

# Criminal Machine Learning

## Responses to Critiques on Machine Learning of Criminality Perceptions (Addendum of arXiv:1611.04135)

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In November 2016 we submitted to arXiv our paper “Automated Inference on Criminality Using Face Images”. It generated a great deal of discussions in the Internet and some media outlets. Our work is only intended for pure academic discussions; how it has become a media consumption is a total surprise to us.

Although in agreement with our critics on the need and importance of policing AI research for the general good of the society, we are deeply baffled by the ways some of them misrepresented our work, in particular the motive and objective of our research.

### 1. Name calling

It should be abundantly clear, for anyone who reads our paper with a neutral mind setting, that our only motive is to know if machine learning has the potential of acquiring humanlike social perceptions of faces, despite the complexity and subtlety of such perceptions that are functions of both the observed and the observer. Our inquiry is to push the envelope and extend the research on automated face recognition from the biometric dimension (e.g., determining the race, gender, age, facial expression, etc.) to the sociopsychological dimension. We are merely interested in the distinct possibility of teaching machines to pass the Turing test on the task of duplicating humans in their first impressions (e.g., personality traits, mannerism, demeanor, etc.) of a stranger. The face perception of criminality was expediently (unfortunately to us in hindsight) chosen as an easy test case, at least in our intuition as explained in our paper:

*“For validating the hypothesis on the correlations between the innate traits and social behaviors of a person and the physical characteristics of that persons face, it would be hard pushed to find a more convincing experiment than examining the success rates of discriminating between criminals and non-criminals with modern automatic classifiers. These two populations should be among the easiest to differentiate, if social*

*attributes and facial features are correlated, because being a criminal requires a host of abnormal (outlier) personal traits. If the classification rate turns out low, then the validity of face-induced social inference can be safely negated.”*

By a magical stretch of imagination, few of our critics intertwine the above passage into some of our honest observations and morph them into the following deduction of, they insist, ours:

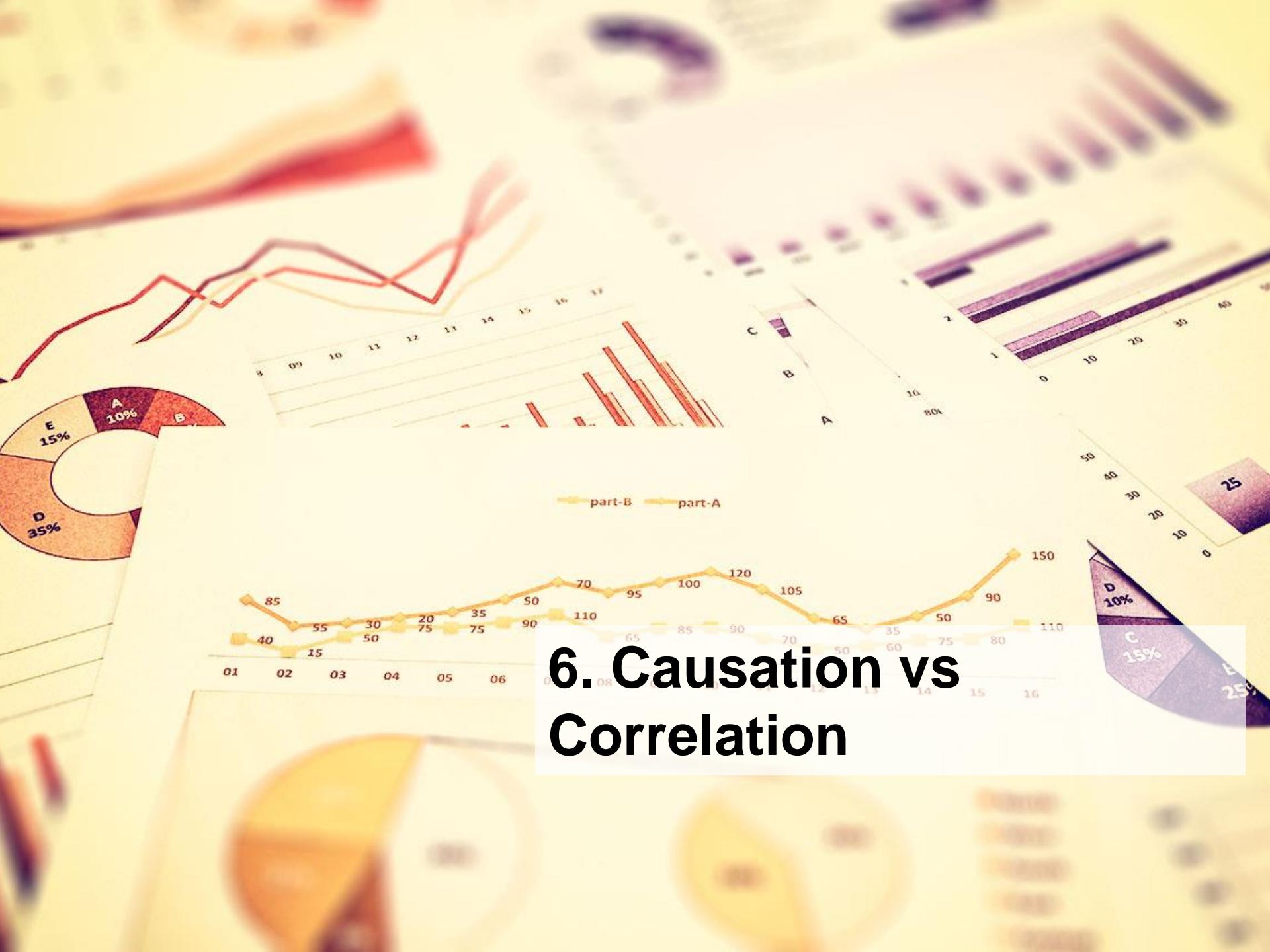
*“Those with more curved upper lips and eyes closer together are of a lower social order, prone to (as Wu and Zhang put it) “a host of abnormal (outlier) personal traits” ultimately leading to a legal diagnosis of “criminality” with high probability.”*

