

Institution: University of Cambridge		
Unit of Assessment: UoA4		
Title of case study: A Psychological Vaccine Against Fake News		
Period when the underpinning research was undertaken: Jan 2017 – present		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Dr Sander van der Linden	Reader and Director, Cambridge Social Decision-Making Lab	Aug 2016 – present
Dr Jon Rosenbeek	Post-doctoral research associate	June 2020- present
Period when the claimed impact occurred: January 2017 - present		
Is this case study continued from a case study submitted in 2014? No		
<p>1. Summary of the impact</p> <p>Dr Sander van der Linden's leading research at the University of Cambridge has produced novel psychological interventions on how to inoculate the public against the spread of fake news and misinformation. In collaboration with industry and government partners, his team developed the interactive online social impact game "<i>Bad News</i>", which has been translated into over 15 different languages and reached over one million people worldwide. His research has led to a shift in national and international policy implementation from traditional 'debunking' to the new approach of <i>prebunking</i>. His research-based approach to combatting misinformation has been recognised as an innovative way forward by the European Commission, the Foreign and Commonwealth Office, the UK Parliamentary Investigation on Fake News, and the US State Department, and has contributed to public discourse on the issue of fake news. This has led to the subsequent development and release of government-backed anti-misinformation interventions such as <i>GoViral!</i> (targeting misinformation during the Covid-19 pandemic, and disseminated in English, French and German), <i>Radicalise</i> (countering radicalisation in Jordan) and <i>Harmony Square</i> (countering US election misinformation).</p>		
<p>2. Underpinning research</p> <p>A societal problem: fake news and the spread of misinformation</p> <p>The growing spread of misinformation and "digital wildfires" is considered one of the most important global threats ('Digital Wildfires', World Economic Forum, 2018). About 83% of Europeans now think fake news is threatening democracy ('Eurobarometer' survey, European Commission, 2018) and in some countries the viral spread of misinformation has led to injury and even death (<i>How WhatsApp helped turn an Indian village into a lynch mob</i>, BBC News, 18 Jul 2018). Dr van der Linden at the University of Cambridge Social Decision-Making Lab has conducted research to understand and address this problem at a psychological level.</p> <p>The vaccine metaphor: psychological inoculation</p> <p>Drawing from 'inoculation theory', Dr van der Linden's research group hypothesized that it may be possible to shield public opinion from the spread of false information. Just as administering a severely weakened strain of a virus triggers antibodies in the immune system (to help confer resistance against future infection), exposing the public to a severely weakened version of a falsehood and pre-emptively forewarning and debunking that falsehood with scientific facts (the 'vaccine'), can help cultivate cognitive resistance ('mental antibodies') against fake news over time [1,3]. In 2014, a study of 2,167 participants (compared across six experimental conditions) [2,3] showed that independent of political affiliation, those who are pre-emptively warned and exposed to a weakened dose of misinformation are subsequently more resistant, and less likely, to be duped by the full 'fake news' dose later on in the experiment compared to both 'false balance' (scientific facts followed by the fake news) and pure control groups. Overall, the inoculation preserved up to two-thirds of the positive effect of the factual message [2].</p>		

Bad News: an online interactive impact game embedded in the social media experience

In order to scale the vaccine into a real-world intervention, Dr van der Linden then explored more experiential ways of engaging audiences to learn about common online misinformation techniques that underlie the production of most fake news. Through a novel external partnership with the Dutch media collective DROG, they created the fake news game, *Bad News* (www.getbadnews.com). Launched in 2018, in the online version of the game, players assume the role of a fake news producer and advance through six levels, each of which showcases weakened doses of six common misinformation techniques (polarization, use of emotion, conspiracy theories/echo chambers, deflection, online trolling and impersonation) that players are exposed to in a simulated social media environment.

In a randomised pilot study conducted with 95 high-school students in the Netherlands, initial evidence was found that *Bad News* helped inoculate students against fictional misinformation about immigration [3]. Through subsequently analysing 15,000 responses from participants exposed to a battery of fake and real news items before and after playing the online version of the game, consistent evidence was found that people: a) improved in their ability to detect fake news after playing; b) became more confident in their judgments about what is real and fake and; c) did not downgrade real news headlines [4,5,6,7].

The intervention (a single-play of the game) boosted immunity by about 20% compared to the pre-game average. The *Bad News* intervention continues to show significant and direct positive effects for players in the form of attitudinal protection against fake news, lasting up to two months with regular booster shots [3].

