Bridging the gap between health care research and policy:
Irrationality, ignorance, miscommunication, bias, and lies

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LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

CENTRE FOR GLOBAL CHRONIC CONDITIONS

European Observatory on Health Systems and Policies

Irrationality: lessons from judicial decision-making

- The sole function of a court of law is to weigh evidence and make a decision…
- … no matter how long it takes to assess the evidence fairly
- So judicial decisions should be based solely on the evidence?

- Well, not actually

Sentencing on "Sleepy Mondays"

- Shift to daylight saving time in the US in the spring leads to approximately 40 minutes lost sleep on Sunday night
- So, on Monday, individuals are sleep deprived
- Known to be associated with more traffic accidents etc.
- But do judges give harsher sentences on "Sleepy Mondays"?

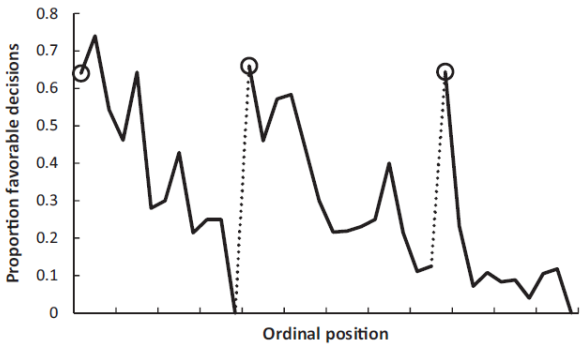
- U.S. Sentencing Commission data 1992-2003
- 1,252 cases on sleepy Monday, 2,785 cases on Mondays before and after
- Controlled for judicial district, yearly trend in sentencing decisions, trial and offender characteristics such as criminal history, offence level, trial or plea, number of convictions, age, gender, race, and education
- Sleepy Monday sentences 5% longer
- Unaffected by numerous robustness checks

Cho et al, 2016

"Justice is what the judge ate for breakfast"

Kozinski, 1993

- 1,112 judicial rulings, collected over 50 days in a 10 month period, by eight Israeli judges who preside over two different parole boards that serve four major prisons in Israel
- The two parole boards process ~40% of all parole requests in the country.
- Measured probability of favourable judgement according to order of cases throughout day, recording meal breaks
- Adjusted for wide range of co-variates



Dotted lines = meal breaks

(mid morning snack, then lunch)

Danziger et al, 2011

"Some people think football is a matter of life and death… it's much more serious than that"

- Data on youth sentencing in Louisiana 1996 to 2012
- "Upset" losses, when LSU was expected to win, increase sentence by ~5%
- No effect of losses that were expected, or where predicted result uncertain
- Effect larger when game is important (when LSU is high in rankings)
- Effect entirely among judges whose first degree was at LSU
- Impact largely on black defendents

Eren & Mocan, 2016

Is this even vaguely plausible?

- Short-lived stock market declines after national soccer team loses international soccer games. Cannot be explained by economic factors and stock market dynamics, and attribute it to the change in investor mood due to the loss of the national team.

  (Edmans et al. 2007)
- Unexpected losses of home teams in National Football League increase domestic violence rates by men in the city in which the team is located.

  (Card & Dahl 2011)
- Asylum grant rates in U.S. immigration courts differ by the success of the court city's NFL team.

  (Chen & Spamann 2014)
- A win by a local college football team during 10 day window before the election day causes the incumbent to receive a higher percentage of the vote in the Senate, gubernatorial and presidential elections.

  (Healy et al. 2010)
- Grade point average of male students declines relative to grade point average of female students at the University of Oregon during the football seasons when the university's football team is successful, attributed to increased alcohol consumption by male students in response to the team's success.

