



CHALLENGE 6: THE COMPETITION BETWEEN SCIENCE AND PSEUDOSCIENCE

HOW TO DEAL WITH MISINFORMATION AND DISINFORMATION
DURING PUBLIC HEALTH EMERGENCIES

MADDALENA FIORELLI, PhD
UNIVERSITÀ DELLA SVIZZERA ITALIANA

“No one in the history of the world has ever self-identified as a pseudoscientist. There is no person who wakes up in the morning and thinks to himself, ‘I’ll just head into my pseudolaboratory and perform some pseudoexperiments to try to confirm my pseudotheories with pseudofacts.’”

The Pseudoscience Wars (University of Chicago Press, 2012)

LEARNING OBJECTIVES

1. Learning about **pseudoscience and its characteristics**
2. Understanding why it can be **hard to distinguish between science and pseudoscience**
3. Reflecting on the examples to **build on best practices** to develop recommendations for institutional communication

DEFINITION

- **Science:** «First, it is an activity carried out by scientists, with certain raw materials, purpose and methodology. Second, it is the *result* of this activity: a well-established and well-tested body of facts, laws and models that describe the natural world.»

Science is a biologically secondary knowledge that is acquired through education and the use of critical and reflective reasoning (Corbellini, 2019)

DEFINITION

- **Pseudoscience:** «The theory, the doctrine, the current of thought or similar, that claims to be recognized as science, even though it is lacking the scientific foundations» (Treccani Encyclopedia)
- «a system of theories, assumptions, and methods erroneously regarded as scientific» (Merriam Webster dictionary)

→ **Often the premise of misinformation**

DISTINGUISHING BETWEEN THE TWO

The study of demarcation

(of science from pseudoscience)

- Theoretical valence (e.g. Popper, Lakatos): it contributes to the philosophy of science
- Practical valence: the distinction is important for decision guidance
 - *Example from Healthcare*: Medical science develops and evaluates treatments according to evidence of their effectiveness. Related pseudoscientific activities give rise to ineffective and sometimes dangerous interventions.

DISTINGUISHING BETWEEN THE TWO



We can fairly safely say that we are dealing with pseudoscience if the results:

- (1) cannot be tested in any way,
- (2) have been tested and always failed the test, or
- (3) predict results that are contradictory to well established and well tested science

THE PSEUDOSCIENCE CONTINUUM

acupuncture

According to the National Institute of Health more than 10 million adults in the U.S. have used acupuncture at some time in the past or are using it currently.

There's never been an acupuncture study in China with a negative result. What are the odds? About the same as a fair coin flip coming up tails 99 times in a row or a fair investor always beating the market.

The OGM
dispute



←
Whole discipline
(traditional epistemology)

→
Single message
(science popularization)

EXAMPLES

EFFICACY EVALUATION OF A SLIMMING COSMETIC PRODUCT INTENSIVE FOR NIGHT TREATMENT – SC IN 7 GEL – Ref: SC -MR 017/17 (abstract)

Ref: SC-MR 017/17

PRODUCT:

SPONSOR:

INVESTIGATOR:

RESPONSIBLE OF THE STUDY:

STUDY OBJECTIVE

Purpose of the study was to evaluate the efficacy of a cosmetic topical slimming treatment versus placebo, applied once a day, before going to sleep, for a period of 4 weeks, under dermatological control. It was also aim of the study to evaluate efficacy and cosmetic acceptability by investigator and volunteers.

METHODOLOGY

The randomized controlled trial was a double blind vs placebo.

Four visits have been made by the investigators:

- Basal condition (before starting with the application) (T0)
- After 7 nights of treatment (T7)
- After 15 nights of treatment (T15)
- At the end, after 4 weeks of treatment (T28)

At each visit, clinical assessment and instrumental measurements have been performed, in the following sites:

- a) Middle Thigh
- b) Hips at level of sub-gluteal furrow
- c) Waist at level of the umbilicus
- d) Knee above the kneecap (only for morphometric measurements)

Furthermore volunteers' body weights were recorded at T0, T7, T15 and T28.

