

Ethics in Statistical Consulting

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TEXAS A&M UNIVERSITY
Statistics



Ethics

“A set of morally-permissible standards of conduct all members of a group want each other to follow.”

– by Michael Davis, Illinois Institute of Technology

- Ethics encompasses a set of **moral principles and rules** of conduct that provide guidance for our behavior.
 - Good, acceptable, or obligatory behavior VERSUS bad, unacceptable, or forbidden behavior.
 - Beliefs regarding behavior that an individual expects of himself or herself, as well as shared beliefs regarding standards of behavior expected or required **by a community or societal group**.

Ethical Principles in Different Fields

- US Food and Drug Administration. Good Clinical Practice in FDA-regulated Clinical Trials.
- American Chemical Society. Ethical Guidelines.
- American Psychological Association. Ethical Principles of Psychologists and Code of Conduct
- **American Statistical Association. Ethical Guidelines for Statistical Practice.**

ASA Ethical Guidelines for Statistical Practice

Professional Integrity and Accountability

- Using appropriate statistical approaches
 - No prejudice or favoritism
 - Valid, interpretable and reproducible results
- Respect for others
 - Acknowledgement of the contributions and intellectual property of others
 - A professional, competent, and respectful manner
- Disclosure of conflicts of interest

Integrity of data and methods

- Acknowledge statistical assumptions and data editing procedures such as missing data imputation
- Reports the limitations, defects, potential biases, confounding effects, and possible sources of error and strive to promptly correct any errors
- Convey the findings in ways that are honest and meaningful to the users
- Identify the ultimate financial sponsor, the stated purpose and the intended use of the study results
- Share data when possible

Responsibilities to Science/Public/Funder/Client

- Present choices among valid alternative statistical approaches and be transparent about the scope, cost and precision
- Explain any expected adverse consequences of failure to follow correct design or analytic plan
- Apply statistical sampling and analysis procedures scientifically, without predetermining the outcome
- Make new statistical knowledge widely available to provide benefits to society
- Conforms to confidentiality requirements and guards privileged information of the employer, client, or funder

Responsibilities to Research Subjects

- Avoid the use of excessive or inadequate numbers of research subjects
- Protect the privacy and confidentiality of research subjects and data concerning them and know the legal limitations on privacy
- Make sure appropriate research-subject approvals were obtained for a study involving human beings
- Recognize any statistical descriptions of groups may carry risks of stereotypes and stigmatization

Responsibilities to Research Team Colleagues

- Recognize different standards and obligations, research practices across disciplines and professions
- Statisticians do not have obligations to standards of other professions that conflict with ethical guidelines in statistical practice
- Ensure all discussion and reporting of statistical design and analysis is consistent with these ethical guidelines
- Avoid compromising scientific validity for expediency
- Strive to promote transparency in design, execution, and reporting or presenting of all analyses

Responsibilities to Other Statisticians or Statistics Practitioners

- Promote sharing of data and methods as much as possible and as appropriate without compromising propriety
- Help strengthen the work of others through appropriate peer review and respect differences of opinion
- Use professional qualifications and contributions as the basis for decisions regarding statistical practitioners' hiring, firing, promotion, work assignments, publications and presentations, candidacy for offices and awards, funding or approval of research, and other professional matters

Responsibilities Regarding Allegations of Misconduct

- Avoid condoning or appearing to condone statistical, scientific, or professional misconduct
- Know the definitions of misconduct and distinguish differences of opinion and honest error from misconduct
- Maintain confidentiality during an investigation, but disclose the investigation results to appropriate parties and stakeholders
- Support the appropriate efforts to reporting the possible scientific error or misconduct
- Avoid retaliation against or damage to the employability of those who responsibly call attention to possible misconduct

Responsibilities of Employers

- Recognize that the ethical guidelines exist and were instituted for the protection and support of the statisticians
- Maintain a working environment free from intimidation, including discrimination; bullying; coercion; and harassment
- Recognize that valid findings result from competent work in a moral environment
- Avoid the potential social harm that can result from the dissemination of false or misleading statistical work
- Require the inclusion of statistical practitioners as authors and acknowledge their contributions to projects or publications
- Support sound statistical analysis and expose incompetent or corrupt statistical practice

