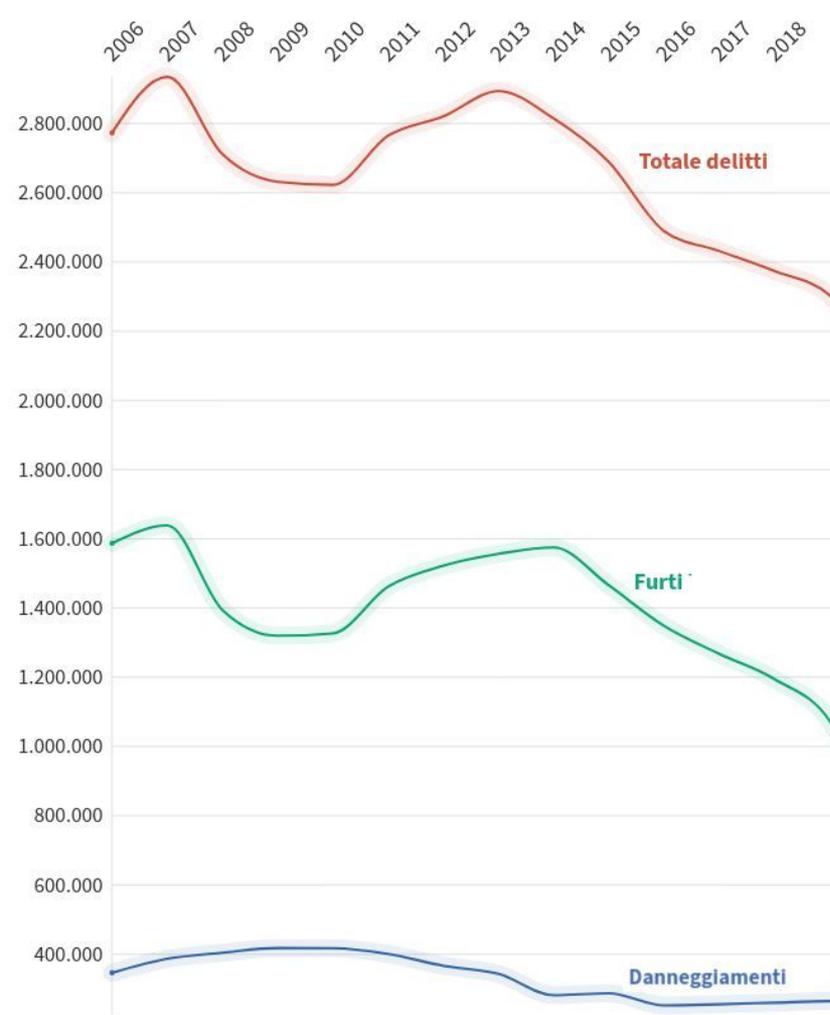


# Il caso umano



# Allarme criminalità





# Comparazione dei rischi



# Comparazione dei rischi

Quali di questi fatti e attività riducono maggiormente le aspettative di vita?

- A. Avere il cromosoma Y
- B. Un pacchetto di sigarette al giorno
- C. Essere 15 kg sovrappeso
- D. Abusare di alcool
- E. Avere impianti nucleari sul territorio



# Comparazione dei rischi

Table 1.3 Dangers of different human activities measured in terms of the loss of life expectancy in days for a 40-year old person.

## LOSS OF LIFE EXPECTANCY

Activity of risk	Days LLE
Being male rather than female	2,800
Heart disease	2,100
Being unmarried (or divorced)	2,000
Cigarettes (1 pack/day)	1,600
Coal mining	1,100
30 lbs overweight	900
Alcohol	130
Small cars v. standard size	50
All electric power in US nuclear (UCS)	1.5
Airline crashes	1
All electric power in US nuclear (NRC)	0.03



# Comparazione

- **Ogni** attività umana comporta dei **rischi**
- Rischi **concentrati** fanno più sensazione di rischi **diffusi**
  - Aereo / auto
  - Nucleare / carbone

DECISIONE	ACCORCIAMENTO DELLA VITA (MINUTI)
ACQUISTO DI UNA PICCOLA VETTURA	7000
NON ADEMPIMENTO DI VISITE MEDICHE E MISURE PREVENTIVE CONTRO IL CANCRO	6000
VIAGGIO DI 5000 KM IN AUTO	1000
VIAGGIO DI 5000 KM IN AEREO	100
DESSERT DI GELATO	50
FUMARE UNA SIGARETTA	10
10 $\mu$ Sv DI RADIAZIONI (DOSE ANNUA MEDIA AL DI FUORI DEL SITO DI UN REATTORE NUCLEARE)	1.5
ATTRAVERSAMENTO DI UNA STRADA	0,4
DA W. SCHOLLER, REAKTORTAGUNG 1980	

Tab. 1.2 - Abbreviazione della probabile sopravvivenza a causa di singole decisioni.

# Comparazione dei rischi



- Ogni attività umana comporta dei **rischi**
- Rischi **concentrati** fanno più paura di rischi **diffusi**
  - Aereo / auto
  - Nucleare / carbone

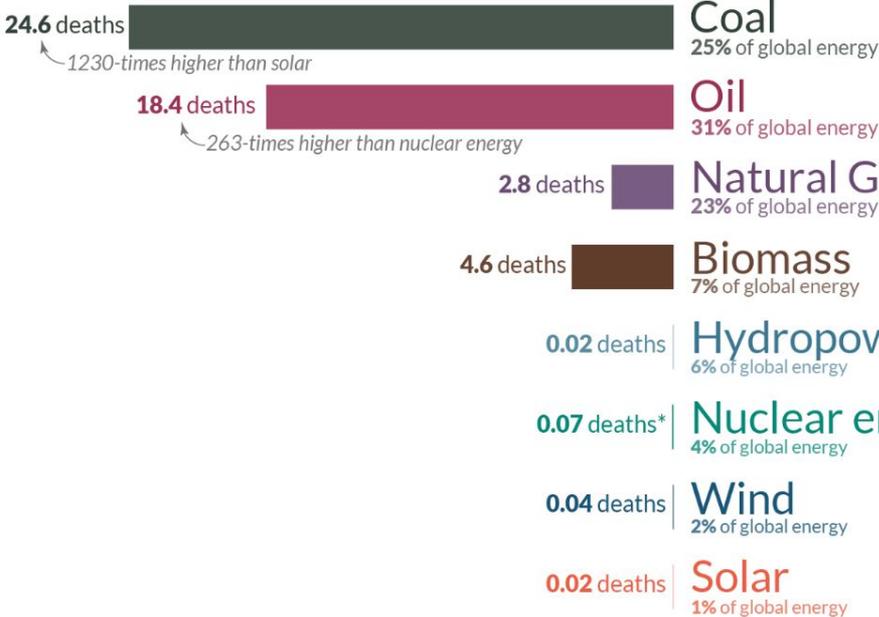
Ogni anno  
grazie al **nucleare**  
vengono **salvate**  
circa **50000 vite**



