#Post-truth and Renewable Energy: Misinformation and its Correction

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What is “Misinformation”? 
Rock idol Richard Blake was found dead in his apartment. Police suspected a drug overdose as heroin was found near the body. Blake’s sudden death shocked fans. Fans will pay tribute at a ceremony tomorrow.

How should police and politicians respond?

“The police should investigate the local drug scene.”  
“Artists need addiction support programs.”
Laboratory Experiments

Rock idol Richard Blake was found dead in his apartment. Police suspected a drug overdose as heroin was found near the body. Blake’s sudden death shocked fans.

Fans will pay tribute at a ceremony tomorrow.

How should police and politicians respond?

“The police should investigate.”

“Artists need addiction support.”

*Misinformation:* Something thought to be truthful later turns out to be false.
From the Laboratory to Society
“Post-Fact” World—“Post-Truth” Politics

![Graph showing the number of media hits for "post-fact" and "post-truth" terms from 1982 to 2016. The graph is divided into two panels: one for "post-fact" and one for "post-truth". The "post-fact" panel shows a significant increase in hits from 2016 onwards, while the "post-truth" panel shows a significant increase in hits after 2012. The distribution is yearly.]
“Post-Fact” World—“Post-Truth” Politics

“post-fact”

“post-truth”

Number of media hits

01-Jan-1982 31-Dec-2016

Distribution: Yearly

“post-truth” Word of the year 2016
(Oxford Dictionaries)
U.S. Presidential Candidates

*Politifact* score card of election campaign
Do Facts Matter?
(Swire, Berinsky, Lewandowsky, & Ecker, 2017)

- Present online sample (MTurk workers) with Trump statements
  - true or false
  - attributed to Trump or unattributed
  - obtain belief ratings
Do Facts Matter?  
(Swire, Berinsky, Lewandowsky, & Ecker, 2017)

• Present online sample (MTurk workers) with Trump statements – true or false – attributed to Trump or unattributed – obtain belief ratings

Donald Trump said that vaccines cause autism (MISINFORMATION)

Donald Trump said that the US spent $2 trillion on the war in Iraq (FACT)
Do Facts Matter?  
(Swire, Berinsky, Lewandowsky, & Ecker, 2017)

- Present online sample (MTurk workers) with Trump statements – true or false – attributed to Trump or unattributed – obtain belief ratings

- Rebut (affirm) false (true) statements – ask for belief ratings immediately or week later

Donald Trump said that vaccines cause autism (MISINFORMATION)
Donald Trump said that the US spent $2 trillion on the war in Iraq (FACT)
Belief Ratings (Swire et al., 2017)
Voting Intentions (Swire et al., 2017)

- **Voting intentions**
  - Likelihood of voting for Trump 0-10
  - Retention Interval: Pre-explanation, Immediate, One week

- **Feelings**
  - Feelings Thermometer 0-100
  - Retention Interval: Pre-explanation, Immediate, One week

Legend:
- Red: Republican supporter unattributed
- Brown: Republican supporter Trump
- Purple: Republican opposer unattributed
- Pink: Republican opposer Trump
- Blue: Democrat unattributed
- Aqua: Democrat Trump
Degree of belief change after correction of misinformation did not correlate with change in voting intentions
Elections Over Time

“Post-truth” politics works

Politifact
Misinformation

• Scope of the problem and its sources
• Does it matter?
• Why do people believe?
• Why do people continue to rely on retracted information?
• Ironic failures of corrections and “backfire” effects
• Successful debiasing
Misinformation

• **Scope of the problem and its sources**
  • Does it matter?
  • Why do people believe?
  • Why do people continue to rely on retracted information?
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• Successful debiasing
What are the Sources of Misinformation?
Changes in risk perceptions and vaccination intentions dependent on search environment, Germany, September 2008

- Risks of vaccinating
- Risks of not vaccinating
- Mean intention to vaccinate
Internet Sources (Betsch, 2011)

Changes in risk perceptions and vaccination intentions dependent on search environment, Germany, September 2008

Google search yields high proportion of anti-vaccination websites (20%+)

Reduced intention translated into (in-)action at follow-up 5 months later
Ramsay et al. (2010)

### It is unclear whether Obama was born in the US—or, Obama was not born in the US

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>About once a week</th>
<th>About 2-3 times a week</th>
<th>Almost every day</th>
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<tbody>
<tr>
<td>Fox News</td>
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<td>CNN</td>
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<td>MSNBC</td>
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<td>38</td>
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<td>42</td>
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<tr>
<td>Network TV news broadcasts</td>
<td>56</td>
<td>39</td>
<td>46</td>
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<tr>
<td>Public broadcasting (NPR or PBS)</td>
<td>51</td>
<td>46</td>
<td>41</td>
<td>26</td>
<td>22</td>
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<tr>
<td>Newspapers and news magazines (in print or online)</td>
<td>55</td>
<td>38</td>
<td>49</td>
<td>36</td>
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### Most scientists think climate change is not occurring + views are divided evenly