Ethical Conflicts in Statistical Consulting

Ethical Conflicts

- The ethical conflicts may come in many forms
- You are asked to do statistical analysis in inappropriate or illegal ways such as falsifying, fabricating, or modifying data and deliberately slanting the results
- You may be asked to work on research that conflicts with your personal values
- A client may simply refuse to follow your advice on good statistical practice

What we should do

- Follow the ethical guidelines
- Withdraw your participation of unethical situations
- Be proactive
 - Take opportunities to model professionalism
 - Don't just wait for request but reach out to check in progress
 - Be acquainted and get involved with details
 - Be the statistical methodology gatekeeper






Ethics Scenarios

Coca-Cola Funds Scientists Who Shift Blame for Obesity Away From Bad Diets

BY ANAHAD O'CONNOR AUGUST 9, 2015 5:25 PM 1259



An image from a video by the Coca-Cola Foundation. In November 2012, the foundation announced a \$3 million grant to Chicago's Garfield Park Conservatory Alliance. The grant was intended to establish a wellness program.

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Coca-Cola, the world's largest producer of sugary beverages, is backing a new "science-based" solution to the obesity crisis: To maintain a healthy weight, get more exercise and worry less about cutting calories.

The beverage giant has teamed up with influential scientists who are advancing this message in medical journals, at conferences and through social media. To help the scientists get the word out, Coke has provided financial and logistical support to a new nonprofit organization called the Global Energy Balance Network, which

TABLE 1: Number of food company / trade group sponsors of AND over 10 years

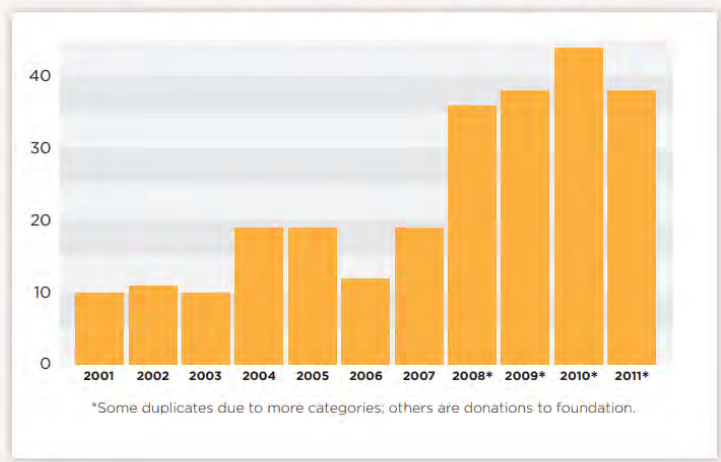


TABLE 2: Most Loyal Corporate Sponsors

Academy Sponsors 2001-2012

 National Cattlemen's Beef Association 12 years	 Food you love 10 years	 GENERAL MILLS 10 years	 9 years	 NATIONAL DAIRY COUNCIL 9 years
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Academy Partners 2008-2012

 ARAMARK	 The Coca-Cola Company	 NATIONAL DAIRY COUNCIL
--	--	---

Partners or Premier Sponsors 2008-2012

 Abbott Nutrition	 GENERAL MILLS	 Kellogg's	 MARS food	 PEPSICO
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Ref: <https://well.blogs.nytimes.com/2015/08/09/coca-cola-funds-scientists-who-shift-blame-for-obesity-away-from-bad-diets/>

Ref: <https://www.ucsusa.org/disguising-corporate-influence-science-about-sugar-and-health>

A 'Fountain Of Youth' Pill? Sure, If You're A Mouse.

The race for the cure to aging sparks hope and hype among top scientists — plus billions of dollars in investment.

By Marisa Taylor • FEBRUARY 11, 2019

A mouse in the pathology and geriatrics lab at the University of Michigan. (Melanie Maxwell for KHN)

Renowned Harvard University geneticist David Sinclair recently made a startling assertion: Scientific data shows he has knocked more than two decades off his biological age.

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 [DISPONIBLE EN ESPAÑOL](#)

(CBS) Are studies tying red wine to health benefits nothing more than wishful thinking? Some red wine studies may soon be called into question following a report that a top researcher at the University of Connecticut falsified data on more than 100 occasions.

The officials found 145 cases of fabricated or false data and notified 11 journals - including the Journal of Cellular & Molecular Medicine and Journal of Agriculture and Food Chemistry - of its review, the university said in a written statement.