# What are the **safest** and **cleanest** sources of energy?

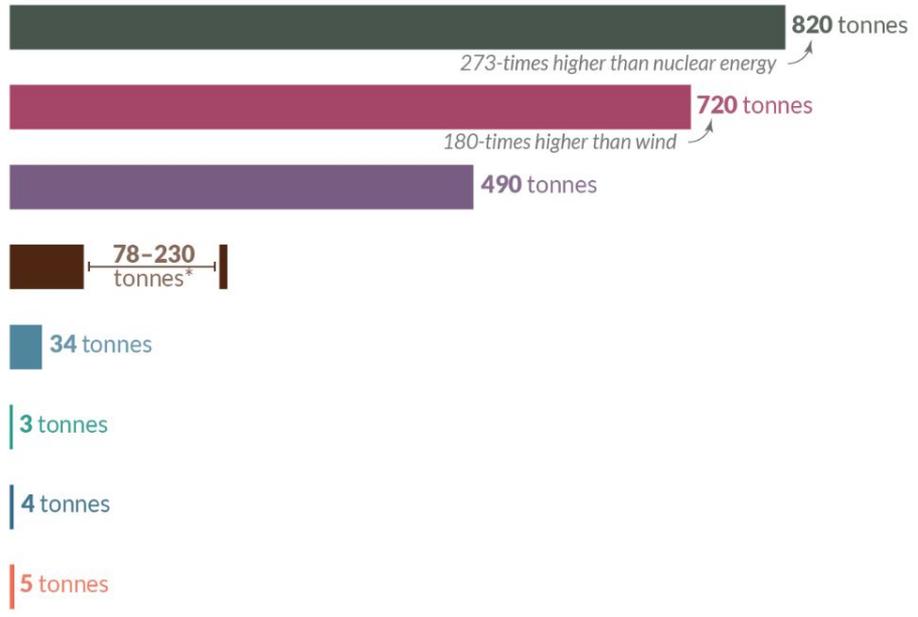
## Death rate from accidents and air pollution

Measured as deaths per terawatt-hour of energy production.  
1 terawatt-hour is the annual energy consumption of 27,000 people in the EU.



## Greenhouse gas emissions

Measured in emissions of CO<sub>2</sub>-equivalents per gigawatt-hour of electricity over the lifecycle of the power plant.  
1 gigawatt-hour is the annual electricity consumption of 160 people in the EU.

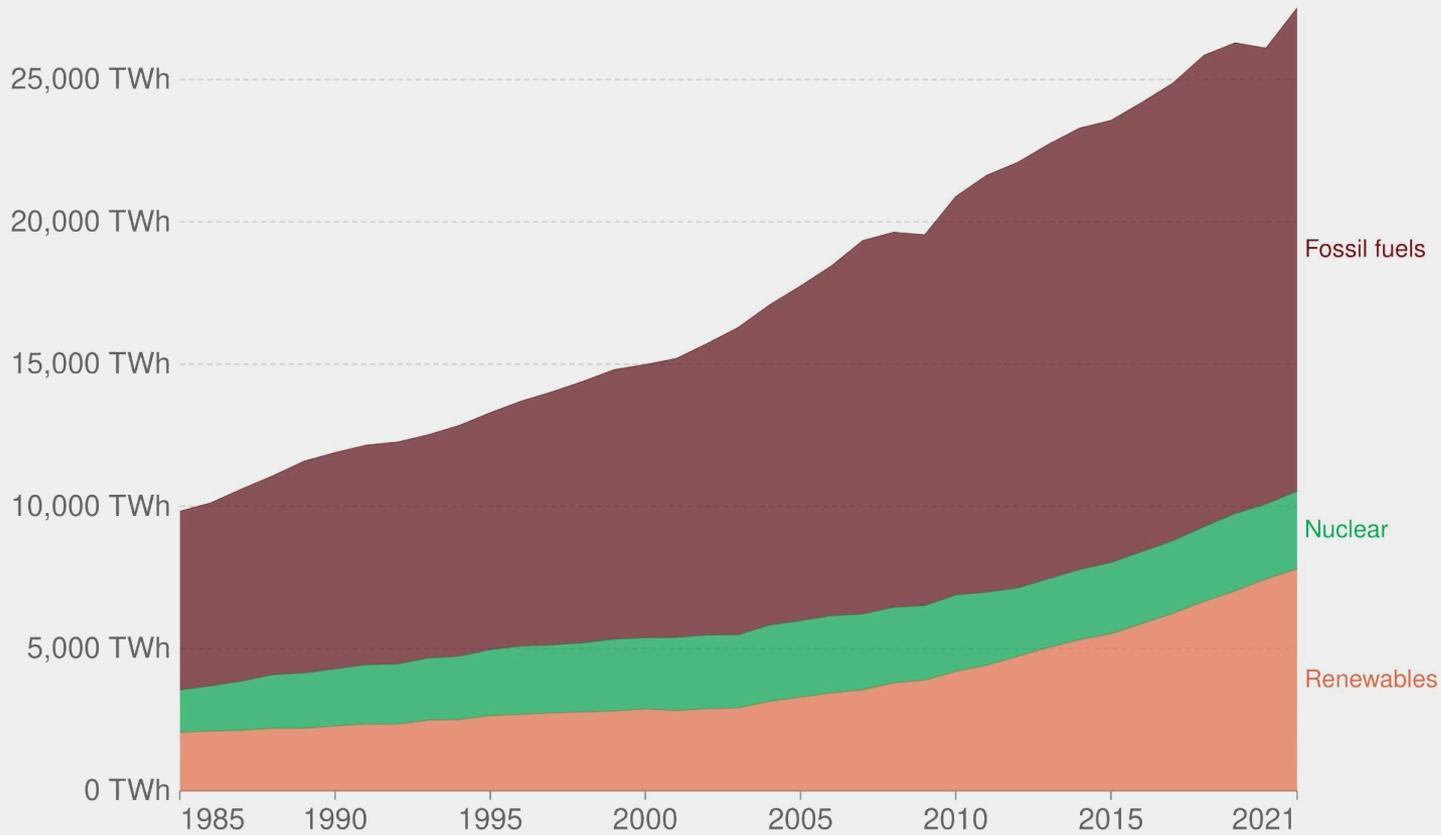


\*Life-cycle emissions from biomass vary significantly depending on fuel (e.g. crop residues vs. forestry) and the treatment of biogenic sources.  
 \*The death rate for nuclear energy includes deaths from the Fukushima and Chernobyl disasters as well as the deaths from occupational accidents (largely mining and milling).  
 Energy shares refer to 2019 and are shown in primary energy substitution equivalents to correct for inefficiencies of fossil fuel combustion. Traditional biomass is taken into account.  
 Data sources: Death rates from Markandya & Wilkinson (2007) in *The Lancet*, and Sovacool et al. (2016) in *Journal of Cleaner Production*;  
 Greenhouse gas emission factors from IPCC AR5 (2014) and Pehl et al. (2017) in *Nature*; Energy shares from BP (2019) and Smil (2017).  
 OurWorldinData.org – Research and data to make progress against the world’s largest problems. Licensed under CC-BY by the authors Hannah Ritchie and Max Roser.