The morphometric measures and ultrasonographic evaluations, to quantify the thickness of the adipose tissue and the edema in the dermis, indicate the reduction of circumferences and the effects on the fatty layer and on the dermal oedema.

All data collected have been statistically analyzed.

RESULTS AND CONCLUSION

The morphometric and ultrasonography evaluations highlighted the slimming activity of the study product SC IN 7 GEL - Form. n°8288 already after 7 nights of treatment and more noticeably after 15 nights and 4 weeks of application a statistically and clinically significant improvement in all the parameters studied.

Concerning the placebo no clinically and instrumental appreciable variation of morphometric assessment was showed.

No adverse event/reaction related or unrelated to the study products occurred during the trial. 100% of the volunteers judged good the tolerance of the study creams already after the first application. The good tolerance of both study products (100%) was confirmed by the investigator.

Prof. Marisa Mosca

Dr. Claudia Rona

BODY

Slimming 7 Nights Ultra-Intensi Gel

The maximum slimming effectiveness of Somatoline i already in 7 nights.

*Effectiveness test conducted by the Oikos Institute i SC - MR 017/17

[Read the complete study](#)

BUY NOW

Sample size?

a

ire a carpire le tue informazioni da ssword, messaggi o carte di credito). Ulteriori

ome inviando a Google gli URL di alcune pagine alcuni contenuti delle pagine. Norme sulla privacy

Torna nell'area protetta

che si tratta di www.oikosfragrances.it; il a www.fioristabilizzati.it. Il problema urazione o a un malintenzionato che

MOTIVATIONS BEHIND PSEUDOSCIENCE

- A feeling that the world described by science is **too ordered and constraining**
- A conviction that there are **in nature hidden powers that can be mastered by the human mind**
- **Nothing conceivable is impossible**
- A science that doesn't appeal to my **common sense** can't be correct
- True science should be **understandable by anyone**

BIASES BEHIND PSEUDOSCIENCE

Cognitive psychology described a set of biases that make pseudoscientific explanation seem natural to us (Corbellini, 2019):

1. Confirmation bias
2. Blind spot bias (meta-bias)
3. Barnum effect bias
4. Placebo effect bias
5. Regression fallacy
6. Irrational escalation (or Escalation of commitment)
7. ..let's not forget the Dunning-Kruger effect

1. CONFIRMATION BIAS



<http://chainsawsuit.com/comic/2014/09/16/on-research/>

2. BLIND SPOT BIAS

- Tendency to see oneself as less **biased** than other people, or to be able to identify more cognitive **biases** in others than in oneself

3. BARNUM EFFECT BIAS



- occurs when individuals believe that generic personality descriptions and **statements** apply to themselves. In reality, the description is general and vague enough to apply to almost everyone

4. PLACEBO EFFECT BIAS

- Patients receiving **placebo**, and believing they are receiving genuine treatment are less likely to seek alternative treatment, or to modify their basic care treatment



5. REGRESSION FALLACY

- It assumes that something has returned to normal because of corrective actions taken while it was abnormal. This fails to account for natural fluctuations



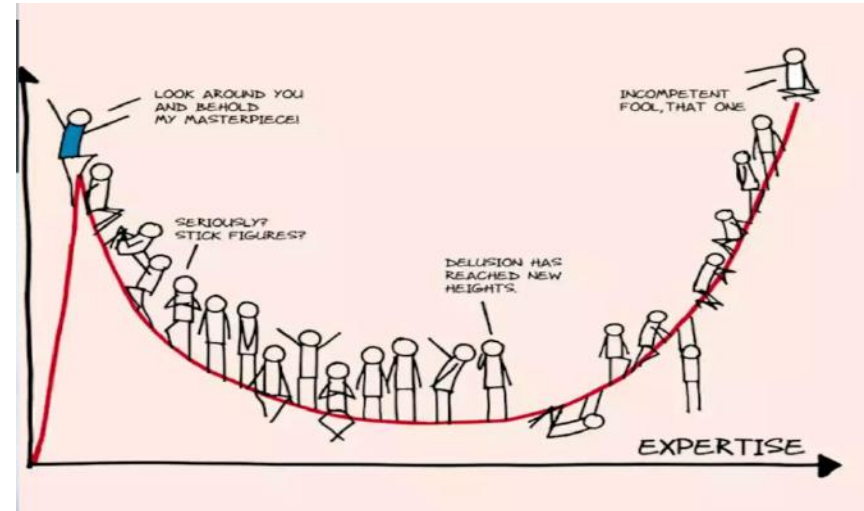
6. IRRATIONAL ESCALATION

- **Escalation** of commitment is a human behavior pattern in which an individual or group facing increasingly negative outcomes from a decision, action, or investment nevertheless continues the behavior instead of altering course.