  (Lindo et al. 2012)

Take home messages

- People do not make rational decisions
- (OK, not a surprise)
- But what is surprising is how relatively trivial things influence them
- Full disclosure: I believe watching paint dry is more exciting than football

Ignorance

Take home message

- Never assume people have even the most basic knowledge

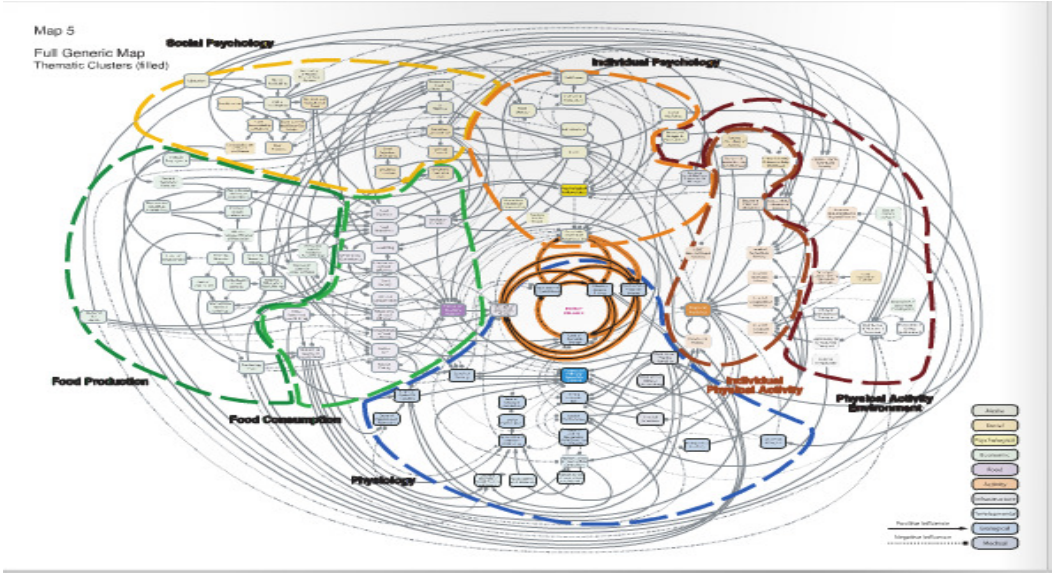
Miscommunication

Reaching policy makers

"… in public policy making, many suppliers and users of social research are dissatisfied, the former because they are not listened to, the latter because they do not hear much what they want to listen to…"