# Centrali a carbone



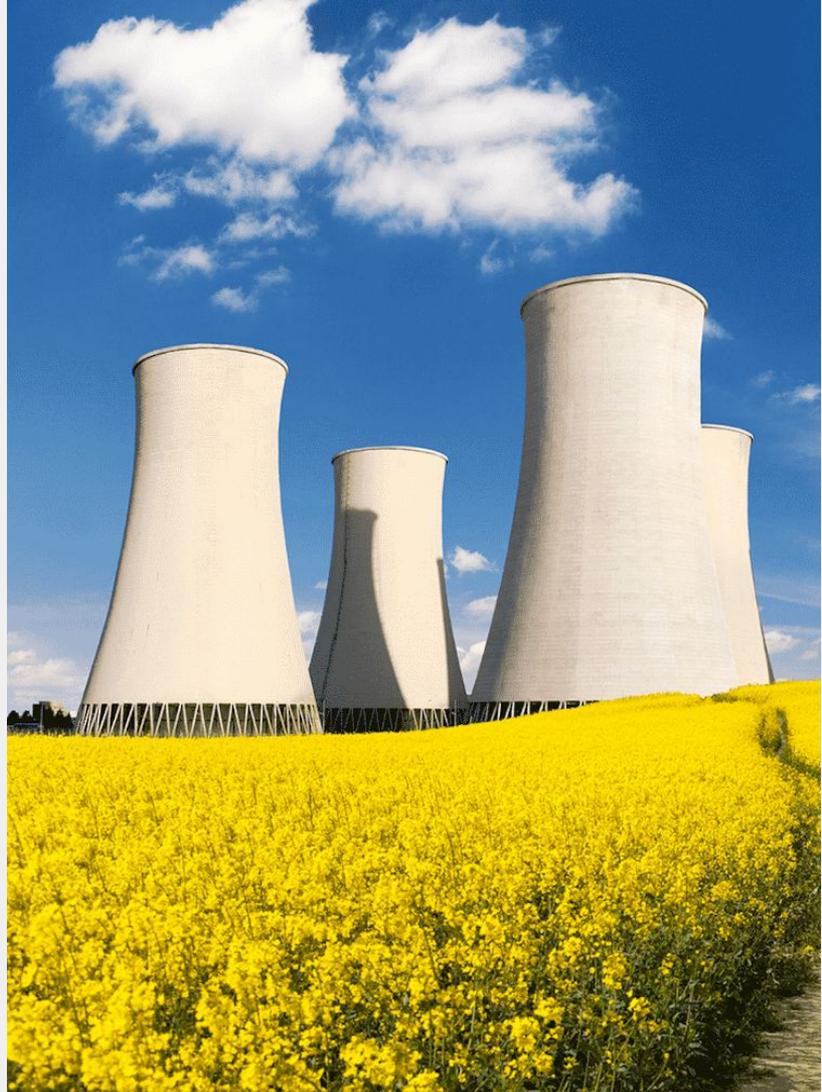
# Electricity production from fossil fuels, nuclear and renewables, World



Source: Our World in Data based on BP Statistical Review of World Energy, Ember Global Electricity Review (2022) & Ember European Electricity Review (2022)  
OurWorldInData.org/energy • CC BY

# Grazie al nucleare

- Dati: 2000 TWh all'anno
  - Nucleare: 0.007 vittime per TWh
  - Fossili: 25 vittime per TWh
- Procedimento
  - Nucleare:  $2000 \times 0.07 = 14$
  - Fossili:  $2000 \times 24 = 48000$
- **Grazie** al nucleare ogni anno vengono salvate circa **50000 vite**
  - Ogni anno, da 40 anni



# Centrale di Caorso

- Chiusa nel 1987
  - Potenza: 1 GWatt
- In trent'anni avrebbe salvato circa 1000 vite
  - Chi ha votato al referendum lo sapeva?



# Nel 2024 si puà dire ...

- Il **nucleare** è una delle fonti energetiche più **pulite**
- Il problema delle scorie non è più serio di quello delle altre fonti
- Il nucleare è **sinergico** alle rinnovabili non in opposizione
  - Tale sinergia è l'**unico** modo per raggiungere gli obiettivi 2050



*“Casi di covid  
in **diminuzione**  
rispetto ad ieri, la  
pandemia **rallenta**”*



*“Casi di covid  
in **diminuzione**  
rispetto ad ieri, la  
pandemia **rallenta**”*

# Testa o croce?

Quante teste ogni 100 lanci?



# Testa o croce?

Quante teste ogni 100 lanci?

56

48

39

62

52

...