We agree that the pungent word criminality should be put in quotation marks; a caveat about the possible biases in the input data should be issued. Taking a court conviction at its face value, i.e., as the “ground truth” for machine learning, was indeed a serious oversight on our part. However, throughout our paper we maintain a sober neutrality on whatever we might find; in the introduction, we declare

*“In this paper we intend not to nor are we qualified to discuss or debate on societal stereotypes, rather we want to satisfy our curiosity in the accuracy of fully automated inference on criminality. At the onset of this study our gut feeling is that modern tools of machine learning and computer vision will refute the validity of physiognomy, although the outcomes turn out otherwise.”*

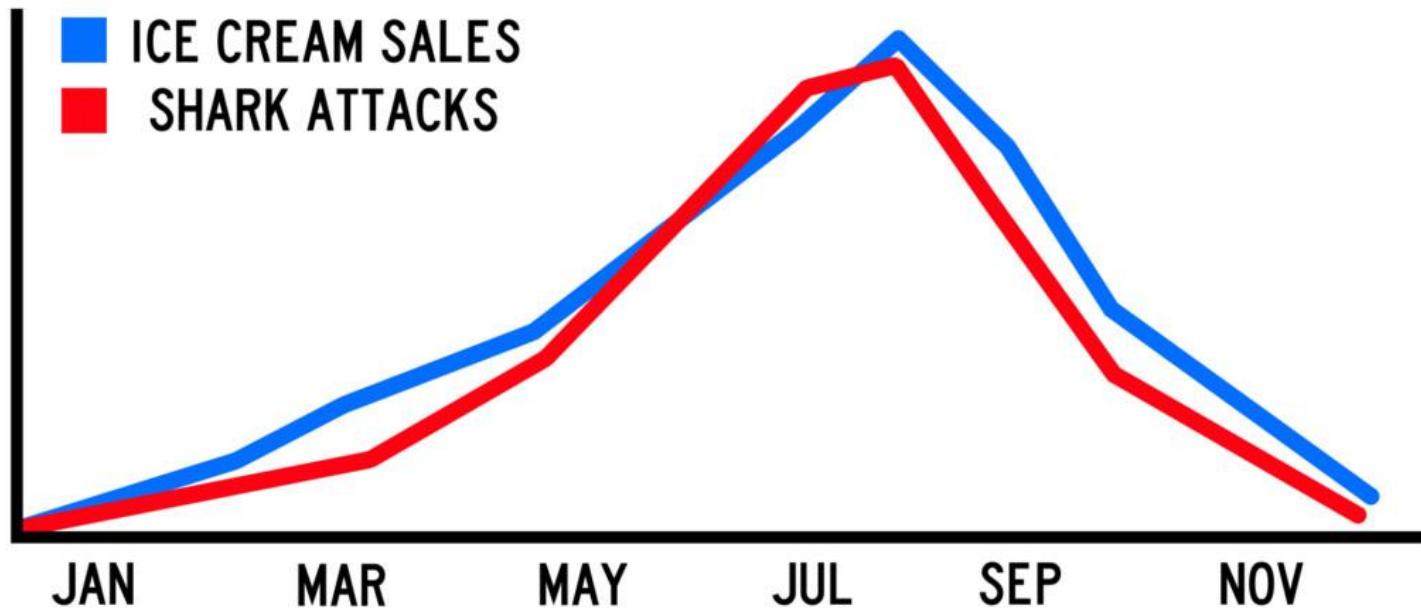
Nowhere in our paper advocated the use of our method as a tool of law enforcement, nor did our discussions advance from correlation to causality. But still we got interpreted copiously by some with an insinuation of racism. This is not the way of academic exchanges we are used to.

## 6. Causation vs Correlation



# Causation or Correlation?

## CORRELATION IS NOT CAUSATION!



Both ice cream sales and shark attacks increase when the weather is hot and sunny, but they are not caused by each other (they are caused by good weather, with lots of people at the beach, both eating ice cream and having a swim in the sea)