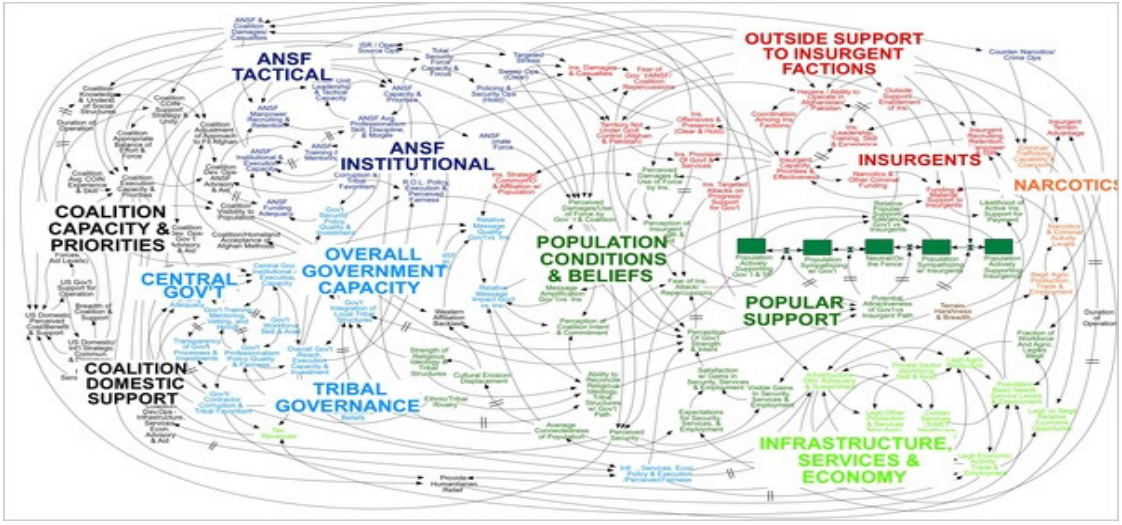
Lindblom, 2002

The world is complex



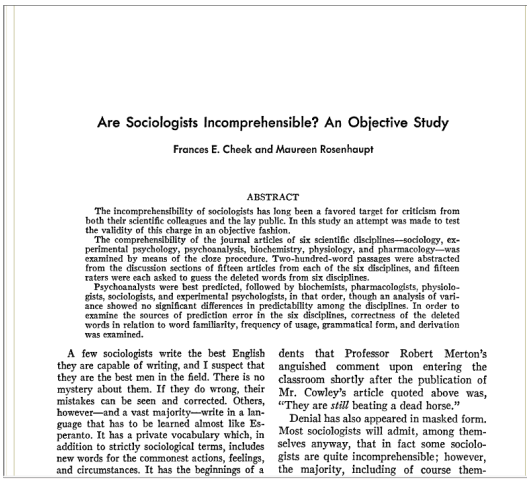
Source: UK Foresight Report on Obesity

But even for policy makers



Source: US Department of Defense (NY Times 28 April 2010)

But do we make it worse?



Are Sociologists Incomprehensible? An Objective Study

Frances E. Cheek and Maureen Rosenhaupt

ABSTRACT

The incomprehensibility of sociologists has long been a favored target for criticism from both their scientific colleagues and the lay public. In this study an attempt was made to test the validity of this charge in an objective fashion.

The comprehensibility of the journal articles of six scientific disciplines—sociology, experimental psychology, psychoanalysis, biochemistry, physiology, and pharmacology—was examined by means of the cloze procedure. Two-hundred-word passages were abstracted from the discussion sections of fifteen articles from each of the six disciplines, and fifteen raters were each asked to guess the deleted words from six disciplines.

Psychoanalysts were best predicted, followed by biochemists, pharmacologists, physiologists, sociologists, and experimental psychologists, in that order, though an analysis of variance showed no significant differences in predictability among the disciplines. In order to examine the sources of prediction error in the six disciplines, correctness of the deleted words in relation to word familiarity, frequency of usage, grammatical form, and derivation was examined.

A few sociologists write the best English they are capable of writing, and I suspect that they are the best men in the field. There is no mystery about them. If they do wrong, their mistakes can be seen and corrected. Others, however—and a vast majority—write in a language that has to be learned almost like Esperanto. It has a private vocabulary which, in addition to strictly sociological terms, includes new words for the commonest actions, feelings, and circumstances. It has the beginnings of a dents that Professor Robert Merton's anguished comment upon entering the classroom shortly after the publication of Mr. Cowley's article quoted above was, "They are *still* beating a dead horse."

Denial has also appeared in masked form. Most sociologists will admit, among themselves anyway, that in fact some sociologists are quite incomprehensible; however, the majority, including of course them-

American Journal of Sociology, Vol. 73, No. 5 (Mar., 1968), pp. 617-627

A few sociologists write the best English they are capable of writing.... Others, however – and a vast majority – write in a language that has to be learned almost like Esperanto. It has a private vocabulary which, in addition to strictly sociological terms, includes new words for the commonest actions, feelings and circumstances. It has the beginnings of a new grammar and syntax, much inferior to English grammar in force and precisions. So far as it has any effect on standard English, the effect is largely pernicious.

Cowley M. Sociological habit patterns in linguistic transmogrification" Reporter, 1965

CAREERS

SPEAKING OUT Former government scientist raises climate megaphone p.131 | SCIENCE ON CAMERA Send us your best research pictures for our contest p.131 | NATURE.COM For the latest career listings and advice www.nature.com/naturejobs

PUBLISHING

The write stuff

How to produce a first-class paper that will get published, stand out from the crowd and pull in plenty of readers.