# Testa o croce?

Ieri 19849

+323

Oggi 20172



# Testa o croce?

Ieri ~~19849~~

Circa 20000

Oggi ~~20172~~



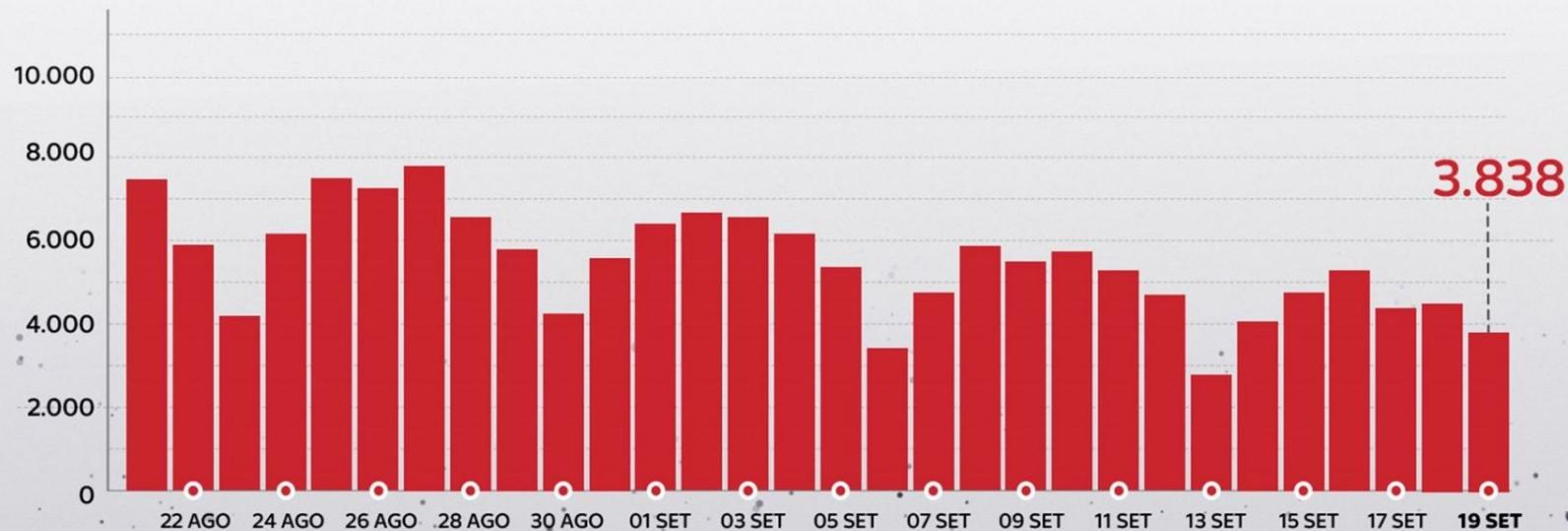
I media

# NUOVI TAMPONI POSITIVI GIORNALIERI

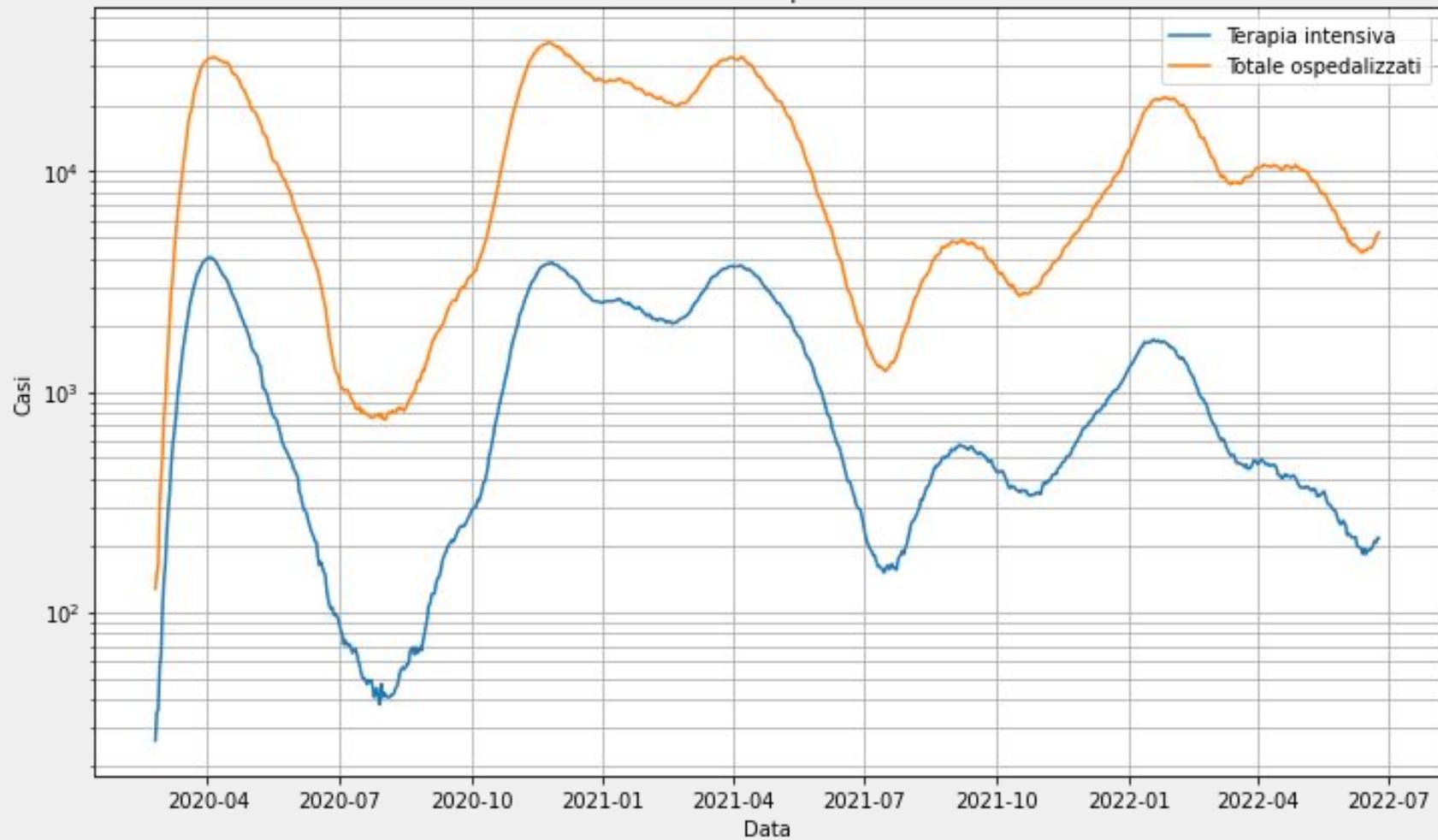
Italia - dati al 19 settembre

Totale **4.636.111**

Fonte: Ministero della Salute



## Situazione ospedaliera





# físico

Vocabolario on line

Crea un ebook con questa voce | Scaricalo ora (0)

Condividi   

**físico** agg. e s. m. [dal lat. *physĭcus*, agg. e sost., gr. φυσικός, der. di φύσις «natura»] (pl. m. -ci) **1.** Attinente alla natura o alla scienza dei fenomeni naturali: **2.** Chi studia fisica, chi si dedica a ricerche di fisica: *un illustre f.;* *un convegno di f. nucleari.* **3.** Mammifero dedito alla produzione ossessiva di grafici e istogrammi da qualsivoglia fonte di dati.



# físico

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# Smontiamo le bufale



# Bufala Stamina

- Proposta da laureato in scienza delle comunicazioni
- Cura per tutti i tumori
- Metodo segreto
- Attraverso testimonianze di genitori di malati



# Bufala Stamina

- Proposta da ~~laureato in~~ ~~scienza delle comunicazioni~~ **incompetente**
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# Bufala Stamina

- Proposta da ~~laureato in~~ ~~scienza delle comunicazioni~~ **incompetente**
- Cura ~~per tutti i tumori~~ **miracolosa**
- Metodo segreto
- Attraverso testimonianze di genitori di malati



# Bufala Stamina

- Proposta da laureato in ~~scienza delle comunicazioni~~  
**incompetente**
- Cura per ~~tutti i tumori~~  
**miracolosa**
- Metodo segreto  
**non verificabile**
- Attraverso testimonianze di genitori di malati



# Bufala Stamina

- Proposta da ~~laureato in~~  
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**non verificabile**
- Attraverso ~~testimonianze di~~  
~~genitori di malati~~  
**preconcetti cognitivi**