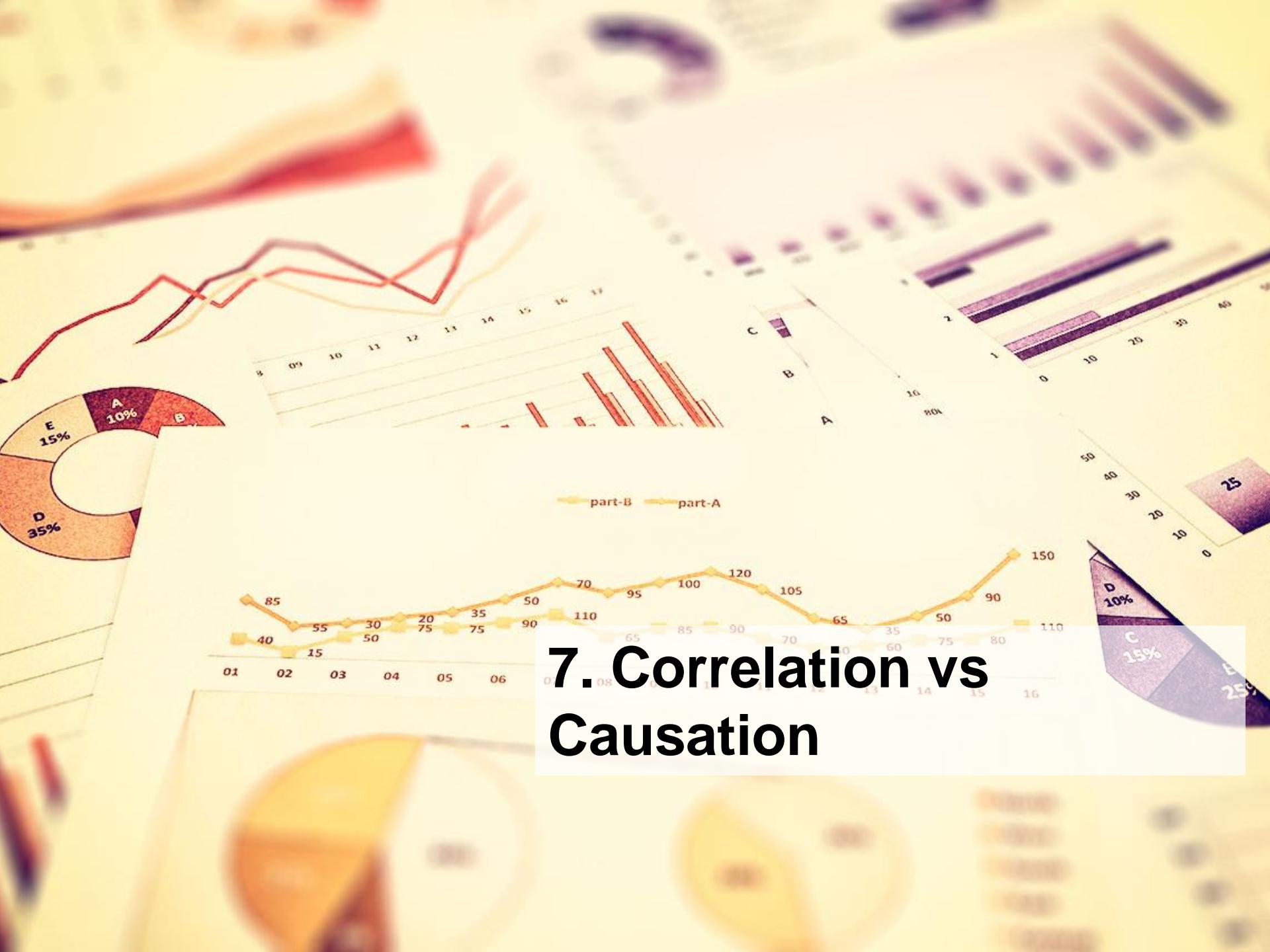
# **Michael Amberg**

Todays Content:

- 1. Motivation**
- 2. Context Data Science**
- 3. Intro to Bullshit**
- 4. Old School Bullshit**
- 5. New School Bullshit**
- 6. Causation / Correlation**
- 7. Bullshit in Science**
- 8. Bullshit in AI / ML**
- 9. Summary**



## 7. Correlation vs Causation



# Correlation or Causation?

## Bergstrom, Calling Bullshit:

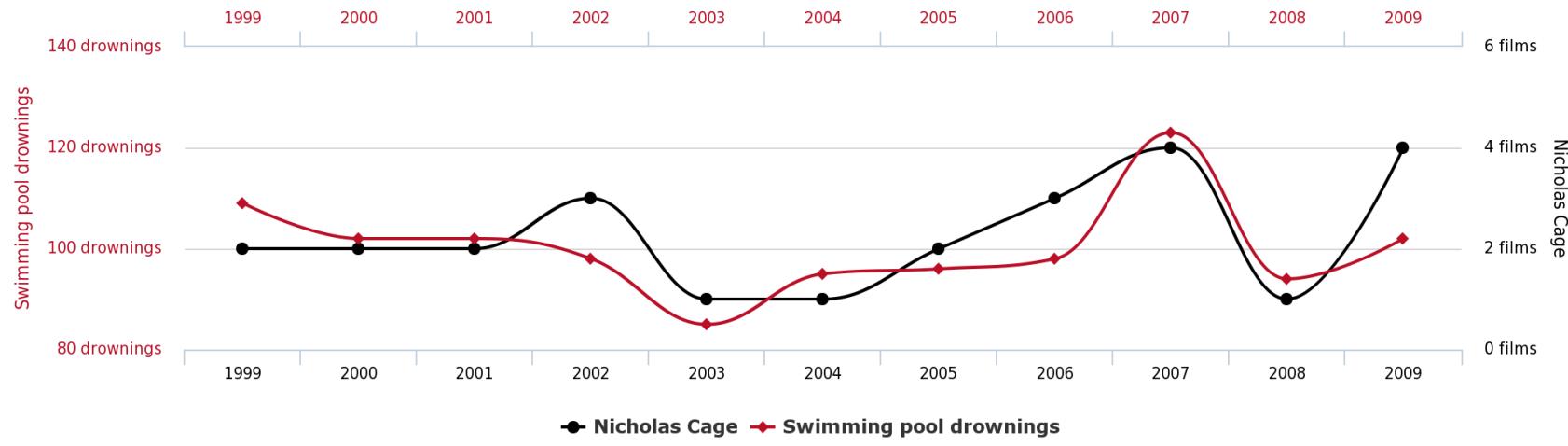
- Two **variables** are correlated when knowing the **value of one** gives you **information** about the likely **value** of the **other**.
- Two **variables** (states, events) are causally related when one variable (...) **influence** the other via a **cause-and-effect process**.

