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The use of short speculative fiction in teaching about privacy

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Abstract

This paper gives four examples of the use of short speculative fiction for teaching different aspects of information privacy. Information privacy is multi-faceted; as an area of study it intersects with a number of fields. A non-exhaustive list could include: law, information systems, decision science, marketing, management, philosophy, psychology, and sociology. The multi-disciplinary character of information privacy poses a challenge to teaching about it. Although using legal cases for teaching about privacy is valuable, the cases often involve disagreeable characters resulting in a distraction from the underlying privacy issue. In contrast, speculative fiction can present a privacy problem in a relatable context with a more agreeable set of characters. Students can imagine themselves in situations similar to those of characters in a short narrative through cognitive processes of transportation (by becoming immersed in the action) and identification (finding the characters familiar and sympathetic). I give four examples (four short stories) where I have used speculative fiction to teach some different aspect pertaining to information privacy. For each example, there is a plot synopsis, some suggested assignment with possible discussion questions, and an analysis of the key points within the fictional work and how they relate to key issues relevant to information privacy. The four fictional pieces are: *Business as Usual* by Pat Cadigan, *Scroogled* by Cory Doctorow, *The Perfect Match* by Ken Liu, and *Water* by Ramez Naam.

Keywords: information privacy, surveillance, speculative fiction, theory of mind

Teaching about information privacy is challenging. One reason is that it draws from a number of disparate fields including: law, information systems, decision science, marketing, management, philosophy, psychology, and sociology. Within the legal environment, privacy is a contested term. Is it a right? See Solove (2008) for a thorough analysis of the problems in defining privacy. Nonetheless, accompanying modern society's increased dependence on data usage and data sharing has been an increased frequency of harmful events involving personal information leading to a growing recognition of the importance of privacy.

Many legal cases illustrate a particular problem in teaching about privacy. Cases often involve

someone who has apparently committed a crime. The evidence provided by the state may have been collected illegally, without a warrant for example, and thus in violation of the 4th Amendment of the U.S. Bill of Rights that protects against unlawful search and seizure. Sympathy may naturally reside with law enforcement; after all bad guys should be put in jail. Furthermore, for many students it is difficult to relate to the defendant in these cases. This paper advocates the value of using speculative fiction for teaching about privacy. This genre of fiction can present a privacy problem in a relatable context with a more agreeable set of characters. Students can imagine themselves in situations similar to those of characters in a short narrative through cognitive processes of transportation (by becoming immersed in the

action) and identification (finding the characters familiar and sympathetic).

As with business cases, well-chosen speculative fiction can provide rich (complex, partly ambiguous, generally realistic) problems. A well written case can be presented from the standpoint of a decision maker with a problem. This enables the student to place herself in the position of the decision maker in resolving the problem at hand. Unlike business cases written with a pedagogical objective, fiction written for entertainment can also enable identification with the characters who are faced with unique situations and forced to resolve some problem. Fiction can also share with case studies the quality of being a good vehicle for participative learning through in-class or online discussions. Margaret Atwood describes some of her work as speculative fiction in contrast to science fiction. She is quoted (Potts 2003) as saying, "Science fiction has monsters and spaceships; speculative fiction could really happen." For these reasons, the use of speculative fiction is valuable for inclusion within a stand-alone course on information privacy or as a module on privacy that could be included within a number of courses in various business disciplines.

I give four examples (four short stories) where I have used speculative fiction to teach some different aspects pertaining to information privacy in a Masters level class. For each example, I provide a plot synopsis, some suggested assignment with possible discussion questions, and an analysis of the key points within the fictional work and how they relate to key issues relevant to information privacy. The four fictional pieces are: *Business as Usual* by Pat Cadigan, *Scroogled* by Cory Doctorow, *The Perfect Match* by Ken Liu, and *Water* by Ramez Naam.

1.0 FOUR SHORT STORIES

Business as Usual by Pat Cadigan (Cadigan 2014)

Synopsis. Cara, the protagonist of 'Business as Usual' works for LifeCandy, the premier interface design company. She supports the module that runs refrigerators. She became interested in interface design for the Internet of Things because of the end of life experiences of her grandmother, Nonna who thought her insulin pump was trying to do her harm. Home refrigerators along with other appliances are run by a home hub that interfaces with an insurance company that has instituted something called Healthy Home, a system that monitors food

intake and enforces healthy eating by restricting access to the refrigerator. Cara has a disturbing interaction with a refrigerator one evening when she receives a call on her dedicated help line. When she is called in to see her supervisor the next day, she infers that her toilet has snitched on her. In the end, she, under the supervision of Life Candy management, come to an organizational accommodation for the buggy AI that runs Healthy Home.

Assignments. 'Business as Usual' works well for in-class discussions, essay assignments and online forums. Some useful discussion questions follow.

- 1) What means of surveillance described in the story do you find most realistic and threatening, and why?
- 2) What is the threat posed by the Internet of Things as a surveillance medium as described in the story? Are there aspects of IoT that you have encountered that are personally concerning?
- 3) The story illustrates an intrusive collaboration among various stakeholders in the healthcare space (e.g. health care providers, insurance companies, big pharma). How realistic is this? How concerning?
- 4) The story describes a fairly passive view of loss of privacy. In his seminal article that coins the phrase "ubiquitous computing," Mark Weiser states, "The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it." How is that illustrated in the story?