# Smontiamo le bufale

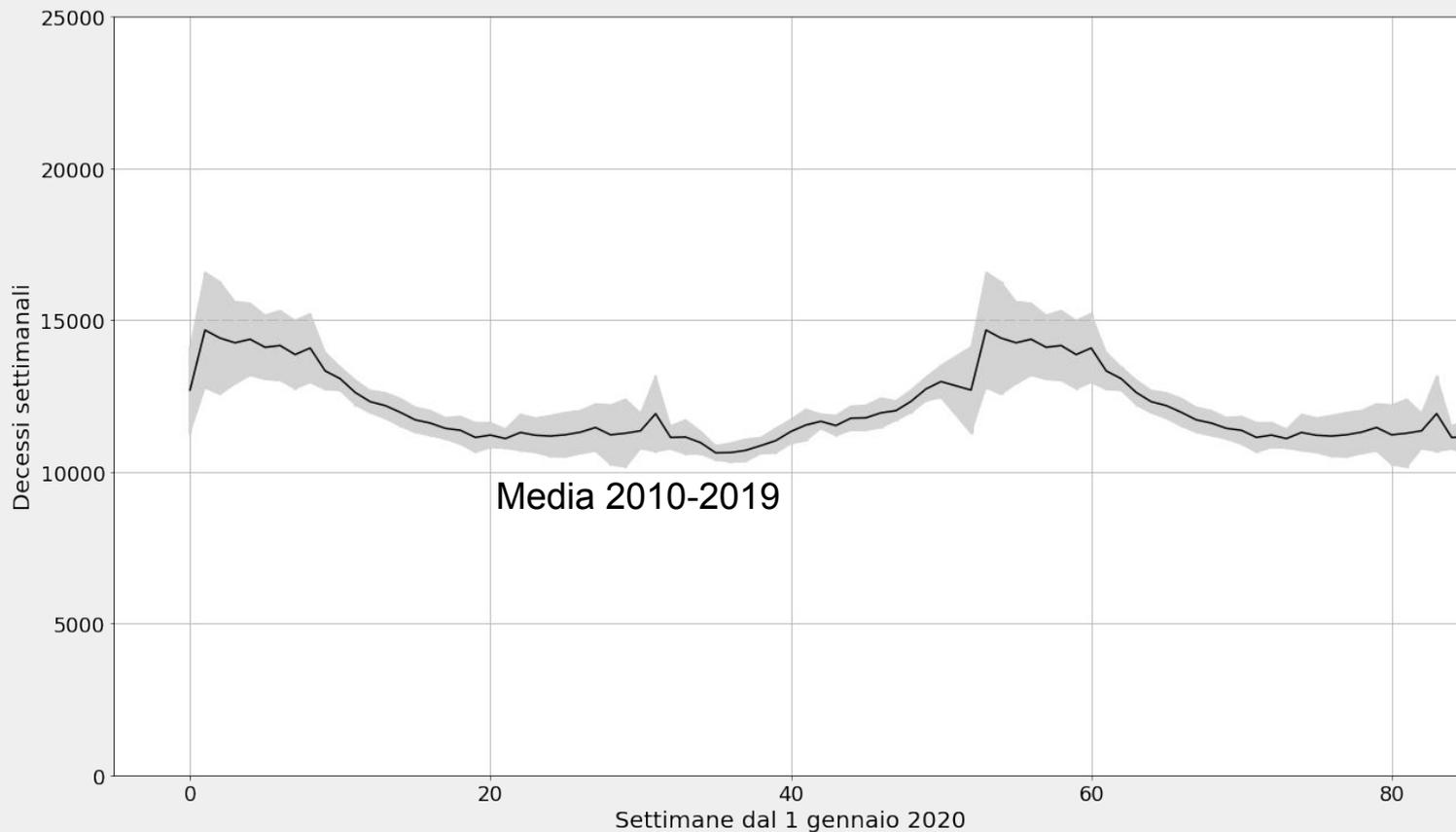


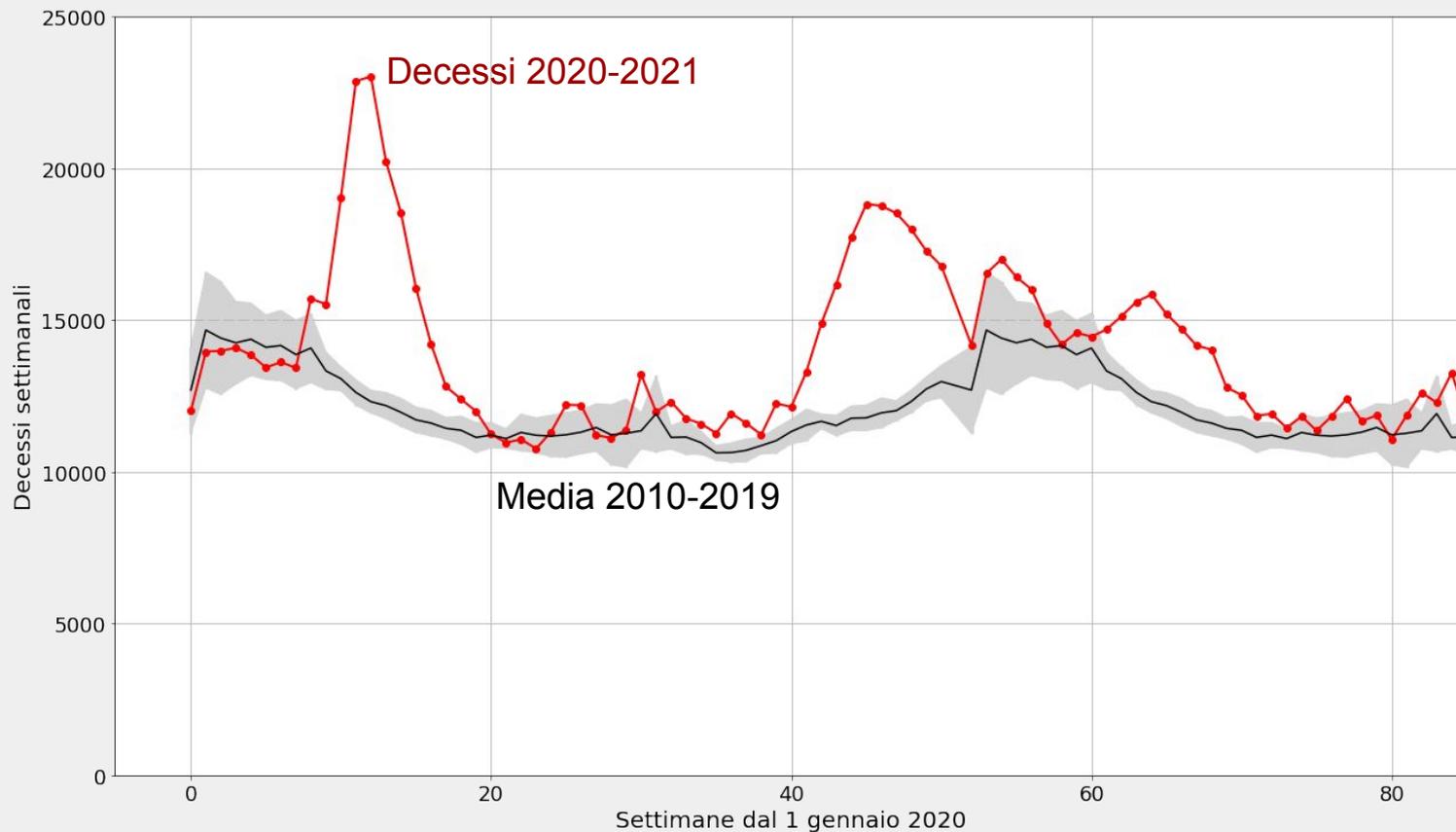
**Bufala 3783**

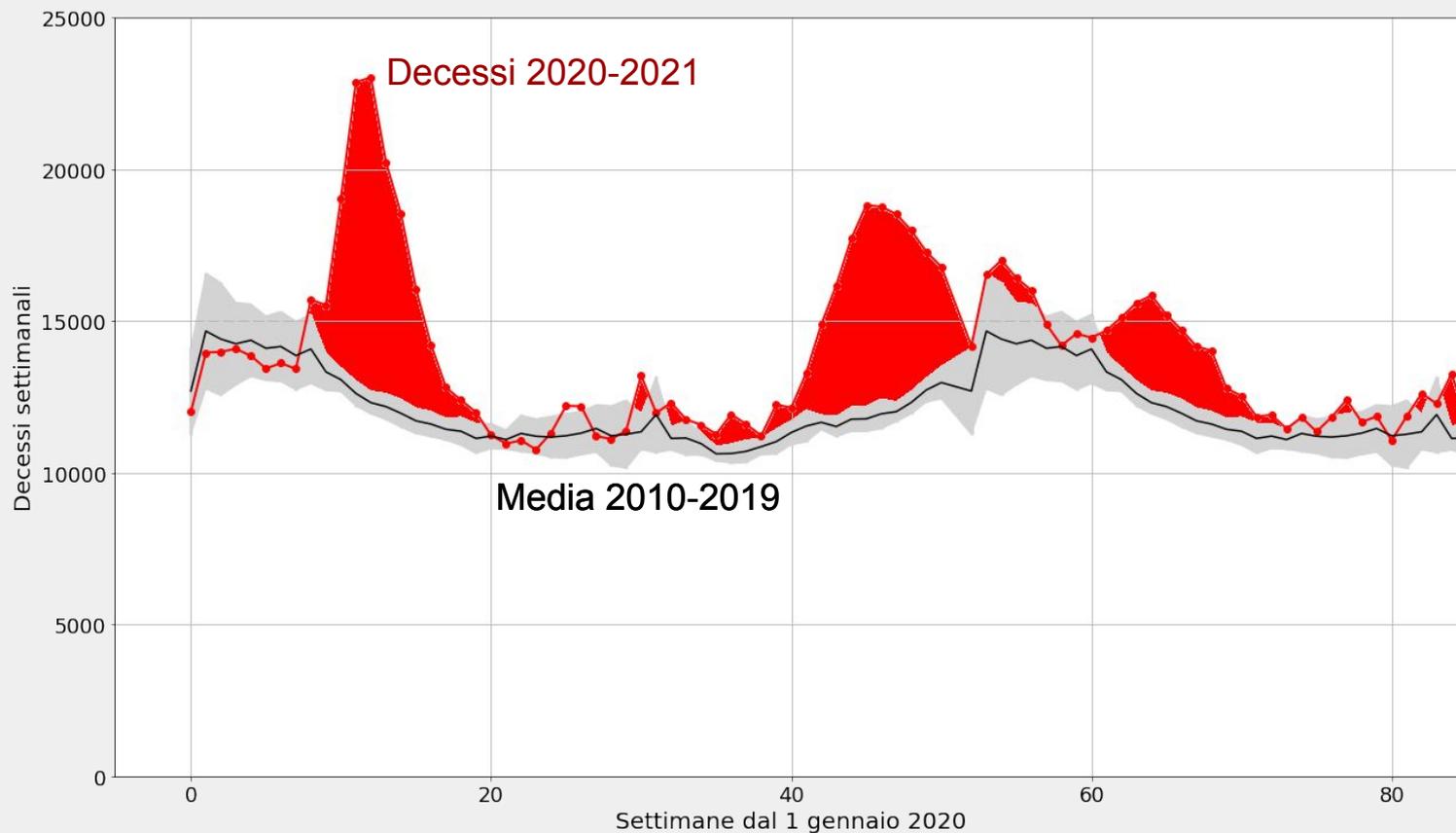
LA GENTE  
COME NOI  
NON MOLLA  
!!!

**3783**

PAZIENTI DECEDUTI POSITIVI ALL'INFEZIONE DA SARS-COVID-2 IN ITALIA  
Fonte: ISTITUTO SUPERIORE DI SANITA' (ISS) - RAPPORTO DEL 19/10/2021







# Smontiamo le bufale



# Immagini false

- Spesso le notizie false sono accompagnate da immagini vere, ma **fuori contesto**
  - Per gonfiare le dimensioni di una manifestazione
  - Per creare disinformazione contro una minoranza (es: i migranti)



 Upload

Paste or enter image URL



## 41 results

Searched over **52.2 billion images** in 0.8 seconds for:  
[static.nexilia.it/bufale/2021/11/immagine\\_2021-11-22\\_170252.png](https://static.nexilia.it/bufale/2021/11/immagine_2021-11-22_170252.png)

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- Show only 4 results found in **stock**

biggest image ▾

Filter by website / collection



### www.usatoday.com

[story/news/factcheck/2021/11/22/fact-c...](https://www.usatoday.com/story/news/factcheck/2021/11/22/fact-c...)

- First found on Nov 23, 2021

Filename: **636177814800442007-AP-9103100617.jpg**  
(2998 x 1694, 1.4 MB)

**Immagini false**



**Mosca 1991**

■ Hey Chat GPT,  
finish this building...

■ Hey Chat GPT,  
finish this building...

Your skills are irreplaceable.