7. DUNNING-KRUGER EFFECT

- People wrongly overestimate their knowledge or ability in a specific area
- This tends to occur because a lack of self-awareness prevents them from accurately assessing their own skills.



OTHER IMPORTANT CONCEPTS



Illusions of causality occur when people develop the belief that there is a causal connection between two events that are actually unrelated.

PSEUDOSCIENCE & COVID-19

Difficult to distinguish because:

- pulled together in a **same pot**
- the source of advice is a so-called «**doctor**»
- appeal to **common sense**
- statements that **we cannot verify**.. probably containing **some truth**

«It contains shikimic acid that is used as a base material for the production of Tamiflu, which is used for influenza virus. It is super powerful as an anti-viral.»

Coronavirus spread: Foods that can help boost your immunity

TIMESOFINDIA.COM | Last updated on - Mar 2, 2020, 16:20 IST

Share



Comments (9)

01 / 9 Fighting Coronavirus: Anti-viral foods to boost immunity



Reise durch die Zeitalter und führe deine Stadt zum Erfolg. Spiele Forge of Empires gratis

Forge of Empires

Other >

SPONSORED STORIES



Parenting hacks: Protect your baby



Vaccination of kids is one of the most stressful parts of...

PSEUDOSCIENCE & COVID-19

Difficult to distinguish science from pseudoscience when:

- pseudoscience is endorsed by politicians



With care and caution,
**Corona Virus Infections
can be prevented.**

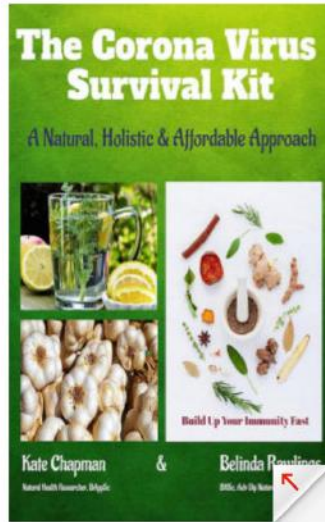
Here are some solutions from:

-  **Ayurveda**
-  **Unani**
-  **Homoeopathy**

PSEUDOSCIENCE & COVID-19

Difficult to distinguish when:

- There are economic interests



 Add to Wishlist

The Corona Virus Survival Kit: A Natural, Holistic & Affordable Approach

by Kate Chapman, Belinda Rawlings

★★★★★ (0)

NOOK Book (eBook)

\$3.00

ADD TO CART

Sign in to Purchase Instantly

Available on Compatible NOOK Devices and the free NOOK Apps. ⓘ

 WANTA NOOK? Explore Now

 Get Free NOOK Book Sample

 Buy As Gift

 LEND ME® See Details

coronavirus
and some are trying to

PSEUDOSCIENCE & COVID-19

Fact-checking
as a
viable
solution

While several drug trials are ongoing, there is currently no proof that hydroxychloroquine or any other drug can cure or prevent COVID-19.

The misuse of hydroxychloroquine can cause serious side effects and illness and even lead to death.

WHO is coordinating efforts to develop and evaluate medicines to treat COVID-19.



#Coronavirus

#COVID19

FACT:
There are currently no
drugs licensed for the
treatment or prevention
of COVID-19



27 April 2020

PSEUDOSCIENCE & COVID-19

Fact-checking
as a
viable
solution

No. Vaccines against pneumonia, such as pneumococcal vaccine and Haemophilus influenza type B (Hib) vaccine, do not provide protection against the new coronavirus.