# Correlation or Causation?



# Correlation or Causation?

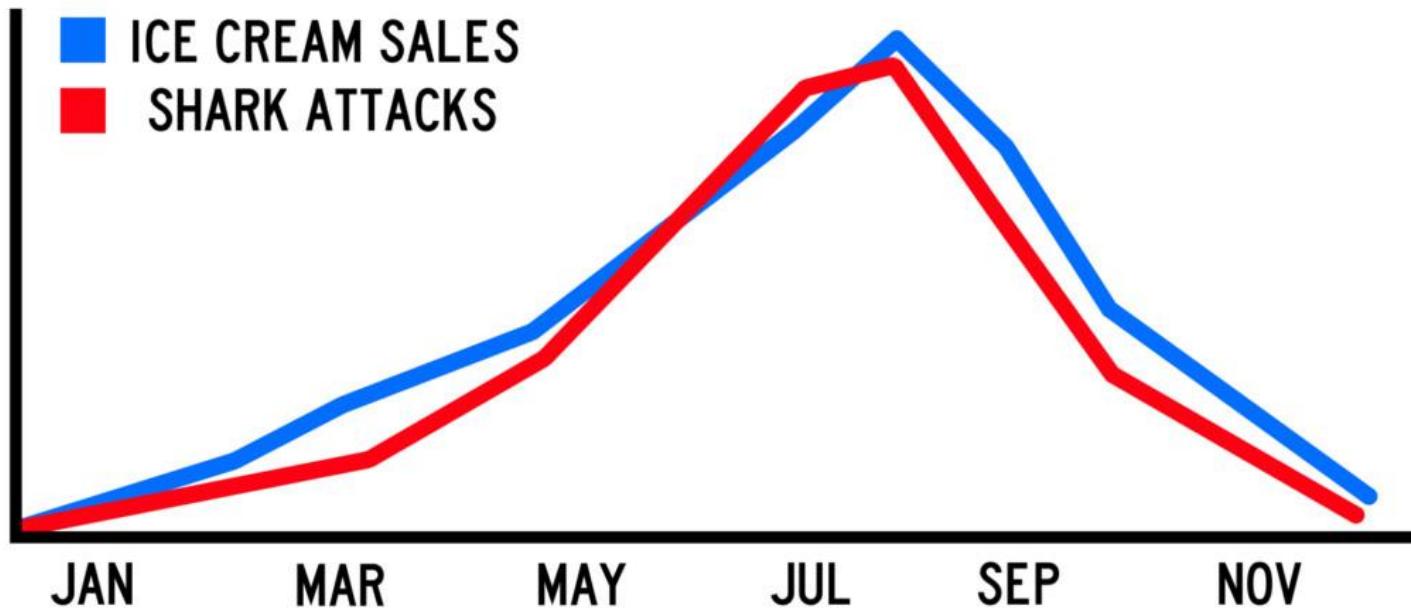
**Number of people who drowned by falling into a pool**  
correlates with  
**Films Nicolas Cage appeared in**



tylervigen.com

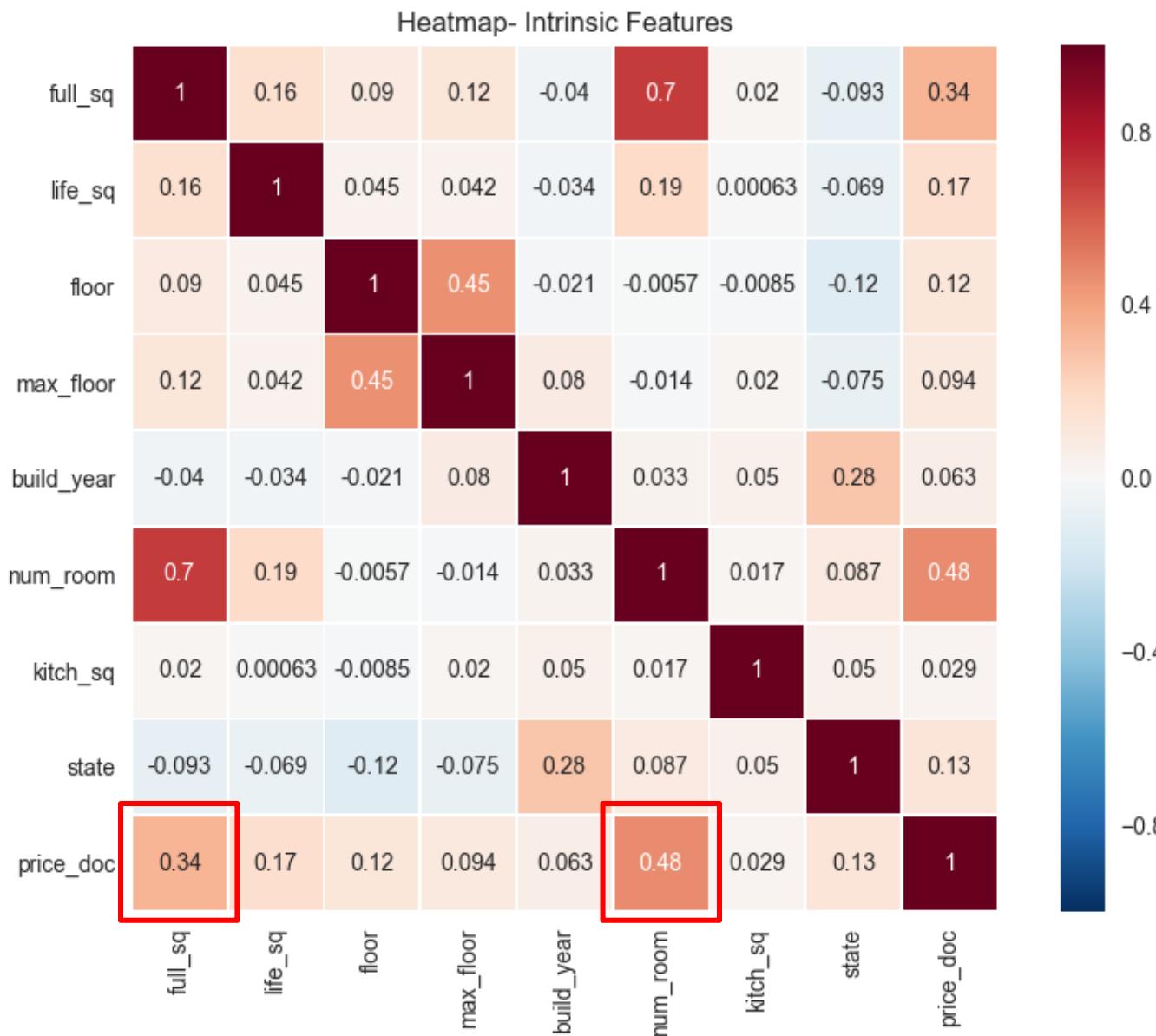
# Correlation or Causation?