Later iterations of the vaccine tool

Since its initial launch, Dr van der Linden has adapted the key principles of *Bad News* to create new games to inoculate against fake news in specific forms and environments. These include: *Join This Group*, a game developed with WhatsApp to inoculate against misinformation frequently encountered within the context of direct messaging apps which was created in 2018 [7]; *Radicalize*, an anti-radicalisation game which was launched in 2019 [7]; *Harmony Square* (harmonysquare.game), a game to guard against political misinformation during elections, which was launched in 2020 [8]; and *Go Viral!* (www.qoviralgame.com), a game developed in collaboration with the World Health Organisation (WHO) and the UK Government to protect against COVID-19 conspiracies during the 2020 'infodemic' (WHO). Results have shown that these games confer immunity upon players, who self-reported increased distrust of misinformation, greater confidence in their own judgements and fewer instances of self-reported sharing of misinformation [7,8].

3. References to the research

1. **van der Linden, S.**, Maibach, E., Cook, J., Leiserowitz, A., & Lewandowsky, S. (2017). Inoculating against misinformation. *Science* 358(6367), 1141-1142. DOI: 10.1126/science.aar4533
2. **van der Linden, S.**, Leiserowitz, A., Rosenthal, S., & Maibach, E. (2017). Inoculating the Public Against Misinformation about Climate Change. *Global Challenges* 1(2). DOI: 10.1002/gch2.201600008.
3. Maertens, R., **Roozenbeek, J.**, Basol, M., & **van der Linden, S.** (2020). Long-term effectiveness of inoculation against misinformation: Three longitudinal experiments. *Journal of Experimental Psychology: Applied*. doi: 10.1037/xap0000315
4. Roozenbeek, J., & **van der Linden, S.** (2018). The Fake News Game: Actively Inoculating Against the Risk of Misinformation. *Journal of Risk Research* 22(5), 570-580. DOI: 10.1080/13669877.2018.1443491.
5. Roozenbeek, J., and **van der Linden, S.** (2019). Fake news game confers psychological resistance against online misinformation. *Nature Humanities and Social Science Communications* 5(65). DOI: 10.1057/s41599-019-0279-9.

6. Basol, M., Roozenbeek, J., & van der Linden, S. (2020). Good news about Bad News: Gamified inoculation boosts confidence and cognitive immunity against fake news. *Journal of Cognition*, 3(1), 1-9. DOI: 10.5334/joc.91
7. Roozenbeek, J., van der Linden, S., & Nygren, T. (2020). Prebunking interventions based on the psychological theory of inoculation can reduce susceptibility to misinformation across cultures. *Harvard Misinformation Review* 1(2). DOI: 10.37016/mr-2020-008.
8. Roozenbeek, J., van der Linden, S. (2020). Breaking Harmony Square: A game that “inoculates” against political misinformation. *Harvard Misinformation Review* 1(8) <https://doi.org/10.37016/mr-2020-47>

Evidence of min 2* quality: all publications have been peer reviewed, research supported by competitively won grants.

Relevant grants and awards (van der Linden, PI)

2020-2020 UK Prime Minister and Cabinet Office – GoViral! development (GBP134,235)
 2020–2020 Google Jigsaw (USD137,253) - Inoculation Against Online Extremism
 2019-2020 Cambridge Technology and Trust Initiative (GBP4,000) Bad News
 2018-2019 WhatsApp Inc/Facebook (USD50,000) Social Science Misinformation
 2018-2019 UK Foreign and Commonwealth Office (GBP55,948) Media Literacy Grant
 2018-2019 ESRC IAA Impact Acceleration (GBP17,000) The Fake News Game
 2017-2018 Nuffield Foundation (GBP95,514) Communicating uncertainty in data without undermining trust (OSP/43227).

4. Details of the impact

The online dissemination of misinformation and fake news is a global problem with profound implications for society, affecting public trust in institutions that govern health, democracy and security. Rather than attempting to control the spread of fake news, Dr van der Linden's research at the University of Cambridge has shown that it is possible to increase awareness of the manipulation tactics used by fake news actors, a technique that has been recognised and adopted by governments and organisations in the UK, Europe, USA, Lebanon and Jordan.