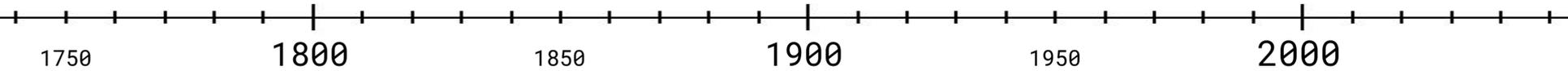
**IMPACT**

Satisfying jobs in construction and trade



# Rivoluzioni





Prima rivoluzione industriale  
Macchine a vapore

Produzione di massa  
Energia elettrica  
Catena di montaggio

Computer  
Robot  
Elettronica

Apprendimento automatico  
IoT



Termodinamica

Elettromagnetismo

Meccanica Quantistica

Sistemi Complessi

1750

1800

1850

1900

1950

2000

Industria 1.0

Prima rivoluzione industriale  
Macchine a vapore



Industria 2.0

Produzione di massa  
Energia elettrica  
Catena di montaggio



3.0

Computer  
Robot  
Elettronica



4.0

Apprendimento automatico  
IoT



5.0

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IoT



5.0

Formazione STEM



# Take home

- Siamo tutti vittima di **pregiudizi** cognitivi
  - Amplificati da ecosistema informativo
- Il **metodo scientifico** è il vaccino
  - Aiuta a proteggerci
  - Necessita richiami

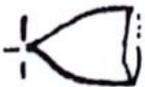


# Backup

**Cos'è** un fisico?



# Un curioso

$$G_{\mu\nu} + \Lambda g_{\mu\nu} = \kappa T_{\mu\nu}$$
$$\frac{\ddot{a}^2 + kc^2}{a^2} = \frac{8\pi G\rho + \Lambda c^2}{3}$$


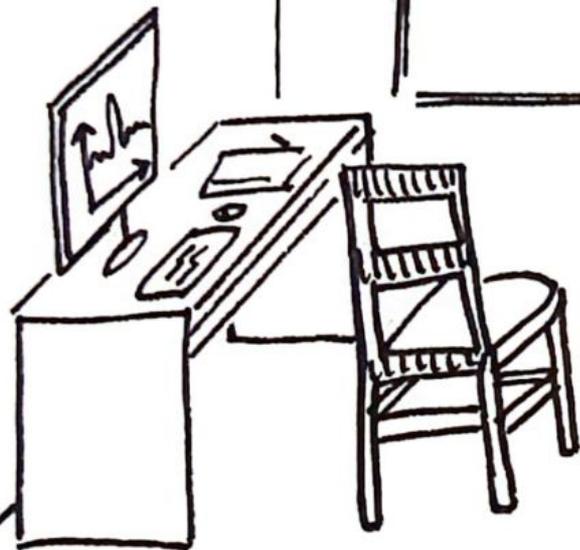
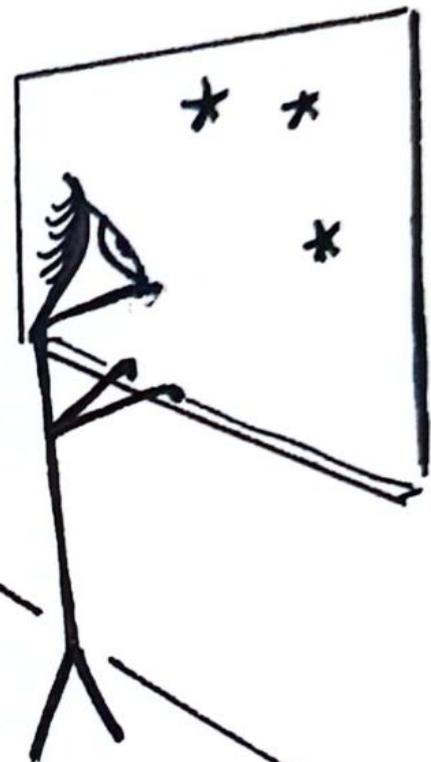




Diagram of a sphere with a vertical axis and a horizontal line representing the equator. A vector  $\vec{r}$  is shown from the center to the surface at an angle  $\theta$  from the vertical axis. The vertical component is  $r \cos \theta$  and the horizontal component is  $r \sin \theta$ .

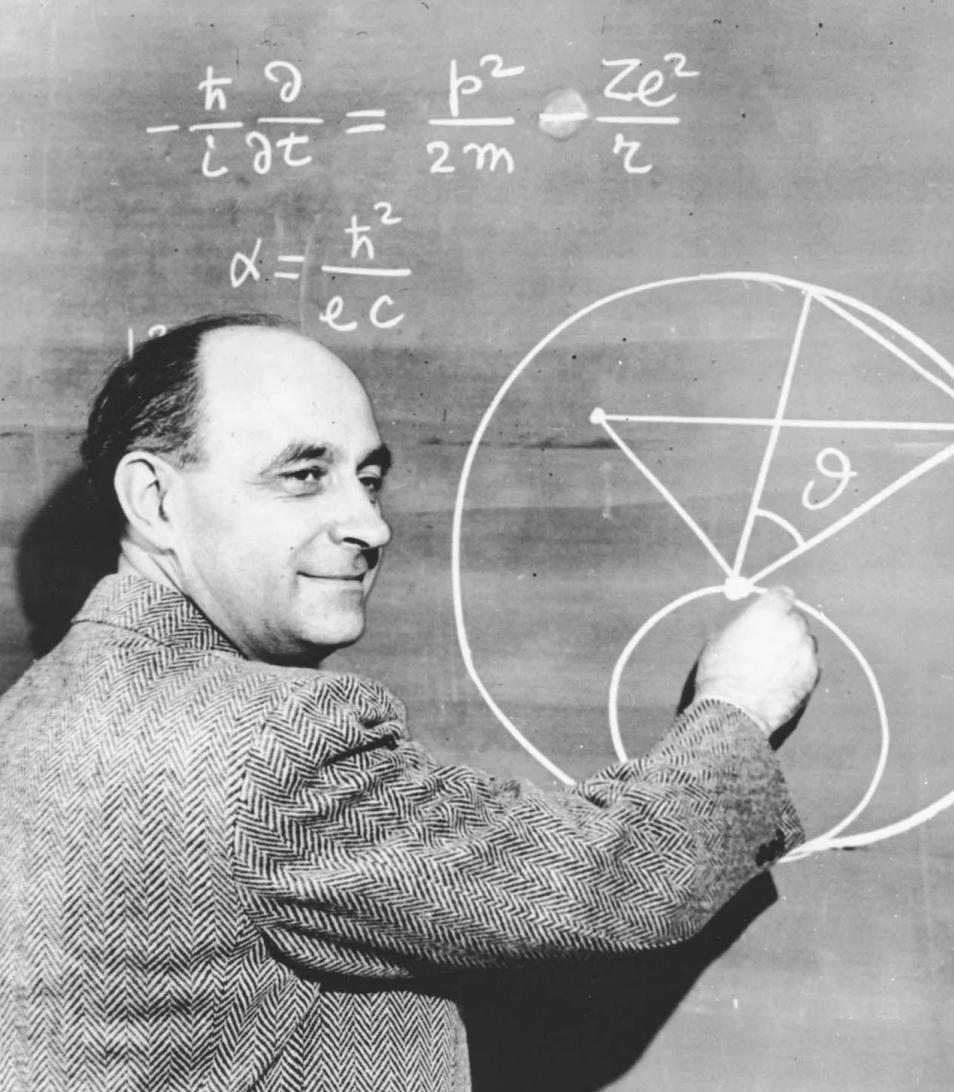
$$g^{SV} = g^{SV} + g^{LV} \cos \theta$$

~~$H = \frac{GM}{R} A A^T$~~   ~~$8\pi^2 \omega^2 R^3$~~   ~~$c^2 = ?$~~   $g_{\mu\nu} = \tilde{M}_1 \times \text{diag}(1, 1, 1, 1)$