ANGEL BORJA

Keep your message clear

Marine scientist at AZTI-Tecnalia, a producer of sustainable business services and goods, Pasaia, Spain;

Manuscripts may have a rigidly defined structure, but there's still room to tell a compelling story — one that clearly communicates the science and is a pleasure to read. Scientist-authors and editors debate the importance and meaning of creativity and offer tips on how to write a top paper.

journal editor; author of a series on preparing a manuscript (go.nature.com/2jw8hp9).

Think about the message you want to give to readers. If that is not clear, misinterpretations may arise later. And a clear message is even more important when there is a multidisciplinary group of authors, which is increasingly common. I encourage groups to sit together in person and seek consensus — not only in the main message, but also in the selection of data, the visual presentation and the information necessary to transmit a strong message.

The most important information should be in the main text. To avoid distraction, writers should put additional data in the supplementary material.

Countless manuscripts are rejected because the discussion section is so weak that it's obvious the writer does not clearly understand the existing literature. Writers should put their results into a global context to demonstrate what makes those results significant or original.

There is a narrow line between speculation and evidence-based conclusions. A writer can speculate in the discussion — but not too much. When the discussion is all speculation, it's no good because it is not rooted in the author's experience. In the conclusion, include a one- or two-sentence statement on the research you plan to do in the future and on what else needs to be explored.

DALLAS MURPHY

State your case with confidence

Book author, New York City; instructor, writing workshops for scientists in Germany, Norway and the United States.

Clarity is the sole obligation of the science writer, yet I find constantly that the "What's new" element is buried. Answering one central question — What did you do? — is the key to finding the structure of a piece. Every section of the manuscript needs to support that one fundamental idea.

There is a German concept known as the 'red thread', which is the straight line that the audience follows from the introduction to the conclusion. In science, 'What's new and compelling?' is the red thread. It's the whole reason for writing the paper. Then, once that's established, the paragraphs that follow become the units of logic that comprise the red thread.

Scientific authors are often scared to make confident statements with masculinity. The result is turgid or obfuscatory writing that sounds defensive, with too many caveats and long lists — as if the authors are writing to fend off criticism that hasn't been made yet. When they write for a journal gatekeeper rather than for a human being, the result is muddy prose.

Examples such as this are not uncommon: "Though not inclusive, this paper provides a useful review of the well-known methods of physical oceanography using as examples various research that illustrates the methodological challenges that give rise to successful solutions to the difficulties inherent in ▸

1 MARCH 2018 | VOL 555 | NATURE | 129

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- Keep your message clear
- Create a logical framework
  - context–content–conclusion
- State your case with confidence
  - 'What's new and compelling?' is the red thread throughout the paper
- Beware the curse of 'zombie nouns'
  - " terms such as 'implementation' or 'application' that suck the lifeblood out of active verbs"
- Prune that purple prose
  - "make the writing only as complex as it needs to be"
- Aim for a wide audience
  - Write lay summaries in publications such as The Conversation

Gerwin V. Nature 2018; 555: 129-130

Complexity matters in decision-making

- Family physicians were mailed a survey outlining a medical situation:
  - a patient suffered with chronic hip pain, and doctors were asked to decide whether to put their patient on new medication
  - doctors give a series of choices
- Option 1:
  - Ibuprofen & referral
  - Just referral
- Option 2:
  - Ibuprofen & referral
  - Piroxicam & referral
  - Just referral

Percentage opting for "just referral"
Option 1: 53% Option 2: 72%

The more complex the decision, the more people go for the simple option

Redelmeier & Shafir, 1995

Take home messages

- Write clearly, concisely, and logically
- Complex problems can be really difficult
- Break down seemingly intractable issues into discrete problems, allowing "small wins" *(Weick, 1984)*
- Develop learning within organisations that examines critically not just the results but the methods used to reach decisions *(Agyris, 1991)*
- Avoid tackling problems at high orders of abstraction or defining problems as the absence of a solution. Start with shared identification of the problem, then make sure it is defined accurately, and then break it down into manageable chunks *(Andrews, Pritchett & Woolcock)*