Global reach and reception of *Bad News*

Bad News proved a timely intervention which has contributed to global discourse around misinformation and fake news. The game was covered by over 300 media outlets across the globe, including high-profile television and radio (e.g. BBC and CNN) and web and print media (e.g. The Financial Times, The Guardian, The New York Times) [A]. Dr van der Linden actively shared his expertise via global popular media (e.g. *National Public Radio (NPR)* in the USA, *Quirks and Quarks* in Canada, and Ed Miliband's *Reasons to be Cheerful* in the UK) [A]. Thanks to active media engagement, the *Bad News* game received about 20,000 players a day during its initial launch event between 19-23 February 2018 and 163,000 unique players during a second launch between 26-30 June 2019 [A]. The BBC interviewed the Social Decision-Making lab and documented the journey of transitioning from a theoretical idea to a translational tool in a major investigative article for BBC Future, “*Could this be the cure for fake news?*” [B].

The game was awarded the *Frank Prize* for research in the Public Interest from the University of Florida in 2020. The game was also nominated for the Beazley Design of the Year Awards (2018) and featured as part of the four-month exhibit in the London Design Museum, which gathers an average of 50,000 visitors per month [C].

Impact on public understanding and behaviour

Based on his research findings, Dr van der Linden estimated that a single play boosts people's ability to spot fake news by about 20% [5]. As of December 2020, approximately one million people worldwide have played *Bad News* online [A] and at least 1,000 students in classroom settings through workshops with DROG [A].

A novel partnership with WhatsApp Inc. led to the development of a special version of the game using the WhatsApp platform called “*Join this Group*” in 2018 [7]. The WhatsApp Lead Research Team has described “*The consequences of misinformation are real and we know this is a long-*

term challenge that requires action from civil society, government, and technology companies [...] The independent research conducted by The Cambridge Social Decision-Making Lab, University of Cambridge, will make a meaningful contribution to how we build WhatsApp for the years to come" [D].

International impact through a new strategy to tackle radicalisation

Created in development with Nudge Lebanon, a non-governmental organisation working to apply behavioural insights to policy challenges in the Middle East, *Radicalize* has offered innovative ways to target radicalisation. Secretary General Office Director of the Supreme Committee for Delivery & Legacy in Qatar commented: *"This new, innovative approach represents a powerful tool to address very important issues such as radicalisation and behavioural biases in a rigorous way, by providing evidence of what works, and, therefore, strengthening the evidence base of Preventing Violent Extremism (PVE) programmes" [E].* UNESCO, and the Jordanian government piloted an offline version of *Radicalize* with 1,000 students in summer camps throughout Jordan in summer of 2019. Receiving positive feedback, UNESCO commissioned a second module [F].

Impact on national and international policy-making

Dr van der Linden and colleagues have been instrumental in shaping policy discussions around fake news both nationally and internationally. The research group were invited to submit written evidence to the UK House of Commons' Digital, Culture, Media and Sport (DCMS) Committee's Parliamentary Inquiry on Fake News in 2018 [G], and consult with DCMS staff in person on the results of the research. Their testimony was deemed *"incredibly useful for the inquiry"* by a Senior Committee Specialist in the House of Commons, and cited in the Select Committee's final report on disinformation and fake news [G]. The research was cited as a solution to the misinformation problem in an official policy document from the UK Parliamentary Office of Science and Technology (*Online Information and Fake News*) [G], and as a basis for evidencing the risk of disinformation in reports from the European Commission's Directorate-General for Education and Culture [H].

In 2018, a collaboration was fostered with the UK Foreign and Commonwealth Office (FCO). As a testament to the importance of the research, the FCO has translated *'Bad News'* into more than 15 languages, and commissioned a new version of the game suitable for junior audiences *"Bad News Junior"*. A Senior Advisor at the Foreign and Commonwealth Office stated in April 2019: *"The adult version of the UK Vaccine App [Bad News] has now had 400,000 'hits' and it is now being rolled out across the UK to young adults while the overseas variants are being distributed through a range of locally run media literacy NGOs in the countries [Netherlands, Germany, Greece, Poland, Romania, Czechia, Slovenia, Bosnia-Herzegovina, Serbia, Sweden, Ukraine] for which translations have been provided. From an FCO point of view a further benefit of this project was the robust measurements of the number of 'hits' and their geographical locations [which was being undertaken by Cambridge's academic team]. This it is hoped will support further work in the media literacy area" [I].*

The team were also invited to consult with the Office of the Vice-President of the European Commission, Andrus Ansip, on the problem of disinformation and how to tackle it. The EU report (H) that followed from this investigation recognized the term "prebunking" and psychological inoculation as a new approach and quoted the research as *"the most sustainable path to information robustness and combating the spread of misinformation and fake news"* [H]. This was put into practice with Jon Roozenbeek and Bad News providing an inoculation training event in 2019 with 22 mayors of the European Union Committee of Regions (COR) as part of their COR Action Plan against disinformation. Members included mayors of municipalities across Europe [H].