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# Correlation illustrated by a heatmap.



The prices of houses are correlated with the number of square meters and the number of rooms

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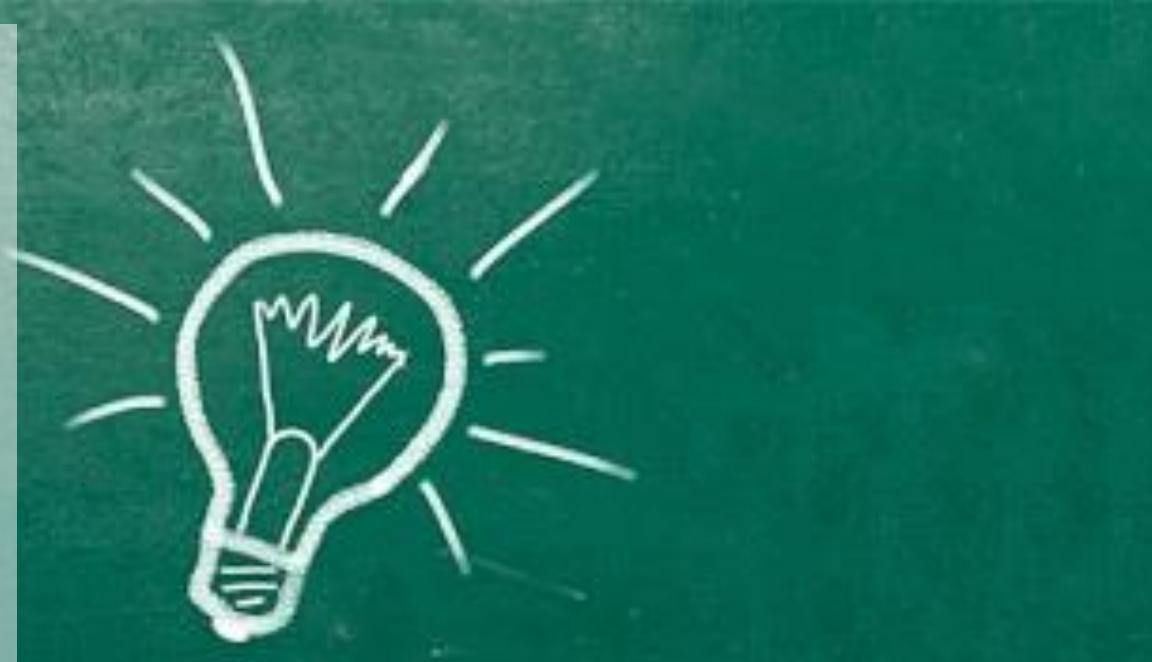
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  2. Context Data Science
  3. Basics of Bullshit
  4. Old School Bullshit
  5. New School Bullshit
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We are drowning in Bullshit.

Statistical Bullshit is the new norm.

