

Research Assessment Exercise 2020
Impact Case Study

University: City University of Hong Kong

Unit of Assessment (UoA): 38 - visual arts, design, creative media, other creative arts and creative writing

Title of case study: Computational creativity for internet freedom

(1) Summary of the impact

Dr. Daniel Howe's project impacts are of several kinds. 1.3m downloads of Howe's software to combat online surveillance have established his work as a major tool to combat data harvesting and have framed international debate on the subject. High profile public exhibitions in San Francisco, Berlin and Dublin have encouraged visitors to change the way they respond to online surveillance and violations of personal privacy. Educational institutions in at least 15 countries have adopted Howe's educational open-source toolkit for creative programming and an influential, prize-winning gaming company has also made extensive use of his open-source tools.

(2) Underpinning research

In his research, Howe seeks to transform the way in which we interact with computers by creating new software that protects and empowers the autonomy and privacy of the user and fosters a creative approach to coding. In the last decade, Howe has been awarded research funding of over 4 million Hong Kong dollars from local and international sources (G1-G5). The major resulting research outputs are *TrackMeNot* (2006-), *AdNauseam* (2012-), and *RiTa* (2008-), all of which are continuing projects. Howe's research findings have been circulated through exhibitions, talks, workshops, consultancies and publications that include articles published by MIT, Oxford University Press, and Cambridge University Press.

Over the past decade, advertising has emerged as the predominant source of revenue for websites and apps. At the same time, it has become a primary means of surveilling users, with advertisers collecting and storing a wide-range of personal data for use in targeted marketing. Furthermore, ad tracking operates without users' explicit knowledge or consent. Howe's research projects, *TrackMeNot* and *AdNauseam*, are pioneering computing tools that both protect users from online surveillance and allow them to protest online surveillance.

TrackMeNot (<http://cs.nyu.edu/trackmenot/>) (R5; R6) is a browser extension designed to insulate web searchers from surveillance and data-profiling by the intentional injection of noise, a strategy Howe calls "obfuscation." When users search, generated decoy queries render the users' actual queries hidden in a cloud of noise. Obfuscation acts as a means to protest against data gatherers through evasion and confusion. Building on their previous research, Howe and Nissenbaum developed a newly modified open-source browser extension, *AdNauseam* (<http://adnauseam.io/>) (R1; R3) in 2012, and a further modified 3.8 version in 2019. *AdNauseam* (E1) both blocks ads on webpages and also captures and clicks each blocked ad in the background. *AdNauseam* achieves three aims: it pollutes data profiles in order to protect user privacy; it empowers users to explore interactive visualizations of their data; and it frustrates trackers and disrupts the economics of advertising networks. Recently, Howe developed Spectre (E2), expanding *AdNauseam* into the context of interactive installations that explore how the Digital Influence Industry influences people's behaviors and decision-making.

Funded by various sources locally and internationally (G1-5), Howe also develops creativity-enhancing technologies for creators and students, aiming to empower users to read and write algorithms. The *RiTa* toolkit (<http://rednoise.org/rita>), originally created in 2008, has

grown into a freely available and widely-used project (E3) (R2; R4) for which the [source code](#) is openly shared. Users are free to deploy, copy, study, and change the toolkit. “Combining features of natural language processing, computational stylistics, and generative systems, *RiTa* enables a range of tasks, from statistical methods, to grammar-based generation, to linguistic database access (e.g., WordNet), to text-mining, to text-to-speech, to image, audio, & animation, all in real-time. *RiTa* is free and open-source and integrates with the popular Processing environment for digital arts programming” ([DIGITAL WRITING](#), MIT). In 2018, Howe released the Dialogic toolkit (<https://rednoise.org/dialogic-web/>), expanding *RiTa* for generative dialogue in AR and VR games. The game company Tender Claws used Dialogic toolkit and developed game TendAR, which won the prestigious “[Innovation in Interaction Award](#)” from the IndieCade International Festival of Independent Games in 2018, and it was officially selected in [Sundance New Frontiers 2018](#) and [IDFA Doc Lab 2018](#) (E4).