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Renowned Harvard University geneticist David Sinclair recently made a startling assertion: Scientific data shows he has knocked more than two decades off his biological age.

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In fact, the initial research that launched the resveratrol frenzy — the finding by Harvard University biologist **David Sinclair** that the compound extended the life of laboratory rats — has been **seriously challenged**.

Yet scientific skepticism about resveratrol’s touted health benefits hasn’t stopped companies from selling resveratrol pills, capsules, powders and creams to gullible consumers. In 2009 (the last year for which I could find sales figures), American consumers alone spent more than \$31 million on resveratrol supplements of one kind or another.

Sinclair himself created a company in 2004 to develop resveratrol-based anti-aging drugs — a company he sold to the pharmaceutical giant GlaxoSmithKline in 2008 for a reported \$720 million.



The Death of Jesse Gelsinger, 20 Years Later

Gene editing promises to revolutionize medicine. But how safe is safe enough for the patients testing these therapies?

By [Meir Rinde](#) | June 4, 2019



Photo illustration by Clay Canler

By all accounts [Jesse Gelsinger](#) was a sweet, sharp-witted, if not particularly ambitious kid who loved motorcycles and professional wrestling. In 1999 he was living in Tucson, Arizona, with his parents and siblings, attending high school, and working part-time as a

“ This experiment yields many interesting insights into the problems related to ethics review of research in general. But there is perhaps one lesson which is more important than all the others. **Research ethics review is concerned primarily with two goals: ensuring that the expected harm involved in participation is reasonable and that participants give valid consent.** The requirement to give valid consent has led many in the research ethics community to suggest that non-therapeutic research on incompetent patients is unethical. This trial illustrates *par excellence* the increasing and mistaken tendency of ethics committees to give too much weight to consent and to fail to give sufficient attention to protecting participants from harm.”

Ref: *Savulescu JHarm, ethics committees and the gene therapy death* *Journal of Medical Ethics* 2001;27:148-150.

Ref: <https://www.sciencehistory.org/distillations/the-death-of-jesse-gelsinger-20-years-later>

THE THALIDOMIDE TRAGEDY: LESSONS FOR DRUG SAFETY AND REGULATION

By: Bara Fintel, Athena T. Samaras, Edson Carias
Jul 28, 2009



Many children in the 1960's, like the kindergartner pictured above, were born with phocomelia as a side effect of the drug thalidomide, resulting in the shortening or absence of limbs. (Photo by Leonard McCombe//Time Life Pictures/Getty Images)

In a post-war era when sleeplessness was prevalent, thalidomide was marketed to a world hooked on tranquilizers and sleeping pills. At the time, one out of seven Americans took them regularly. The demand for sedatives was even higher in some European markets, and the presumed safety of thalidomide, the only non-barbiturate sedative known at the time, gave the drug massive appeal. Sadly, tragedy followed its release, catalyzing the beginnings of the rigorous drug approval and monitoring systems in place at the **United States Food and Drug Administration (FDA)** today.

Thalidomide first entered the German market in 1957 as an over-the-counter remedy, based on the maker's safety claims. They advertised their product as "completely safe" for everyone, including mother and child, "even during pregnancy," as its developers "could not find a dose high enough to kill a rat." By 1960, thalidomide was marketed in 46 countries, with sales nearly matching those of aspirin.

"In July of 1962, president John F. Kennedy and the American press began praising their heroine, FDA inspector Frances Kelsey, who prevented the drug's approval within the United States despite pressure from the pharmaceutical company and FDA supervisors. **Kelsey felt the application for thalidomide contained incomplete and insufficient data on its safety and effectiveness.**"

"She was also concerned that there were not yet any results available from U.S. clinical trials of the drug. **Even if these data were available, however, they may not have been entirely reliable.** At the time, clinical trials did not require FDA approval, nor were they subject to oversight. The "clinical trials" of thalidomide involved distributing more than two and a half million tablets of thalidomide to approximately 20,000 patients across the nation—approximately 3,760 women of childbearing age, at least 207 of whom were pregnant. More than one thousand physicians participated in these trials, but few tracked their patients after dispensing the drug."