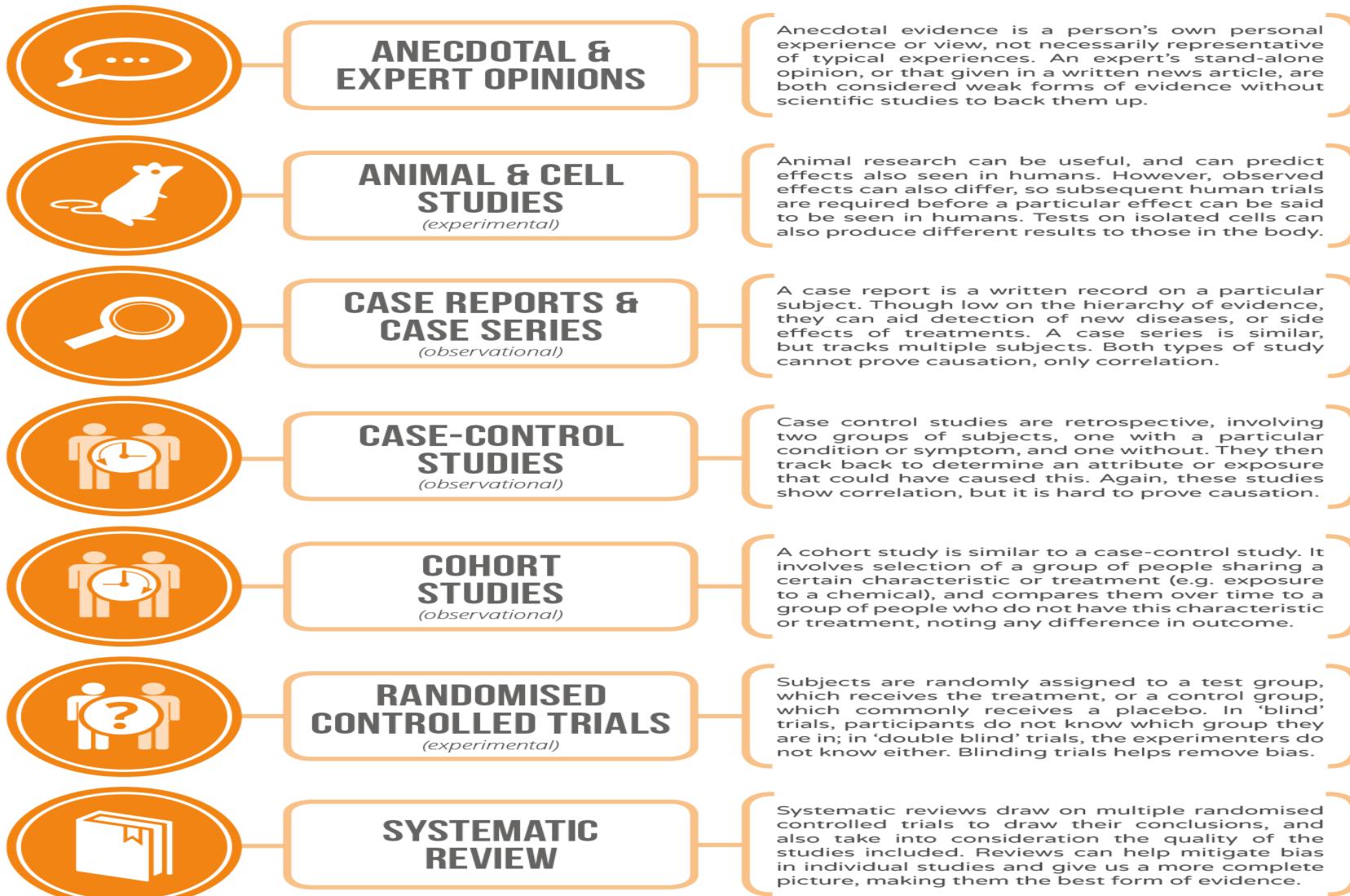
Avoid falling for Bullshit.

Society needs Critical Thinking & Data Science Skills more than ever.

# TYPES OF SCIENTIFIC EVIDENCE

Being able to evaluate the evidence behind a claim is important, but scientific evidence comes in a variety of forms. Here, the different types of scientific evidence are ranked and described, particularly those relevant to health and medicinal claims.

INCREASING STRENGTH OF EVIDENCE



Note that in certain cases, some of these types of evidence may not be possible to procure, for ethical or other reasons.

# Michael Amberg

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# Investigation of energy production by synchrotron, synchrocyclotron and laser radiations in human cancer cells, tissues and tumors and evaluation of their effective on human cancer cells, tissues and tumors treatment trend

Alireza Heidari<sup>1\*</sup> and Ricardo Gobato<sup>2</sup>

<sup>1</sup>Faculty of Chemistry, California South University, 14731 Comet St. Irvine, CA 92604, USA

<sup>2</sup>State Secretariat for Education of Paraná, Laboratory of Biophysics and Molecular Modeling Genesis, Bela Vista do Paraiso, Paraná, Brazil

Development of synchrotron, synchrocyclotron and LASER radiations increased significantly in human cancer cells, tissues and tumors that led to their effective of attention to the creation of human cancer cells, tissues and tumors treatment trend. The best methods and techniques for decreasing human cancer cells, tissues and tumors is investigation of energy production by synchrotron, synchrocyclotron and LASER radiations in human cancer cells, tissues and tumors and evaluation of their effective on human cancer cells, tissues and tumors treatment trend. To achieve this goal, according to the studies by factors in the process such as pH, temperature and retention time, among the systems were used for this purpose, single-stage systems under synchrotron, synchrocyclotron and LASER radiations possesses higher efficiency. In the conversion process of the system, human benign cancer cells, tissues and tumors were produced with efficiency 99% in total. Efficiency 99% was obtained after irradiating of synchrotron, synchrocyclotron and LASER radiations on malignant human cancer cells, tissues and tumors under synchrotron, synchrocyclotron and LASER radiations for transformation process to benign human cancer cells, tissues and tumors with the passage of time [1-212].