(3) References to the research

- (R1) Daniel C. HOWE, Qianxun CHEN, and Zong CHEN. 2018. “Advertising Positions: Data Portraiture as Aesthetic Critique.” *Leonardo* 51 (4): 413-418.
- (R2) Braxton SODERMAN and Daniel C. HOWE. 2019. “A Critique of Surprise in Generative Art.” *Leonardo Electronic Almanac*, [Special Issue on Algorithmic and Generative Art](#), 22(4). Cambridge: MIT Press.
- (R3) Daniel C. HOWE and Helen NISSENBAUM. 2017. “Engineering Privacy and Protest: a Case Study of AdNauseam.” In *Proceedings of the IEEE International Workshop on Privacy Engineering*. San Jose, California, USA. 57-64.
- (R4) Daniel C. HOWE. 2009. “RiTa: Creativity Support for Computational Literature.” In *Proceedings of the seventh ACM conference on Creativity and cognition*. Berkeley, California, USA, p. 205-210.
- (R5) Daniel C. HOWE and Helen NISSENBAUM. 2009. “TrackMeNot: Resisting Surveillance in Web Search.” In *Lessons from the Identity Trail: Anonymity, Privacy and Identity in a Networked Society*. I Kerr, C Lucock and V Steeves (eds.) Oxford: Oxford University Press, 417–436.
- (R6) Daniel C. HOWE. 2015. “Surveillance Countermeasures: Expressive Privacy via Obfuscation”. In *APRJA, A Peer-Reviewed Journal About Datafield Research*. Vol. 4, Issue 1.

Evidence of quality

- (E1) AdNauseam: download over 498,000 times; Translated into over [30 languages](#); [Over 35,000 current users](#), [4.5 star rating](#); [press coverage in nine languages](#).
- (E2) AdNauseam/Spectre. 2019. “[Alternate Realities](#)” [commission](#) from Arts Council England, Site Gallery, the British Council and MUTEK (£20,000).
- (E3) RiTa download times over 100,000 times, [used by many artists](#).
- (E4) Dialogic/TendAR. 2018. “[Innovation in Interaction Award](#)” from the IndieCade. International Festival of Independent Games in early October, 2018; “[Sundance New Frontiers 2018](#)” Official Selection; “[IDFA Doc Lab 2018](#)” Official Selection.

Grants and awards

- (G1) 2015. Hong Kong GRF grant “AdNauseam,” \$268,000 HKD.
- (G2) 2014. HKGRF “Community-centered tool design for internet freedom,” \$354,900 HKD.
- (G3) 2010, 2011. National Science Foundation Computing Innovations Fellowship Award, “Creativity Support for Aesthetic Natural Language,” \$165,000 USD.
- (G4) 2015. Hong Kong Arts Development Council (ADC) Grant for “Juried Exhibition: R_EVOLUTION,” Hong Kong Arts Development Council, \$210,000 HKD.

(G5) 2016. Strategic Programme for International Research and Education (SPIRE) Grant for “Virtual Reality, Aesthetics, and Society,” University of Bergen, Norway, \$100,000NOK.

(4) Details of the impact

I. Use and dissemination of computational artifacts

TrackMeNot and *AdNauseam* have been downloaded over [950,000](#) and over [498,000](#) times respectively. Over [35,000 users](#) currently use *AdNauseam* in their Firefox browser, where it was recently selected as a “Featured Addon” by the Mozilla Foundation. The users are the direct beneficiaries as *AdNauseam* allows them to playfully subvert mass surveillance. Dr. Benjamin Grosser (S1) attests that “... at a time when individual users can feel hopelessly subject to the black boxes of big tech, Howe’s work has enabled a renewed sense of agency against computational surveillance and in support of digital privacy.” Dr. Tsui Lok Man (S2) further states that “The work of Daniel Howe is impactful because he made it possible for every user to apply this theory [of obfuscation] and protect his or her privacy.... Not only did Howe take a revolutionary theory (obfuscation) and made a practical implementation, he also made it freely available for anyone to download and use.” In 2017, Google removed *AdNauseam* from its Chrome Web Store. Tsui explains that this was because *AdNauseam* “was starting to reach a scale that made it hard for Google to ignore.” With [4.5/5 stars rating](#) from over 33,000 users, a user comments, “This extension does what it claims... My private information is thus hidden inside a cloud of nonsense that Google is welcome to have”; and another remarks, “When I used this component in China, it worked very well.” Since *AdNauseam* disrupts the economics of advertising networks, non-users are also potential beneficiaries. As [CBC News](#) (22 Dec 2014) stated, “Even if someone isn’t using *AdNauseam*, they may reap its benefits because the larger data collection statistics may be less accurate overall.”