Impact on global politics

Dr van der Linden's research has been recognised in the United States and was cited in a report from the US Department of State [J] on how to effectively tackle fake news and misinformation. The report concludes that *"preemptively warning about and debunking disinformation themes are all potential approaches for reducing vulnerabilities to disinformation"*. Following this report, Dr

van der Linden were invited to collaborate with the Department of Homeland Security's Cybersecurity and Infrastructure Security Agency (DHS-CISA), to help secure the integrity of the 2020 U.S. Presidential election. The election game "Harmony Square" was released nationwide by the US government on 6th November 2020. By December it had been played 55,000 times. From the DHS-CISA: *"We believe this game has broad applicability with our stakeholders and presents an effective tool in a whole-of-society approach to countering information manipulation... DHS-CISA is very satisfied with the game's initial impact and anticipates further application."*[J].

Impact on COVID-19 conspiracies

In 2020, as part of a campaign to encourage Covid vaccine take-up and counter the anticipated spread of misinformation around vaccine rollout, the UK cabinet office commissioned van der Linden and colleagues to develop an anti-fake news tool focused on countering vaccine myths. Launched in October 2020, it was promoted on Twitter by government bodies including Public Health England, the Department of Health and Social Care, DCMS, and the United Nations (as part of their 'Verified' campaign [K]. The game also forms part of the World Health Organisation "Stop the Spread" campaign (in collaboration with the UK government) which aims to raise awareness globally the risks of misinformation around COVID-19, and encourages people to double check information with trusted sources such as WHO and national health authorities [K]. From the UK Cabinet Office, *"... the support and research provided by your team has enabled the UK to combat trends that could undermine adherence to official guidance about Covid-19 vaccines, treatments and diagnostics. Your contributions have been invaluable to evidence communication policy and have formed an important part of our international response. Without the expertise of you and your team there would be fewer people able to access important and potentially life-saving advice about how to protect themselves from harmful misinformation"*. By December 2020, the game had been played by 282,893 people, and been translated into French and German [K].

5. Sources to corroborate the impact

- A. Global reach and reception of Bad News: (i) Media coverage; (ii) Google analytics data of visitor numbers.
- B. Arguedas Ortiz, D (2018). Could this be the cure for fake news? BBC Future
- C. Fastcompany Design (2018). Innovation by Design Awards. University of Cambridge/DROG.
- D. (i) Press release quote from WhatsApp Lead Research Team (ii) WhatsApp Misinformation Awards: <https://www.whatsapp.com/research/awards/announcement/>
- E. Testimonial from Secretary General Office Director of the Supreme Committee for Delivery & Legacy in Qatar
- F. DROG Disinformation Awareness Module for UNESCO Jordan, Evaluation report, 2019
- G. **UK Government policy impact:** (i) van der Linden, S., Roozenbeek, J., Oosterwoud, R., Compton, J., & Lewandowsky, S. (2018). The Science of Prebunking: Inoculating the Public Against Fake News. Written evidence submitted to the Parliamentary Inquiry on Fake News. House of Commons, UK: London.(ii) DCMS (2019). Disinformation and 'fake news': Final report. Digital, Culture, Media, and Sport Committee. House of Commons, page 107 (iii) Harriss, L., & Raymer, K. (2017). Online information and fake news. POSTnotes-0559. Parliamentary Office of Science and Technology, page 4.
- H. **European Commission impact:** (i) Testimonial from European Commission, March 2019, (ii) Klossa, Guillaume (2019). Towards European Media Sovereignty: An Industrial Media Strategy to Leverage Data, Algorithms, and Artificial intelligence. European Commission. Pg 23, refs 39-40 (iii) Minutes and papers from COR workshop April 2019
- I. Testimonial letter from Senior Advisor at the Home Office
- J **Harmony Square:** (i) Nemr, C. & Gangware, W. (2019). Weapons of Mass Distraction: Foreign State-Sponsored Disinformation in the Digital Age. Park Advisors. Commissioned by the US Department of State's Global Engagement Centre pg 13. (ii) Testimonial from Countering Foreign Influence Task Force, DHS-CISA, USA. (iii) Harmony square Google analytics data
- K. **Go Viral!:** (i) Promotion by UK government on Twitter (ii) Testimonial from UK Cabinet Office (iv) WHO 'Stop the Spread' campaign (iii) Go Viral! Google analytics data