## References

1. Alireza Heidari, Christopher Brown (2015) Study of Composition and Morphology of Cadmium Oxide (CdO) Nanoparticles for Eliminating Cancer Cells. *Journal of Nanomedicine Research*, Volume 2, Issue 5, 20 Pages.
2. Alireza Heidari, Christopher Brown (2015) Study of Surface Morphological, Phytochemical and Structural Characteristics of Rhodium (III) Oxide ( $Rh_2O_3$ ) Nanoparticles. *International Journal of Pharmacology, Phytochemistry and Ethnomedicine*, Volume 1, Pages 15-19.
8. Alireza Heidari (2016) Future Prospects of Point Fluorescence Spectroscopy, Fluorescence Imaging and Fluorescence Endoscopy in Photodynamic Therapy (PDT) for Cancer Cells. *J Bioanal Biomed* 8: e135.
9. Alireza Heidari (2016) A Bio-Spectroscopic Study of DNA Density and Color Role as Determining Factor for Absorbed Irradiation in Cancer Cells. *Adv Cancer Prev* 1: e102.
10. Alireza Heidari (2016) Manufacturing Process of Solar Cells Using Cadmium Oxide (CdO) and Rhodium (III) Oxide ( $Rh_2O_3$ ) Nanoparticles. *J Biotechnol Biomater* 6: e125.
11. Alireza Heidari (2016) A Novel Experimental and Computational Approach to Photobiostimulation of Telomeric DNA/RNA: A Biospectroscopic and Photobiological Study. *J Res Development* 4: 144.
12. Alireza Heidari (2016) Biochemical and Pharmacodynamical Study of Microporous Molecularly Imprinted Polymer Selective for Vancomycin, Teicoplanin, Oritavancin, Telavancin and Dalbavancin Binding. *Biochem Physiol* 5: e146.
13. Alireza Heidari (2016) Anti-Cancer Effect of UV Irradiation at Presence of Cadmium Oxide (CdO) Nanoparticles on DNA of Cancer Cells: A Photodynamic Therapy Study. *Arch Cancer Res.* 4: 1.
14. Alireza Heidari (2016) Biospectroscopic Study on Multi-Component Reactions (MCRs) in Two A-Type and B-Type Conformations of Nucleic Acids to Determine Ligand Binding Modes, Binding Constant and Stability of Nucleic Acids in Cadmium Oxide (CdO) Nanoparticles-Nucleic Acids Complexes as Anti-Cancer Drugs. *Arch Cancer Res.* 4: 2.
15. Alireza Heidari (2016) Simulation of Temperature Distribution of DNA/RNA of Human Cancer Cells Using Time-Dependent Bio-Heat Equation and Nd: YAG Lasers. *Arch Cancer Res.* 4: 2.
16. Alireza Heidari (2016) Quantitative Structure-Activity Relationship (QSAR) Approximation for Cadmium Oxide (CdO) and Rhodium (III) Oxide ( $Rh_2O_3$ ) Nanoparticles as Anti-Cancer Drugs for the Catalytic Formation of Proviral DNA from Viral RNA Using Multiple Linear and Non-Linear Correlation Approach. *Ann Clin*

# 1 Bullshit with Data

- The Art of Skepticism in a Data-Driven World  
(7) Correlation vs Causation



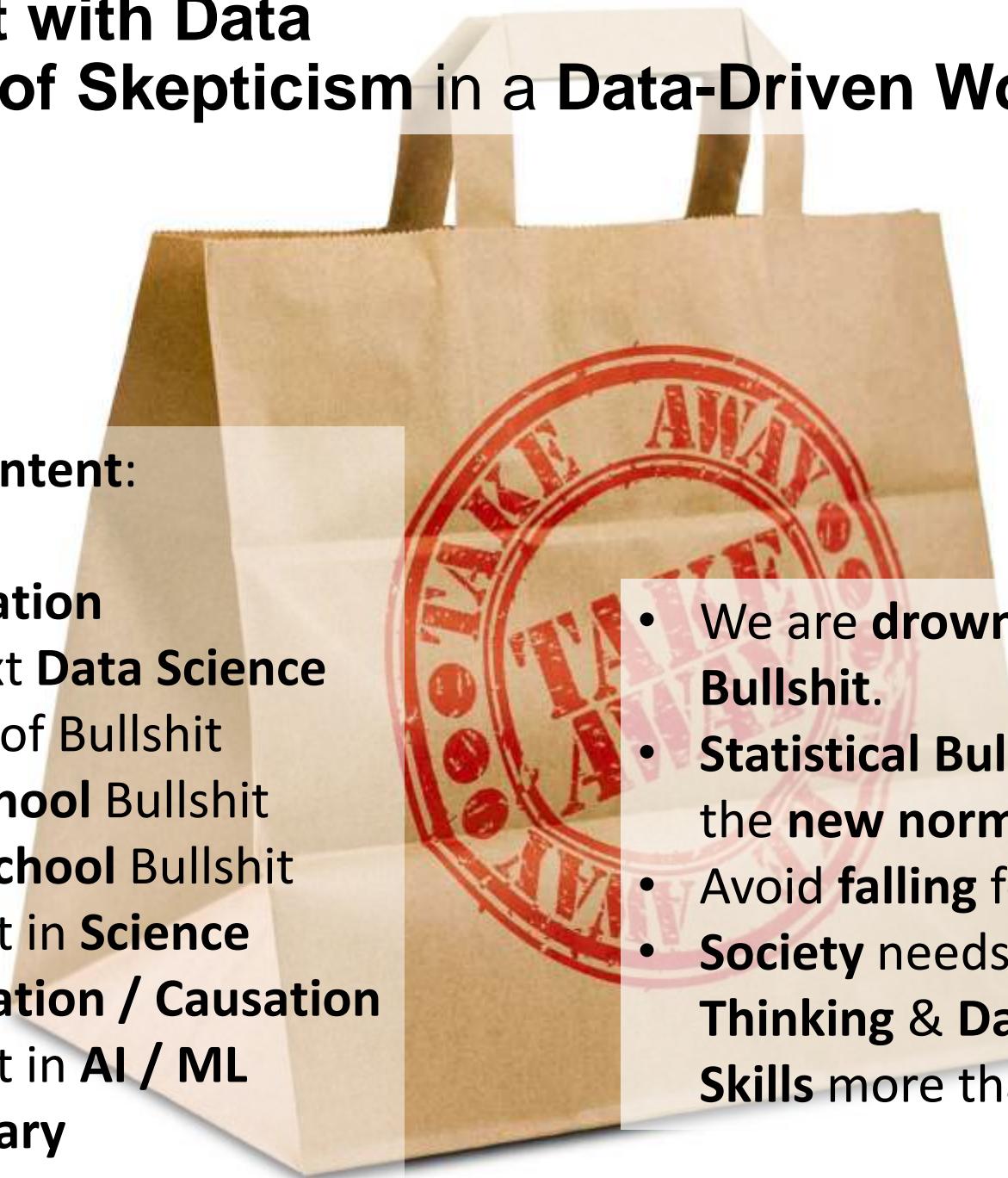
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- We are **drowning** in **Bullshit**.
- **Statistical Bullshit** is the **new norm**.
- Avoid **falling** for **Bullshit**.
- Society needs **Critical Thinking & Data Science Skills** more than ever.