Howe’s research projects, *TrackMeNot* and *AdNauseam*, were first introduced on the internet for download and then disseminated through public exhibitions, talks, interviews and workshops in *Transmediale* 2015, Berlin; Dublin Science Gallery, and San Francisco Museum of Modern Art, and also at venues in Denmark, Liverpool, Washington, the Netherlands, and Hong Kong. In the SECRET exhibition in Dublin Science Gallery, *AdNauseam* was featured as an anti-surveillance technique which visitors could use in the *Crypto Bar* area. Zack Denfeld (S3), researcher, educator and curator of Science Gallery Dublin, said over 10,000 young visitors (aged 15-25) engaged with *AdNauseam* where they “developed new ideas and relationships to personal privacy, surveillance and data collection.” He notes: “I personally gave tours to visitors who then asked me how they might change their behaviour or device configurations so as not to be tracked or marketed to.” Since *AdNauseam* also “circulates in the form of video and even news headlines,” Denfeld argues that it “expands the scope of media art.” Spectre, develops *AdNauseam* into an interactive art experience that enlarges the audience for the product. [Dan Tucker](#), Alternate Realities Curator of Sheffield Doc/Fest said, “[Spectre] is so prescient and so powerful. A deceptively dark exploration of the power of the digital influence industry, Spectre is an algorithmic alchemy that will keep the audience guessing all the way through.” The popularity of the two research projects as tools against online surveillance has framed the discussion about online surveillance among computing communities and helped to shape the larger societal debate about the nature and scope of online surveillance. Dr. Grosser (S1) comments that “Daniel Howe’s research activities have had significant impacts on a wide array of fields and focus areas, including computer science, computational surveillance, digital privacy, and internet/media art. His works *TrackMeNot* and *AdNauseam* are both canonical as artworks, regularly referred to within internet and media art communities as prime examples of projects that address the cultural effects of surveillance... both *TrackMeNot* and *AdNauseam* regularly activate discourse within computing communities around the ethics of noise and obfuscation as a response to surveillance and data tracking.”

AdNauseam and Howe's strategy of "obfuscation" received over [78 media reports](#) in at least nine languages (E1), from bringing attention to online surveillance to clarifying ways to resist: "[with] *AdNauseam*... Google and Bing can't easily profile me either.... Obfuscation is ... a way for people in a relatively weak position—which is to say all of us, compared with Google or Facebook—to fight back" ([WIRED](#) magazine, 21 Nov 2015). In a column that asked "How to make yourself digitally invisible," the UK's second-biggest-selling daily newspaper, the [Daily Mail](#) (29 Jan 2016), described *AdNauseam* and *TrackMeNot* as "tools to block ads and data collectors" and Obfuscation as a tool that educates users "on how to keep their personal data private." In Hong Kong the [TVB Pearl television news program](#) devoted an entire segment to *AdNauseam* in order to educate audiences about online surveillance.

II. Creative coding training

The *RiTa* toolkit (<http://rednoise.org/rita>) has been downloaded over 100,000 times (E3) and employed in educational institutions in more than 15 countries, including Duke, MIT, Harvard, Davidson, Lancaster, Glasgow, Biskra, Waterloo, South Asian University, the Indian Institute of Technology, Nanyang, Bucharest University, and Alicante University. As Professor John Cayley writes, "text processing is close to the heart of computing and needs to be closer to the heart of literary practice. Professor Howe's emphasis in this respect is highly important" ([Cayley, Conduit](#), p.24). Professor Mark Sample of Davidson College also states: "Say what you want about JavaScript but you can't deny that Daniel Howe's *RiTa* library is a powerful tool for algorithmic literary play" ([Sample](#), 2015). *RiTa*'s education impact goes beyond the university. Darius Kazemi (S4), an internet artist and educator, has been using *RiTa* to develop over 50 projects (with over 100,000 visits) since 2015. He also writes blog posts and organizes workshops to teach novice programmers using *RiTa*. *RiTa* has also contributed to the development of text processing as an artistic practice. Kazemi states: "*RiTa* is one of the best pieces of software in the toolkit of artists working with generative text in JavaScript.... Students were inspired to program . . . due to *RiTa*'s excellent, clear API." Most recently, Howe released the *Dialogic* toolkit, expanding *RiTa* for generative dialogue in AR and VR games. The toolkit has already been adopted by game labs including Tender Claws, a game company which won Apple's Best Apps of 2015 and Best VR Experience at the Google Play Awards in 2017. Danny Cannizarro (S5), the founder of Tender Claws, writes, "Dialogic . . . is very rare for existing AR apps. We also introduced Dialogic to peers at the largest Games Developer Conference (GDC). Professional writers as well as other companies that have tool kits for generative dialog are now starting to look into implementing Dialogic in their own practices and products."

(5) Sources to corroborate the impact

- (S1) Statement from Dr. Benjamin Grosser, Associate Professor of New Media, University of Illinois at Urbana-Champaign (grosser@illinois.edu).
- (S2) Statement from Dr. Tsui Lok Man, Assistant Professor, School of Journalism and Communication, Chinese University of Hong Kong (lokmentsui@cuhk.edu.hk).
- (S3) Statement from Zack Denfeld, Dublin Science Gallery (zack.denfeld@dublin.sciencegallery.com).
- (S4) Statement from Darius Kazemi, Co-founder of Free Train (darius.kazemi@gmail.com).
- (S5) Statement from Danny Cannizarro, Co-founder of Tender Claws (danny.cannizarro@tenderclaws.com).
- (S6) Media: [CBC News](#).
- (S7) Media: [WIRED](#) magazine.
- (S8) Media: [Daily Mail](#).
- (S9) Media: [TVB Pearl TV news program](#).