Lancet retracts 'utterly false' MMR paper

After medical council ruling last week that MMR doctor Andrew Wakefield was dishonest, journal finally quashes paper



▲ Andrew Wakefield 'deceived the journal' says Lancet's editor. Photograph: Steve Parsons/PA Wire/PA

The Lancet today finally **retracted the paper** that sparked a crisis in MMR vaccination across the UK, following the General Medical Council's decision that its lead author, Andrew Wakefield, had been dishonest.

The medical journal's editor, Richard Horton, told the Guardian today that he realised as soon as he read the GMC findings that the paper, published in February 1998, had to be retracted. "It was utterly clear, without any ambiguity at all, that the statements in the paper were utterly false," he said. "I feel I was deceived."

Ref: <https://www.theguardian.com/society/2010/feb/02/lancet-retracts-mmr-paper>

"There are hard lessons for many in this highly damaging saga. Firstly, for the coauthors. ... His coauthors seem to have been unaware of what he was doing under the cover of their names and reputations. ... However, this does not absolve them., they all failed in their duties as authors. The satisfaction of adding to one's CV must never detract from the responsibility to ensure that one has been neither party to nor duped by a fraud. **This means that coauthors will have to check the source data of studies more thoroughly than many do at present—or alternatively describe in a contributor's statement precisely which bits of the source data they take responsibility for.**

Secondly, research ethics committees should not only scrutinize proposals but have systems to check that what is done is what was permitted (with an audit trail for any changes) and work to a governance procedure that can impose sanctions where an eventual publication proves this was not the case. ..."

Ref: Godlee Fiona, Smith Jane, Marcovitch Harvey. Wakefield's article linking MMR vaccine and autism was fraudulent *BMJ* 2011; 342 :c7452

Early report

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

A J Wakefield, S H Murch, A Anthony, J Linnell, D M Casson, M Malik, M Berelowitz, A P Dhillon, M A Thomson, P Harvey, A Valentine, S E Davies, J A Walker-Smith

Summary

Background We investigated a consecutive series of children with chronic enterocolitis and regressive developmental disorder.

Methods 12 children (mean age 6 years [range 3–10], 11 boys) were referred to a paediatric gastroenterology unit with a history of normal development followed by loss of acquired skills, including language, together with diarrhoea and abdominal pain. Children underwent gastroenterological, neurological, and developmental assessment and review of developmental records. Ileocolonoscopy and biopsy sampling, magnetic-resonance imaging (MRI), electroencephalography (EEG), and lumbar puncture were done under sedation. Barium follow-through radiography was done where possible. Biochemical, haematological, and immunological profiles were examined.

Findings Onset of behavioural symptoms was associated by the parents, with measles, mumps, and rubella vaccination in eight of the 12 children, with measles infection in one child, and otitis media in another. All 12 children had intestinal abnormalities ranging from lymphoid nodular hyperplasia to atypical ulceration. Histology showed patchy chronic inflammation in 11 children and reactive ileal lymphoid hyperplasia in seven, but no granulomas. Behavioural disorders included autism (nine), disintegrative psychosis (one), and possible postviral or vaccinal encephalitis (two). There were no focal neurological abnormalities and MRI and EEG tests were normal. Abnormal laboratory results were significantly raised urinary methylmalonic acid compared with age-matched controls ($p=0.03$), low haemoglobin in four children, and low serum IgA in four children.

Interpretation We identified associated gastrointestinal disease and developmental regression in a group of previously normal children, which was generally associated in time with possible environmental triggers.

Lancet 1998; **351**: 637–41

See Commentary page

Inflammatory Bowel Disease Study Group, University Departments of Medicine and Histopathology (A J Wakefield FRCS, A Anthony MB, J Linnell PhD, A P Dhillon MRCPsyt, S E Davies MRCPsyt) and **The University Departments of Paediatric Gastroenterology** (S H Murch MB, D M Casson MRCP, M Malik MRCP, M A Thomson FRCP, J A Walker-Smith FRCP), **Child and Adolescent Psychiatry** (M Berelowitz FRCPsyt), **Neurology** (P Harvey FRCP), and **Radiology** (A Valentine FRCP), **Royal Free Hospital and School of Medicine, London NW3 2QG, UK**

Correspondence to: Dr A J Wakefield

Introduction

We saw several children who, after a period of apparent normality, lost acquired skills, including communication. They all had gastrointestinal symptoms, including abdominal pain, diarrhoea, and vomiting and, in some cases, food intolerance. We describe the clinical findings, and gastrointestinal features, of these children.