Bias: A crucial distinction

- Are policy makers:
  - Uninformed?
    - can be compensated for by provision of information
    - In practice, people use heuristics (information shortcuts, "filling in the blanks")
  - Misinformed?
    - conventionally thought to require corrections
    - may require action against fundamental biases

Kuklinski et al, 2000

Seeking and interpreting evidence

- Subjects undertook computer-based exercise where stated purpose was to assimilate evidence to explain to others (gun control, affirmative action)
  - Initial assessment of each subject's position on the issue
  - On-line searching and synthesis of evidence to be placed on an information board
  - Evidence clearly attributable to sources known to have different views on issue (e.g. Brady Campaign and NRA)
  - Computer tracked search patterns and time spent reading different arguments

Taber & Lodge, 2006

Key findings

- Prior attitude effect
  - Subjects see evidence that they agree with as stronger and more relevant that evidence they disagree with
- Disconfirmation bias
  - Subjects actively denigrate evidence they disagree with while accepting evidence they agree with at face value
- Confirmation bias
  - When given control over sources of information, subjects seek out confirmatory evidence and avoid what might challenge their prior beliefs
- Attitude polarization
  - Partisans presented with same evidence will diverge in their attitudes

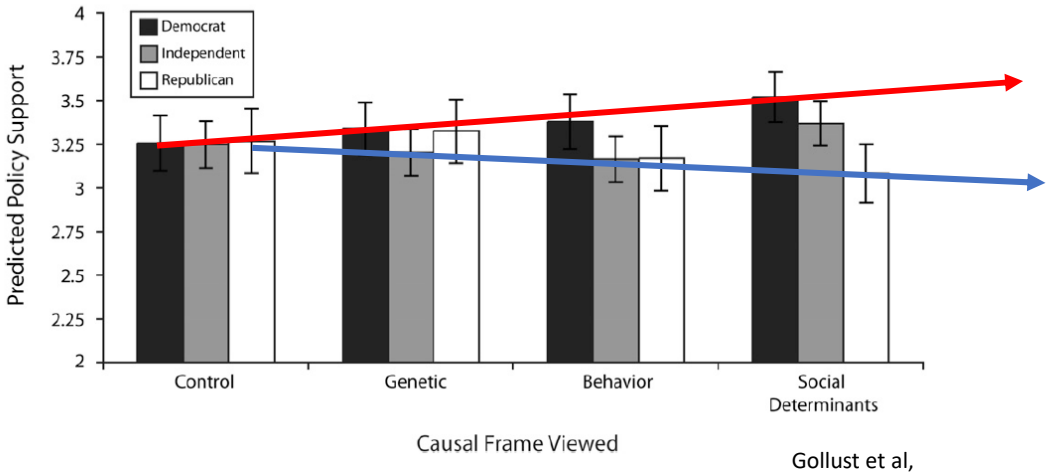
Taber & Lodge, 2006

Confirmation bias in health policy

- Subjects were given, at random, one of four news stories on diabetes to read, each formatted as article from authoritative source
- Four different causal explanations were embedded in text:
  - No specific cause (controls)
  - Genetic
  - Lifestyle
  - Social determinants

Gollust et al, AJPH 2009

Support for collective societal responses to diabetes



Gollust et al, AJPH 2009

Confirmation bias in action

- Classic study by Kahan et al (2013) presented individuals with the same numerical data but on
  - Skin cream
  - Gun control
- With skin cream, probability of right answer increases with numeracy
- With gun control, main determinant is the subject's prior opinion
- Replicated by World Bank on its staff
  - Skin cream
  - Impact of minimum wage laws on poverty rates (where views are divided, mainly according to discipline)
- Staff significantly less accurate in interpretation on minimum wage data, although numbers identical
- Correlated with views on income inequality

Correcting misconceptions

- Subjects initially categorized on a conservative-liberal scale
- Exposed to factually incorrect stories on the effect of US tax cuts and Weapons of Mass Destruction in Iraq, followed by an authoritative correction
- Among those who sympathised with the initial message the correction either failed to change their misperception or actually reinforced it.