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<td>MSNBC</td>
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<td>43</td>
<td>41</td>
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<td>40</td>
</tr>
</tbody>
</table>
Scope of Misinformation

• Difficult to quantify but some false beliefs seem to be relatively widespread
Vaccinations, Autism, and the Public

• U.K. public in 2002 (Colgrove & Bayer, 2005):
  - 25% believed in link MMR vaccination – autism
  - 39% believed in “equal evidence on both sides”

Petrovich et al. (2001):
  13% of GP’s and 27% of nurses found association with autism to be very likely or possible (Welsh sample).
WMD: Persistence of a Myth

- Duelfer report: Sept 2004
- Iraq Survey Group winds down Jan 2005

![Bar chart showing opinions on WMD by party and year]

Legend:
- U.S. has found WMD
- Iraq probably has WMD U.S. has not found
- Iraq probably does not have WMD
Pluralistic Ignorance and False Consensus Effect
What best describes thoughts about climate change?

- I don’t think that climate change is happening: 5.6%
- I have no idea whether climate change is happening or not: 3.8%
- I think that climate change is happening, but it’s just a natural fluctuation in Earth’s temperatures: 40.2%
- I think that climate change is happening, and I think that humans are largely causing it: 50.4%

CSIRO
January 2011
False Consensus Effect (Leviston et al., 2013)

The greater this discrepancy, the greater resilience to change.
When Are Opinions Misperceived? (Shamir & Shamir, 1997)

- Correlated with prominence of an opinion in the media
- Information that is more accessible raises people’s estimates of the preponderance of that opinion
When Are Opinions Misperceived? (Shamir & Shamir, 1997)

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The Guardian

One third of Australia's media coverage rejects climate science, study finds

An academic study has found that 32% of articles dismissed or questioned the link between human activity and climate change
Misinformation

• Scope of the problem and its sources

• **Does it matter?**

• Why do people believe?

• Why do people continue to rely on retracted information?

• Ironic failures of corrections and “backfire” effects

• Successful debiasing
U.K. MMR Vaccination Rates
(Smith et al., 2007)

95% for "herd immunity"

92% in 2012-13
U.K. MMR Vaccination Rates
(Smith et al., 2007)

95% for “herd immunity”

U.S. spared: Vaccination rates remained at 92%

92% in 2012-13
DTP Vaccinations
(Gangarosa et al. 1998)

• DTP = diphtheria-tetanus-pertussis

• Pertussis (whooping cough)
  – millions of cases and 100,000’s of deaths annually
    (developing countries)
  – preventable by vaccination
  – difficult to treat and can have serious long-term
    consequences even in survivors

• Localized opposition provides naturalistic
  “experiment”
Incidence of pertussis (whooping cough)

Gray shading signifies anti-vaccination movement
Policy Support: Climate Mitigation

Cook et al. (2013)

Cook (2014)
Policy Support: Climate Mitigation

Table 3. Skeptical Arguments by Category and Year

<table>
<thead>
<tr>
<th>Argument</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>It’s not happening</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature record is unreliable</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>It’s cooling</td>
<td>17</td>
<td>9</td>
<td>31</td>
<td>23</td>
<td>80</td>
</tr>
<tr>
<td>Ice isn’t melting</td>
<td>16</td>
<td>6</td>
<td>11</td>
<td>12</td>
<td>45</td>
</tr>
<tr>
<td>Climategate/CRU email suggests conspiracy</td>
<td>0</td>
<td>0</td>
<td>27</td>
<td>13</td>
<td>40</td>
</tr>
<tr>
<td>Sea level rise is exaggerated</td>
<td>6</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>There is no consensus</td>
<td>45</td>
<td>17</td>
<td>28</td>
<td>39</td>
<td>129</td>
</tr>
</tbody>
</table>
Perception of scientific consensus pivotal for climate-change attitudes (Lewandowsky et al., 2013; Cook & Lewandowsky, 2016; van der Linden et al., 2015)
Misinformation

- Scope of the problem and its sources
- Does it matter?
- **Why do people believe?**
  - Why do people continue to rely on retracted information?
  - Ironic failures of corrections and “backfire” effects
- Successful debiasing
How and What *Do* People Believe?