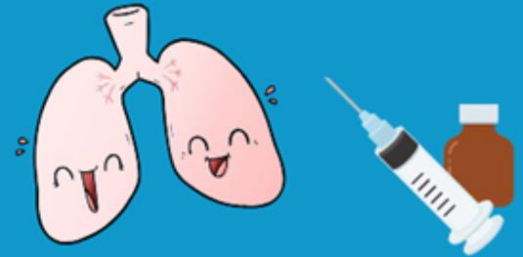
The virus is so new and different that it needs its own vaccine. Researchers are trying to develop a vaccine against 2019-nCoV, and WHO is supporting their efforts.

Although these vaccines are not effective against 2019-nCoV, vaccination against respiratory illnesses is highly recommended to protect your health.



#2019nCoV

Do vaccines against pneumonia protect you against the new coronavirus?



PSEUDOSCIENCE & COVID-19

Fact-checking
as a
viable
solution

No, antibiotics do not work against viruses, only bacteria.

The new coronavirus (2019-nCoV) is a virus and, therefore, antibiotics should not be used as a means of prevention or treatment.

However, if you are hospitalized for the 2019-nCoV, you may receive antibiotics since bacterial co-infection is possible.



#Coronavirus

Are antibiotics effective in preventing and treating the new coronavirus?



PSEUDOSCIENCE & COVID-19

Fact-checking
as a
viable
solution

To date, there is no specific medicine recommended to prevent or treat the new coronavirus (2019-nCoV).

However, those infected with the virus should receive appropriate care to relieve and treat symptoms, and those with severe illness should receive optimized supportive care. Some specific treatments are under investigation, and will be tested through clinical trials.

WHO is helping to accelerate research and development efforts with a range of partners.