Nyhan & Reifler, 2010

Addressing misinformation

- Subjects divided into 3 groups
  - A. Given facts about scale and duration of US welfare payments (much less than most people think)
  - B. Completed multiple choice quiz on welfare
  - C. Given no information
- Extremely high level of wrong answers
- Those most wrong also most confident they are right
- Giving facts has almost no effect on those misinformed
- *"It is the 'I know I'm right' syndrome that poses the most formidable problem"*

Kuklinski et al, 2000

Addressing misinformation

- Subjects asked
  - how much *is* spent on welfare?
  - How much *should be*?
  - Should welfare be cut?
- Those who say:
  - amount spent is high
  - What should be spent is much lower
  - And discover what is spent is really even lower than they think should, can be persuaded to become more generous
- Authors' conclusion: to correct misinformation you need to "hit them between the eyes"

Kuklinski et al, 2000

Home team advantage

- Well known that teams playing at home do better
- Reasons include supportive crowd, familiarity with setting…
- But in soccer games, referees add more injury time at end of games when home team is behind *(Moskowitz & Wertheim, 2011)*
- Explained by referees wishing to avoid wrath of majority of crowd
- *Barth, Caprio & Levine (2013)* argue that failure of regulators to act during financial crisis was because the banks were the "home team" and their customers, who were more distant, were the "away team"
- In sports, decisions improved by video replay (e.g. rugby), thereby increasing public scrutiny

Mechanisms

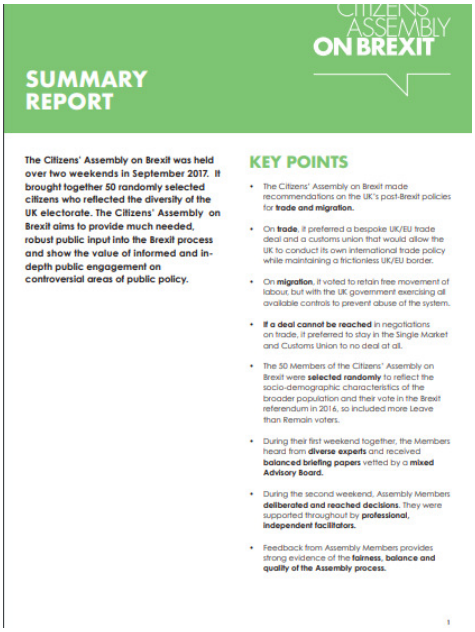
- PET scanning of brains of 15 Democrats and 15 Republicans just before 2004 US Presidential Election
- Presented with sets of ***clearly contradictory*** statements by candidates
- Individuals reported no contradictions in statements from their own party but contradictions in statements from opposing party
- PET scanning showed that, when confronted with contradictions from own party, brain both switched off centres dealing with negative emotions and switched on centres dealing with positive emotions
- This happened without involving centres involved in reasoning

Westen et al. J Cognitive Neuroscience, 2006

Take home messages

- Decision-making, even by experts, subject to numerous biases
- Major difference between being uninformed and misinformed
- Providing information is not enough
- Group decision making among people with the same view likely to reinforce wrong decisions (groupthink)
- Ideally, groups should comprise a mix of people with differing prior views on relevant issues, forcing them to articulate their arguments
- Examples include redteaming in military, citizens assemblies, and deliberative democracy

Citizens' Assembly on Brexit


CITIZENS' ASSEMBLY ON BREXIT

SUMMARY REPORT

The Citizens' Assembly on Brexit was held over two weekends in September 2017. It brought together 50 randomly selected citizens who reflected the diversity of the UK electorate. The Citizens' Assembly on Brexit aims to provide much needed, robust public input into the Brexit process and show the value of informed and in-depth public engagement on controversial areas of public policy.