Patients and methods

12 children, consecutively referred to a department of paediatric gastroenterology with a history of a pervasive developmental disorder with loss of acquired skills and intestinal symptoms (abdominal pain, bloating and food intolerance), were investigated. All children were admitted to the ward for a week, accompanied by their parents.

Clinical investigations

We took histories, including details of immunisations and exposure to infectious diseases, and assessed the children. In 11 cases the history was obtained by the senior clinician (JW-S). Neurological and psychiatric assessments were done by consultant staff (PH, MB) with HMS-4 criteria.¹ Developmental assessments included a review of prospective developmental records from parents, health visitors, and general practitioners. Four children did not undergo psychiatric assessment in hospital; all had been assessed professionally elsewhere, so these assessments were used as the basis for their behavioural diagnosis.

After bowel preparation, ileocolonoscopy was performed by SHM or MAT under sedation with midazolam and pethidine. Paired frozen and formalin-fixed mucosal biopsy samples were taken from the terminal ileum; ascending, transverse, descending, and sigmoid colons, and from the rectum. The procedure was recorded by video or still images, and were compared with images of the previous seven consecutive paediatric colonoscopies (four normal colonoscopies and three on children with ulcerative colitis), in which the physician reported normal appearances in the terminal ileum. Barium follow-through radiography was possible in some cases.

Also under sedation, cerebral magnetic-resonance imaging (MRI), electroencephalography (EEG) including visual, brain stem auditory, and sensory evoked potentials (where compliance made these possible), and lumbar puncture were done.

Laboratory investigations

Thyroid function, serum long-chain fatty acids, and cerebrospinal-fluid lactate were measured to exclude known causes of childhood neurodegenerative disease. Urinary methylmalonic acid was measured in random urine samples from eight of the 12 children and 14 age-matched and sex-matched normal controls, by a modification of a technique described previously.² Chromatograms were scanned digitally on computer, to analyse the methylmalonic-acid zones from cases and controls. Urinary methylmalonic-acid concentrations in patients and controls were compared by a two-sample *t* test. Urinary creatinine was estimated by routine spectrophotometric assay.

Children were screened for antiendomysial antibodies and boys were screened for fragile-X if this had not been done



RETRACTED ARTICLE: [A lowered probability of pregnancy in females in the USA aged 25–29 who received a human papillomavirus vaccine injection]

Gayle DeLong

Department of Economics and Finance, Baruch College/City University of New York, New York, NY, USA

ABSTRACT

Birth rates in the United States have recently fallen. Birth rates per 1000 females aged 25–29 fell from 118 in 2007 to 105 in 2015. One factor may involve the vaccination against the human papillomavirus (HPV). Shortly after the vaccine was licensed, several reports of recipients experiencing primary ovarian failure emerged. This study analyzed information gathered in National Health and Nutrition Examination Survey, which represented 8 million 25-to-29-year-old women residing in the United States between 2007 and 2014. Approximately 60% of women who did not receive the HPV vaccine had been pregnant at least once, whereas only 35% of women who were exposed to the vaccine had conceived. For married women, 75% who did not receive the shot were found to conceive, while only 50% who received the vaccine had ever been pregnant. Using logistic regression to analyze the data, the probability of having been pregnant was estimated for females who received an HPV vaccine compared with females who did not receive the shot. Results suggest that females who received the HPV shot were less likely than those who never been pregnant than women in the same age group who did not receive the shot. In 100% of females in this study had received the HPV vaccine, data suggest the number of women having ever conceived would have fallen by 2 million. Further study into the influence of HPV vaccination on fertility is thus warranted.

ARTICLE HISTORY

Received 11 August 2017
Revised 13 May 2018
Accepted 14 May 2018

Introduction

The birth rates in the United States for women under the age of 30 are at record low (Martin, Hamilton, and Osterman 2017). Birth rates per 1000 females aged 25–29 fell 11.5% from 118.1 in 2007 to 104.5 in 2015. The recent decline follows a steady increase of 8.5% between 1993 and 2006 (from 108.8 to 118). The basis for the recent decrease remains unknown. Factors contributing to the reduction might be associated with more effective and better use of contraceptives (Sundaram et al. 2017), as well as the recession of 2008 (Schneider 2009).