• Norms of everyday conversational conduct suggests speakers are *truthful* and *relevant* (Grice, 1975).

• Comprehension often impossible without initial acceptance of truth and hence belief (Gilbert, 1991)
  – people first believe upon comprehension ...
  – then attach negation “tag” (unless they are distracted)
  – negation tag may be forgotten sooner than the to-be-negated information
Fluency and Truth (Reber & Schwarz, 1999).

• If it’s easy to read or understand (no accent), material is more likely to be judged true.

• “Fluency” is taken to be an indicator of compatibility with prior knowledge.
Misinformation

- Scope of the problem and its sources
- Does it matter?
- Why do people believe?
- **Why do people continue to rely on retracted information?**
- Ironic failures of corrections and “backfire” effects
- Successful debiasing
Pretrial Publicity

- All participants read transcript of murder trial and deliver verdict.
- Control
- Pretrial publicity: Inflammatory articles prior to transcript

Fein et al. (1997)
Why Does Misinformation Persist?

- Correction of misinformation leaves a gaping hole in people’s event model.
- People prefer a *wrong* model to an *incomplete* model.
That Was the Good News
Misinformation

• Scope of the problem and its sources
• Does it matter?
• Why do people believe?
• Why do people continue to rely on retracted information?
• **Ironic failures of corrections and “backfire” effects**
• Successful debiasing
Backfire or Boomerang Effects

• Corrections can make things worse
• Telling people that something is wrong may make them believe *more* in the *wrong* information
  – worldview backfire effect
  – (familiarity backfire effect)
Worldview Backfire Effect

• Belief in WMD split along partisan lines
  – Republicans **61%** (average 2006 - 2008)
  – Democrats **18%**

• What happens if corrective information is presented?
Worldview Backfire Effect
(Nyhan & Reifler, 2010)
Worldview Backfire Effect

• People actively counter-argue to resist the correction (Prasad et al., 2009).

• Initially-held incorrect beliefs become more entrenched.

• Some evidence for ideological symmetry of worldview effects (i.e., for political left, Nyhan & Reifler, 2010).

• Also shown for vaccinations (in people who have negative pre-existing attitudes, Nyhan et al., 2014).
Misinformation

• Scope of the problem and its sources
• Does it matter?
• Why do people believe?
• Why do people continue to rely on retracted information?
• Ironic failures of corrections and “backfire” effects

• Successful debiasing
Providing an Alternative

• Correction of misinformation leaves a gaping hole in people’s event model.
• But they like a correct alternative even better.
Pretrial Publicity Revisited

- All participants read transcript of murder trial and deliver verdict.

  • **Control**
  • **Pretrial publicity**: Inflammatory articles prior to transcript
  • **Suspicion**: Inflammatory articles followed by suggestion that prosecutor planted them

  - “Guilty” 45%
  - “Guilty” 80%
  - “Guilty” 36%

Fein et al. (1997)
Pretrial Publicity Revisited

- All participants read transcript of murder trial and deliver verdict.
- Control
- Pretrial publicity: Inflammatory articles prior to transcript
  - Suspicion: Inflammatory articles followed by suggestion that prosecutor planted them

Fein et al. (1997)
Suspicion and Inoculation

• Research on misinformation: Correction effective if people are:
  – skeptical of a source
  – suspicious of motives
  – people who doubted that Iraq War was over WMD processed information more accurately (Lewandowsky et al., 2005, 2009)

• Important to analyze denial and publicize their techniques
Inoculation
(Cook, Lewandowsky, & Ecker, 2017)
Inoculation

(Cook, Lewandowsky, & Ecker, 2017)

Inoculation messages neutralized effects of ‘false balance’
Successful Debunking

• People can discount misinformation if they are suspicious or skeptical of motives
• People can discount misinformation when there is a causal alternative
  – if an alternative explanation for an event is provided
  – if people discover misinformation was “astroturfed” by a “front group”
  – which can discredit hidden sponsor
Successful Debunking

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• People can discount misinformation when there is a causal alternative
  – if an alternative explanation for an event is provided
  – if people discover “astroturfed” by a “front group”
  – which can discredit hidden sponsor

Remember Richard Blake?
Who died of a drug overdose ...