KEY POINTS

- The Citizens' Assembly on Brexit made recommendations on the UK's post-Brexit policies for **trade and migration.**
- On **trade**, it preferred a bespoke UK/EU trade deal and a customs union that would allow the UK to conduct its own international trade policy while maintaining a frictionless UK/EU border.
- On **migration**, it voted to retain free movement of labour, but with the UK government exercising all available controls to prevent abuse of the system.
- **If a deal cannot be reached** in negotiations on trade, it preferred to stay in the Single Market and Customs Union to no deal at all.
- The 50 Members of the Citizens' Assembly on Brexit were **selected randomly** to reflect the socio-demographic characteristics of the broader population and their vote in the Brexit referendum in 2016, so included more Leave than Remain voters.
- During their first weekend together, the Members heard from **diverse experts** and received **balanced briefing papers** vetted by a **mixed Advisory Board.**
- During the second weekend, Assembly Members **deliberated and reached decisions.** They were supported throughout by **professional, independent facilitators.**
- Feedback from Assembly Members provides strong evidence of the **fairness, balance and quality of the Assembly process.**

Lies: Boris Johnson – April 2016

April 2016

UK Statistics Authority

Chair of the UK Statistics Authority, Sir Andrew Dilnot CBE

The Rt Hon Norman Lamb MP
House of Commons
London
SW1A 0AA

21 April 2016

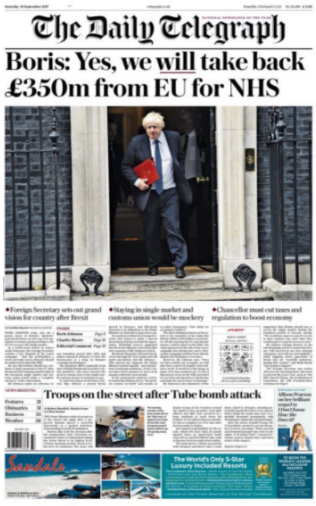
Dear Mr Lamb,

UK CONTRIBUTIONS TO THE EUROPEAN UNION

Thank you for your letter of 15 April in which you highlight recent statements used in campaign literature by Vote Leave, the designated campaign for Britain to leave the European Union (EU). These include a poster which says 'Let's give our NHS the £350 million the EU takes every week'[1], and a statement on the Vote Leave website that suggests that the UK, 'stop sending £350 million every week to Brussels and instead spend it on our priorities'[2]. I have considered these statements, and sought the advice of colleagues, including our Director General for Regulation at the UK Statistics Authority, Ed Humpherson.

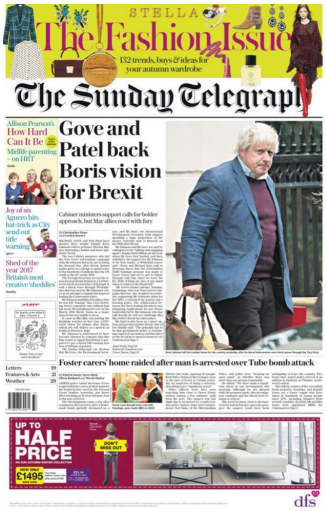
"The continued use of a gross figure in contexts that imply it is a net figure is misleading and undermines trust in official statistics."

Boris again – September 2017


The Daily Telegraph

Boris: Yes, we will take back £350m from EU for NHS

Troops on the street after Tube bomb attack


The Sunday Telegraph

Fashion Issue

132 trends, buys & ideas for your autumn wardrobe

Gove and Patel back Boris vision for Brexit

Foster carers' home raided after man is arrested over Tube bomb attack

UP TO HALF PRICE

UK Statistics Authority

Chair of the UK Statistics Authority, Sir David Norgrove

Rt Hon Boris Johnson MP
Foreign Secretary
Foreign and Commonwealth Office
King Charles Street
London
SW1A 2AH

17 September 2017

Dear Foreign Secretary,

I am surprised and disappointed that you have chosen to repeat the figure of £350 million per week, in connection with the amount that might be available for extra public spending when we leave the European Union.