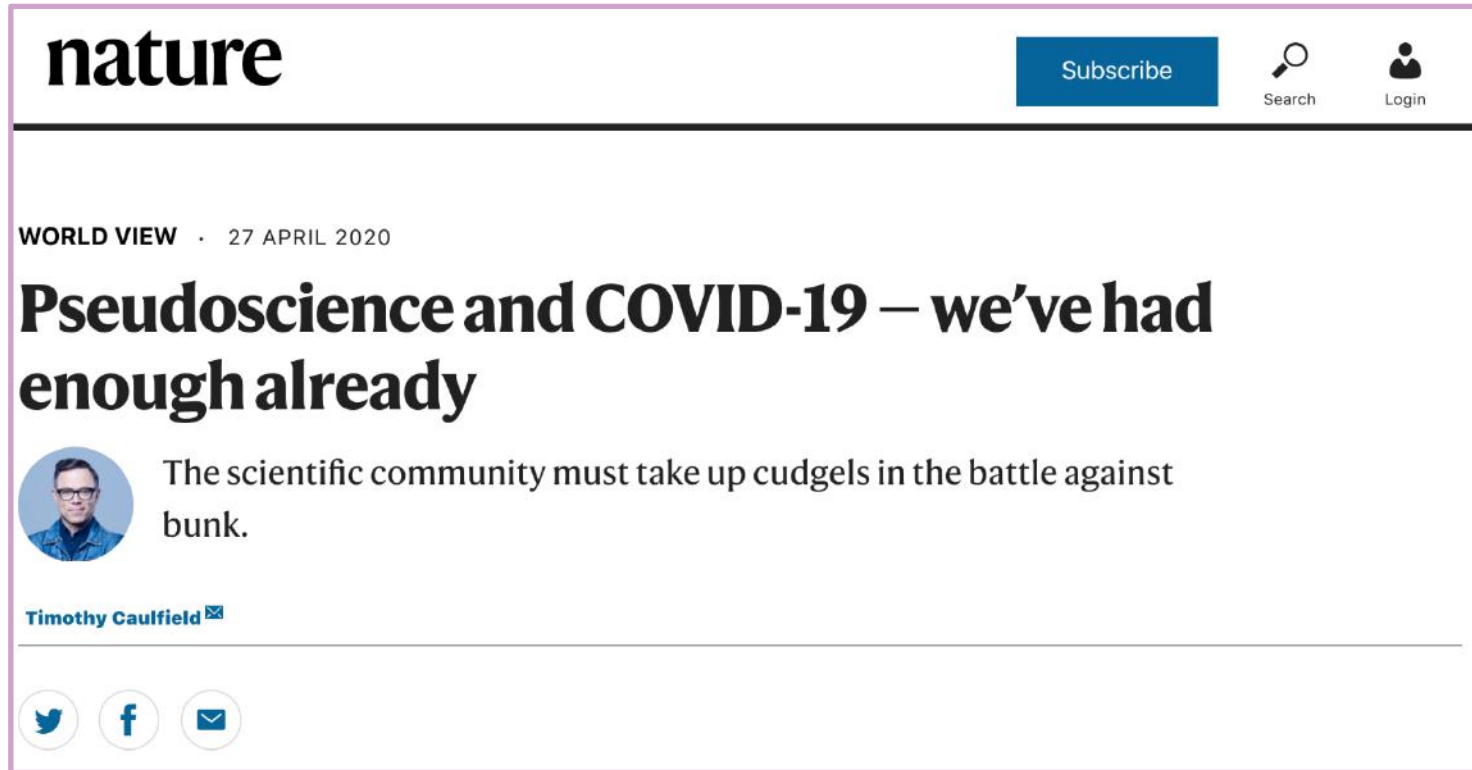


#Coronavirus

Are there any
specific medicines
to prevent or
treat the new
coronavirus?



TIME FOR SCIENCE TO REACT?





The image is a screenshot of a web page from the journal Nature. At the top left is the 'nature' logo. To the right are a blue 'Subscribe' button, a search icon with the text 'Search', and a user icon with the text 'Login'. Below the header, the text 'WORLD VIEW · 27 APRIL 2020' is displayed. The main headline reads 'Pseudoscience and COVID-19 – we've had enough already'. To the left of the text is a circular profile picture of a man with glasses. To the right of the picture is the text 'The scientific community must take up cudgels in the battle against bunk.' Below this is the author's name 'Timothy Caulfield' with a small envelope icon. At the bottom left of the article area are three circular icons for social media: Twitter, Facebook, and Email.




nature [Subscribe](#) [Search](#) [Login](#)

WORLD VIEW · 27 APRIL 2020

Pseudoscience and COVID-19 – we've had enough already

 The scientific community must take up cudgels in the battle against bunk.

Timothy Caulfield 

TIME FOR SCIENCE TO REACT?

If this pro-science response is to endure, all scientists must stand up for quality information:

1. we must stop tolerating and legitimizing health pseudoscience, especially at universities and health-care institutions.
2. more researchers should become active participants in the public fight against misinformation.

(Caulfield, 2020)

“The best way to fight misinformation is to swamp the landscape with accurate information that is easy to digest, engaging and easy to share on mobile devices.”

(Wardle, 2020)

BEST PRACTICES

What institutions should do:

- Be aware that not all what seem science is *really* science
- Become able to **distinguish between science and pseudoscience**
- **Avoid the promotion** and dissemination of pseudoscience
- **React** against pseudoscience → see the best practice in the module «conspiracies»
- Educate on the **scientific thinking** starting from school education

REFERENCES

Gordin, M. D. (2012). *The pseudoscience wars: Immanuel Velikovsky and the birth of the modern fringe*. University of Chicago Press.

Corbellini, G. (2019) Nel paese della pseudoscienza. Perché i pregiudizi minacciano la nostra libertà. Milano: Feltrinelli

Caulfield, T. (2020). Pseudoscience and COVID-19-we've had enough already. *Nature*.

Desta, T. T., & Mulugeta, T. (2020). Living with COVID-19-triggered pseudoscience and conspiracies. *International Journal of Public Health*, 1-2.

Lakatos, I. (1978). Science and pseudoscience. *Philosophical papers*, 1, 1-7.

Hansson, S. O. (2008). Science and pseudo-science. Retrievable at:

https://plato.stanford.edu/entries/pseudo-science/?utm_source=instantmagazine&utm_medium=organic&utm_campaign=OImrt19