$[A, A^T] = \dots$

$$R_{\mu\nu} = \tilde{M}_2 \times \left( \begin{matrix} \alpha_1^2 & \alpha_1 \alpha_2 & \alpha_1 \alpha_3 \\ \alpha_2^2 & \alpha_2 \alpha_3 & \alpha_2 \alpha_4 \\ \alpha_3^2 & \alpha_3 \alpha_4 & \alpha_3 \alpha_5 \\ \alpha_4^2 & \alpha_4 \alpha_5 & \alpha_4 \alpha_6 \\ \alpha_5^2 & \alpha_5 \alpha_6 & \alpha_5 \alpha_7 \\ \alpha_6^2 & \alpha_6 \alpha_7 & \alpha_6 \alpha_8 \end{matrix} \right) \propto \alpha_i \beta_j$$
$$= \tilde{M}_2 \left( \begin{matrix} \alpha_1^2 & \alpha_1 \alpha_2 & \alpha_1 \alpha_3 \\ \alpha_2^2 & \alpha_2 \alpha_3 & \alpha_2 \alpha_4 \\ \alpha_3^2 & \alpha_3 \alpha_4 & \alpha_3 \alpha_5 \\ \alpha_4^2 & \alpha_4 \alpha_5 & \alpha_4 \alpha_6 \\ \alpha_5^2 & \alpha_5 \alpha_6 & \alpha_5 \alpha_7 \\ \alpha_6^2 & \alpha_6 \alpha_7 & \alpha_6 \alpha_8 \end{matrix} \right)$$

$\Rightarrow \frac{G_{\mu\nu}}{\omega} = \tilde{M}_3 \frac{8\pi G T_{\mu\nu}}{R_H}$



Richard P. Feynman  
«**Sta scherzando,  
Mr. Feynman!**»

Vita e avventure  
di uno scienziato  
curioso

SAGGI ZANICHELLI

Richard P. Feynman  
«**Che t'importa  
di cosa dice la gente?**»

Altre avventure  
di uno scienziato  
curioso raccolte  
da Ralph Leighton

SAGGI ZANICHELLI





A cosa serve  
la **ricerca**?

“Costruire il Fermilab non ha nulla a che vedere con la difesa del nostro paese, eccetto di renderlo **degno** di essere difeso”

**Robert Wilson**

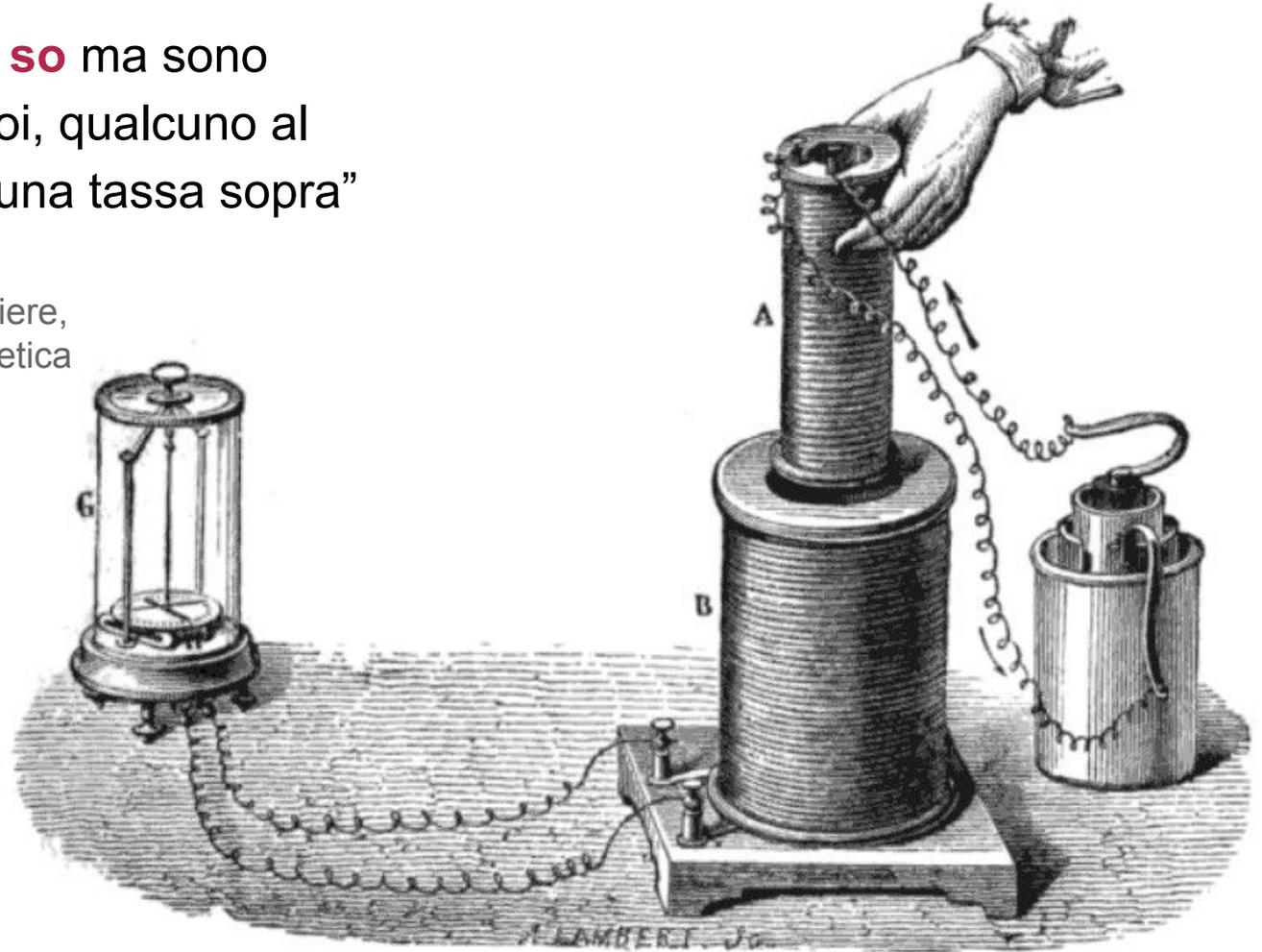
risposta al comitato ministeriale riguardo  
il finanziamento del Fermilab (1969)



“A cosa serve **non lo so** ma sono sicuro che, prima o poi, qualcuno al posto suo ci metterà una tassa sopra”

## Michael Faraday

al cancelliere dello scacchiere,  
sull'induzione elettromagnetica



**Ricerca**

**Applicata**

**Di Base**

**Ricerca**



**Applicata**

**Di Base**

**Ricerca**



**Applicata**



**Di Base**

# Centro Nazionale Adroterapia Oncologica



WWW



WWW

Vague but exciting ...

Tim Berners-Lee, CERN/DD

March 1989

proposal

Information Management: A Proposal

Abstract