Perhaps exposure to more environmental toxins might be influencing the birth rates. Dominick (1994) reported the adverse effects of metals such as mercury and lead that are common in the human environment as well as metals used in pharmaceutical products such as aluminum (Al) on fetal development and teratogenicity in

mammals (Burt (2000) surveyed the literature on environmental endocrine disruptors such as dioxins and polychlorinated biphenyls and found these chemicals were shown to be associated with infertility, menstrual irregularities, and spontaneous abortions. Garry et al. (2002) reported an increased frequency of miscarriages and spontaneous abortions in women exposed to pesticides. Marwa et al. (2017) found that introducing Al to ovarian cells of rats triggered intracellular damage primarily by altering the cellular mitochondria. It is of interest that Veras et al. (2010) demonstrated that exposure to ambient air pollutants was associated with decreased female and male fertility.

In 2006, the U.S. Food and Drug Administration (2006) licensed the first of two vaccines to protect women against the human papillomavirus (HPV). Both HPV vaccines (Gardasil and Cevaxir) address HPV 16 and 18, two strains of HPV that produce approximately 70% of cervical cancer cases. Further, Gardasil

What Is Happening...

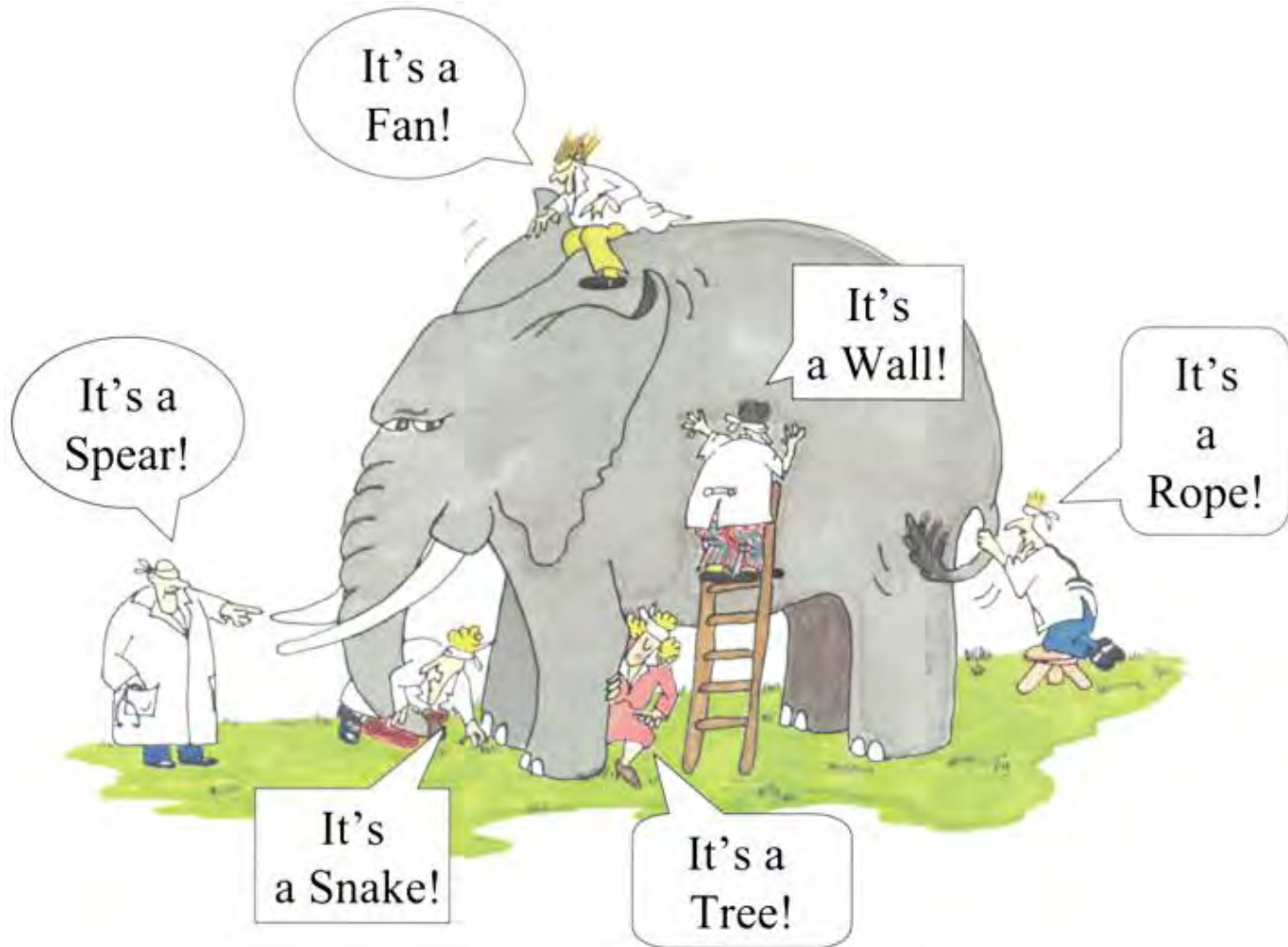


Image source: <https://www.pinkconcussions.com/blogreal/2015/12/6/the-6-blind-men-and-the-elephant-the-story-of-concussion>

How Statisticians Can Help?

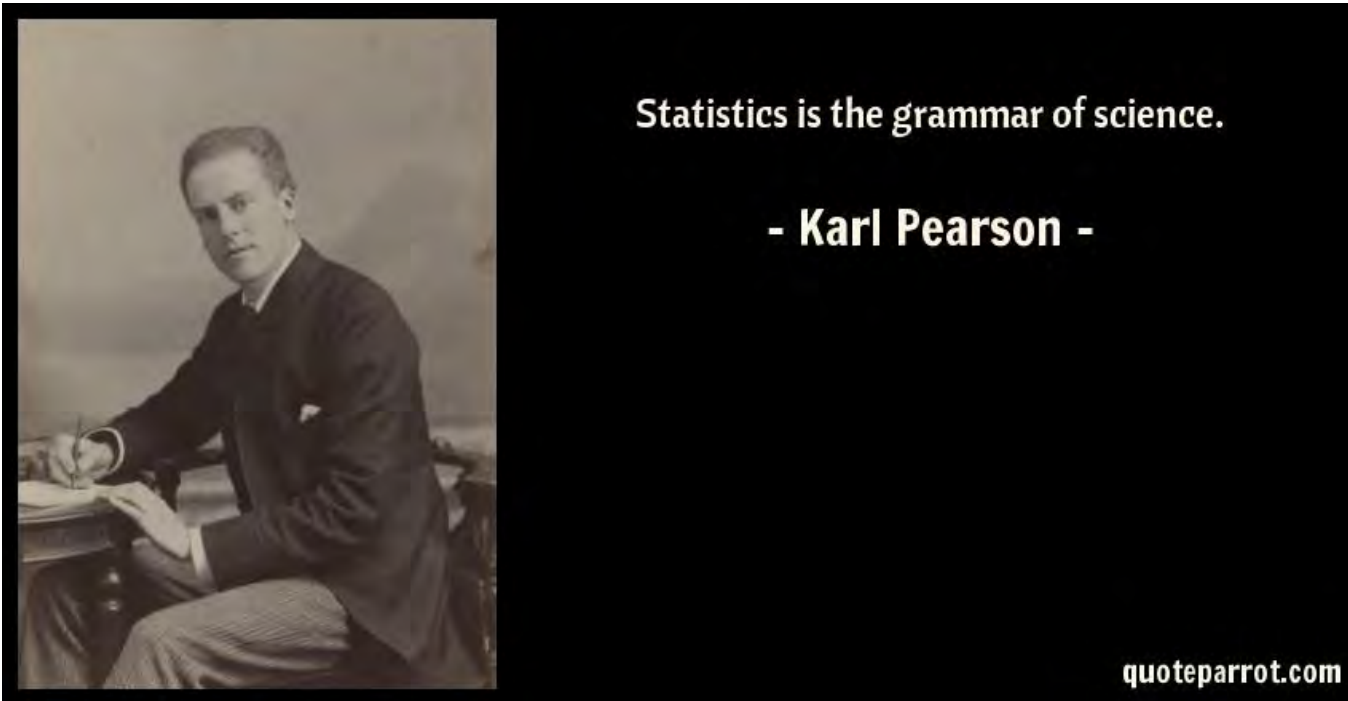
- Always...

“Oh, doctors are always changing their mind. One week bacon grease is bad for you. The next week we’re not getting enough of it.”

-- Mary Cooper, the Big Bang Theory

How Statisticians Can Help?

- Sometimes...



Thank you!