“The toxicology report was negative and the cause of death was linked to cardiac problems”
Renewable Energy
Solution Aversion: On the Relation Between Ideology and Motivated Disbelief

Troy H. Campbell and Aaron C. Kay
Duke University

[Bar chart showing agreement with climate change science by Democrats and Republicans. The chart indicates that Democrats show a higher percentage agreement with the free market friendly solution compared to the government regulation solution, while Republicans show a lower percentage agreement with both solutions.]
Wind Turbines

• There are no verifiable adverse health effects of wind turbines
• ... although there is a lot of pseudoscience to suggest otherwise ...
• ... and although health complaints from the public seem to suggest otherwise
Nocebo Effect
(e.g., Chapman et al., 2013)

Farms with wind turbine complainants by state, Australia 1993–2012
Nocebo Effect (e.g., Chapman et al., 2013)

Farms with wind turbine complainants by state, Australia 1993–2012
Nocebo Effect
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- Only 129 individuals ever complained (out of 32,000+ residents within 5km)
- 116/129 (90%) of complainants made their first complaint after 2009 when anti wind farm groups began campaign
- Laboratory evidence suggests that expectation determines symptomology (Crichton et al., 2013).
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(e.g., Chapman et al., 2013)

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• 116/129 (90%) of complainants made their first complaint after 2009 when anti wind farm groups began campaign
• Laboratory evidence suggests that expectation determines symptomology (Crichton et al., 2013).

Use this information to induce skepticism
Thank You.

Also available in German, French, Dutch, Polish, Swedish, Spanish, and Italian

http://sks.to/debunk
The End
http://www.cfr.org/interactives/GH_Vaccine_Map/#map
97 out of 100 climate experts think humans are causing global warming

Doran et al 2009, Anderegg et al 2010

http://sks.to/consensus
97 out of 100 climate experts think human activity is causing climate change.

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
</tr>
<tr>
<td>(a) Acceptance of scientific propositions*</td>
<td></td>
</tr>
<tr>
<td>CO₂ emissions cause climate change</td>
<td>3.96 (0.081)</td>
</tr>
<tr>
<td>Smoking causes lung cancer</td>
<td>4.63 (0.069)</td>
</tr>
<tr>
<td>HIV virus causes AIDS</td>
<td>4.24 (0.106)</td>
</tr>
<tr>
<td>(b) Perceived consensus among scientists</td>
<td></td>
</tr>
<tr>
<td>Emissions and climate change</td>
<td>67.28 (3.11)</td>
</tr>
<tr>
<td>Smoking and lung cancer</td>
<td>91.81 (1.90)</td>
</tr>
<tr>
<td>HIV and AIDS</td>
<td>84.83 (2.79)</td>
</tr>
<tr>
<td>(c) General climate trends†</td>
<td></td>
</tr>
<tr>
<td>Increase in atmospheric temperature</td>
<td>60.53 (2.42)</td>
</tr>
<tr>
<td>Increase of global sea level</td>
<td>61.52 (2.94)</td>
</tr>
<tr>
<td>Doubling of weather-related natural disasters</td>
<td>53.26 (3.38)</td>
</tr>
</tbody>
</table>

Doran et al 2009, Anderegg et al 2010

http://sks.to/consensus
Broader Context

- ...activists with ties to the Tea Party ... brand ... preserving open space as ... a United Nations-led conspiracy to deny property rights... They are showing up at planning meetings to denounce bike lanes ... and smart meters...

---

Donald J. Trump
@realDonaldTrump

The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive.
7:15 PM - 6 Nov 2012

97,892 retweets 62,476 likes
Broader Fallout of Conspiracism

The social consequences of conspiracism: Exposure to conspiracy theories decreases intentions to engage in politics and to reduce one’s carbon footprint

Daniel Jolley* and Karen M. Douglas*
University of Kent, Canterbury, UK
Broader Fallout of Conspiracism

The Sarrazin effect: the presence of absurd statements in conspiracy theories makes canonical information less plausible

Marius Hans Raab, Nikolas Auer, Stefan A. Ortlieb and Claus-Christian Carbon*

Department of General Psychology and Methodology, University of Bamberg, Bamberg, Germany

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Reptile prime ministers and flying Nazi saucers—extreme and sometimes off-wall conclusion are typical ingredients of conspiracy theories. While individual differences are a common research topic concerning conspiracy theories, the role of extreme statements in the process of acquiring and passing on conspiratorial stories has not been regarded in an experimental design so far. We identified six morphological components of conspiracy theories empirically. On the basis of these content categories a set of narrative elements for a 9/11 story was compiled. These elements varied systematically in terms of conspiratorial allegation, i.e., they contained official statements concerning the events of 9/11, statements alleging to a conspiracy limited in time and space as well as extreme statements indicating an all-encompassing cover-up. Using the method of narrative construction, 30 people were given a set of cards with these statements and asked to construct the course of events of 9/11 they deem most plausible. When extreme statements were present in the set, the resulting stories were more conspiratorial; the number of official statements included in the narrative dropped significantly, whereas the