# 1 Bullshit with Data

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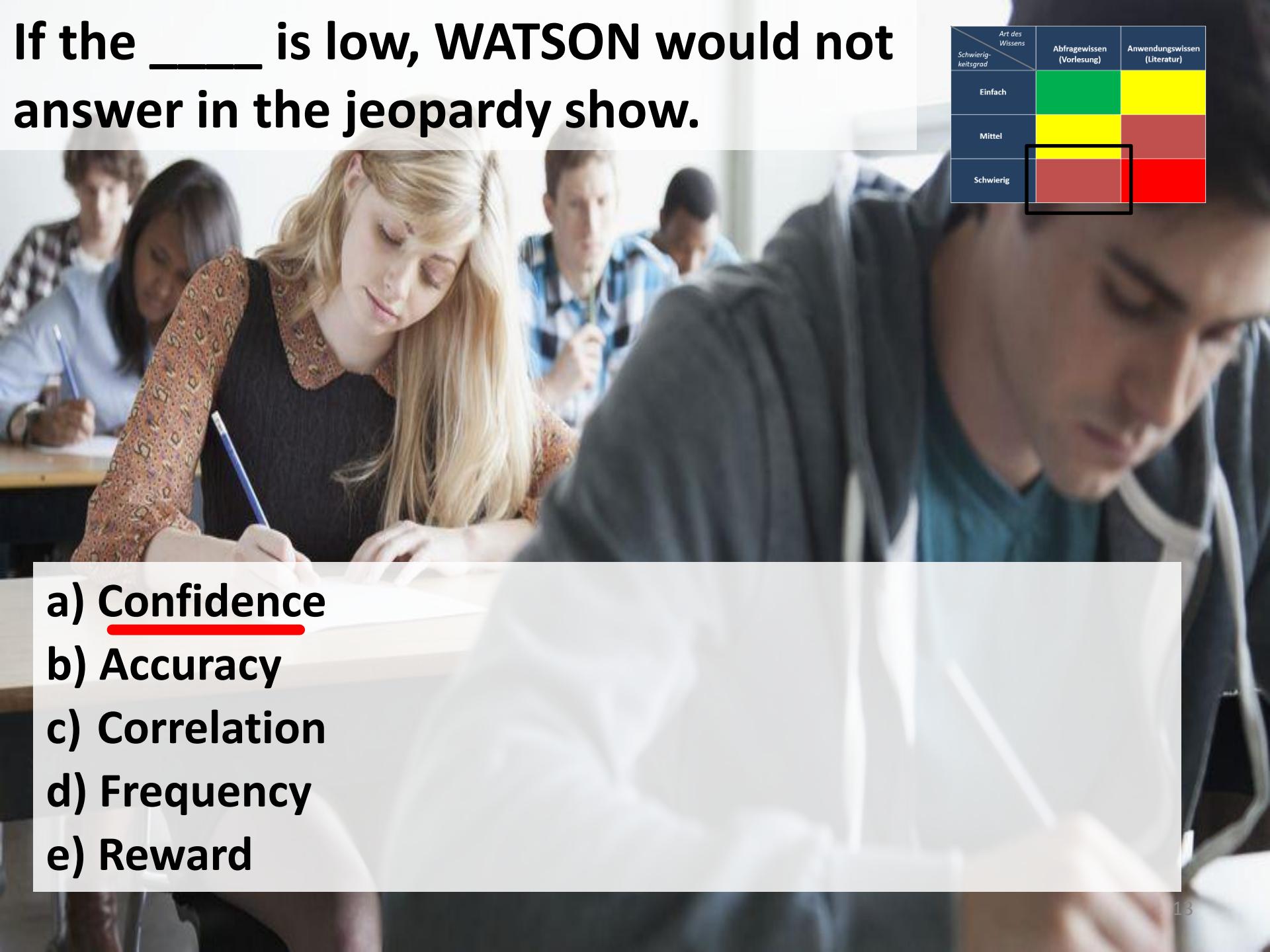
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If the \_\_\_\_\_ is low, WATSON would not answer in the jeopardy show.

Schwierigkeitsgrad	Art des Wissens	Abfragewissen (Vorlesung)	Anwendungswissen (Literatur)
Einfach		Green	Yellow
Mittel		Yellow	Red
Schwierig		Red	Red

- 
- A photograph showing several students in a classroom setting, focused on writing in their notebooks. The student in the foreground on the left is a young woman with long blonde hair, wearing a black top and a patterned scarf. The student on the right is a young man with dark hair, wearing a teal t-shirt. Other students are visible in the background.
- a) Confidence
  - b) Accuracy
  - c) Correlation
  - d) Frequency
  - e) Reward