This confuses gross and net contributions.[1] It also assumes that payments currently made to the UK by the EU, including for example for the support of agriculture and scientific research, will not be paid by the UK government when we leave.

It is a clear misuse of official statistics.

Yours sincerely

Sir David Norgrove

Dear Foreign Secretary,
I am surprised and disappointed that you have chosen to repeat the figure of £350 million per week… It is a clear misuse of official statistics.

[1] For further detail on official statistics relating to the UK's financial contributions to the EU, see Sir Andrew Dilnot's letter of April 2016 to the Rt Hon Norman Lamb MP regarding UK contributions to the EU.

Corporate lies

- In 1994, the chief executives of the leading tobacco companies went before a US Senate committee and testified under oath that “nicotine is not addictive”
- "Nobody believed them" - *Supreme Court Justice Antonin Scalia*

  (duck shooting partner of Dick Cheney)

“Nicotine is addictive. We are, then, in the business of selling nicotine—an addictive drug effective in the release of stress mechanisms.”

1963 industry document

The media

- Between 1996 and 2000, Fox News entered cable TV markets of 20% of US towns.
- Entry of Fox News to a town had a significant impact on voting patterns, with 3-8% shift in favour of Republicans
- More detailed analysis of coverage of specific senate races showed that this was a general ideological shift and not one favouring particular candidates

DellaVigna & Kaplan. The Fox News Effect: Media Bias and Voting (NBER Working Paper No. 12169

Contents lists available at ScienceDirect

Social Science Research

journal homepage: www.elsevier.com/locate/ssresearch

'It's *The Sun* Wot Won It': Evidence of media influence on political attitudes and voting from a UK quasi-natural experiment

Aaron Reeves [a, *], Martin McKee [b], David Stuckler [a, b]

[a] Department of Sociology, University of Oxford, England, United Kingdom
[b] London School of Hygiene and Tropical Medicine, London, England, United Kingdom

- The Sun's endorsements were associated with a significant increase in readers' support for Labour in 1997, approximately 525,000 votes, and its switch back was associated with about 550,000 extra votes for the Conservatives in 2010.
- The magnitude of these changes, about 2% of the popular vote, would have been unable to alter the outcome of the 1997 General Election, but may have affected the 2010 Election.

Welcome to the world of fake news

"It sounds a dreadful thing to say, but these are things that don't necessarily need to be true as long as they're believed."

Alexander Nix
Cambridge Analytica

Taking lying to a new level

POLITIFACT
WINNER OF THE PULITZER PRIZE

DONALD TRUMP

In Japan, "they take a bowling ball from 20 feet up in the air and they drop it on the hood of the car. And if the hood dents, then the car doesn't qualify...It's horrible, the way we're treated."

— *PolitiFact National* on Thursday, March 15th, 2018

Gutter ball

DONALD TRUMP

"You take Pulse nightclub. If you had one person in that room that could carry a gun and knew how to use it, it wouldn't have happened, or certainly to the extent that it did."

— *PolitiFact National* on Thursday, March 1st, 2018

Armed guard present

DONALD TRUMP

"We have signed more legislation than anybody. We broke the record of Harry Truman."

— *PolitiFact National* on Friday, December 29th, 2017

DONALD TRUMP

"We essentially repealed Obamacare because we got rid of the individual mandate ... and that was a primary source of funding of Obamacare."

— *PolitiFact National* on Thursday, December 21st, 2017

Wrong on both counts

Take home messages

- Decision making is far from rational
  - Influenced by an enormous range of extraneous factors
- Keep it simple
  - Break complex problems down into manageable pieces
- Anticipate and address biases
  - Make decision making transparent
  - Force decision makers to articulate their arguments
- Politicians lie
  - Be suspicious, very suspicious
  - Those on social media may not be who they say they are
  - Check, check, and check the facts again and again