Scroogled by Cory Doctorow (Doctorow 2007)

Synopsis. After vesting out of Google, Greg takes a several months-long vacation to Mexico. Upon returning, he discovers some changes to the USA's immigration process - Google has partnered with the Department of Homeland Security to provide information about people entering the country. After a rudely invasive interrogation, he is finally passed through security. Still agitated from his experience at Customs, he seeks out and meets with a former co-worker and discovers the extent of the collaboration between Google and the government and in particular the wide ranging information they have about him. It turns out that his colleague has been developing something called Google Cleaner that will cull

incriminating information from Google's databases. The two of them sanitize Greg's digital dossier which provokes a reaction from a quasi-governmental group.

Assignments. The 'Scroogled' story is a good source for either an in-class discussion, an online discussion forum, or an essay. Some interesting discussion questions include:

- 1) Since this is fiction, some aspects of 'Scroogled' do not conform to reality. What parts of 'Scroogled' do you consider to be true; what parts are a slight stretch; and what parts are unrealistic?
- 2) Which amendments in the US Bill of Rights are implicated in the 'Scroogled' story?
- 3) Discuss the following quote from the story, "Recently, the site's search-optimization software had begun using the data to tailor Web searches to individual users. It proved to be a revolutionary tool for advertisers. An authoritarian government would have other purposes in mind."
- 4) [This article from Ars Technica](#) (Amadeo 2017) discusses Google's linking of email contents to ad servers. In addition, it links to a Microsoft advertising campaign for Outlook. Discuss any ethical issues raised by this article and the Microsoft ad campaign.

The Perfect Match by Ken Liu (Liu 2012)

Synopsis. Sai works as a paralegal assistant for a prestigious law firm. His largely mediated life is managed by 'Tilly' a virtual concierge who takes care of all his needs from waking him up in the morning to the perfect wake up music "...the rousing first movement of Vivaldi's violin concerto in C minor, "Il Sospetto," to arranging dates with a new girl, "I'm sure you'll like her. The compatibility index is very high. I think you'll be in love for at least six months." Tilly knows Sai's moods and tastes better than anyone. Tilly is produced by Centillion whose mission is to "...arrange the world's information to ennoble the human race," and has the motto, "Make things better!"

When Sai leaves his apartment he has an argument with his next door neighbor Jenny who is putting tape over the lens of his security camera. She doesn't want Tilly observing the comings and goings of her friends. Jenny's parting shot to Sai as he heads to work is, "Tilly

doesn't just tell you what you want ... she tells you what to *think*. Do you even know what you really want any more?" When Sai's date doesn't go too well - everything went too smoothly, no surprises, no thrill of new discovery, a somewhat boring date, Sai turns off Tilly.

As he arrives at home, he encounters Jenny again. She invites him into her apartment, but not before she puts his phone into a Faraday pouch - her apartment is equipped as a Faraday cage. Thus begins Sai's education into the nefarious attributes of the surveillance economy and his radicalization. Jenny explains that the biggest threat to Centillion is the corruption of their data on a broad scale. This would render their personal prediction unreliable and as a consequence their advertising revenues would dry up. They hatch a plot that involves Sai's employer whose client is the CEO of Centillion.

Assignments. The Perfect Match provides a good basis for discussing many of the issues covered in *Surveillance Capitalism* by Shoshana Zuboff. I introduce material from this book in the class. The following questions could be used in either an online or in class discussion or as an essay assignment.

- 1) Jenny's strategy to take down Centillion involves the corruption of their data. Browser add-ons TrackMeNot and AdNauseum both rely on obfuscation. TrackMeNot protects against search engine profiling by using a PC's idle time to send out random queries. AdNauseum employs a similar strategy by automatically clicking on all blocked ads registering a visit on ad networks' databases. AdNauseum has been booted from Google Play. Is this recognition by Google that obfuscation is a viable threat to their user profiling?
- 2) One part of Google's business model is to generate ad revenue by using big data and algorithms to profile individuals. A second approach is called economy of action - system attributes that channel attention and action in a manner that alters people's behavior in a predictable way. These could employ conditioning or nudges to influence behavior. How does Tilly aim to create economies of action?
- 3) At one point Jenny says, "Years ago, they caught Centillion's traffic-monitoring cars sniffing all the wireless traffic from home networks on the

streets they drove through. Centillion also used to override the security settings on your machine and track your browsing habits before they shifted to an opt-in monitoring policy designed to provide better 'recommendations.' Do you think they've really changed? They hunger for data about you—the more the better—and damned if they care about how they get it." What are some parallels to legal issues involving Google or Facebook attempts to skirt privacy law in the US and the EU?

- 4) At one point Sai attempts to turn Tilly off. It turns out that Centillion has installed a failsafe switch preventing this. How is this like attempting to uninstall Google Play from Android systems? How does Google take advantage of the presence of Google Play to ensure their ability to gather user data?
- 5) In the story, Christian Rinn, Founder and Executive Chairman of Centillion quotes Winston Churchill as saying that we shape our buildings, and afterwards, our buildings shape us. We made machines to help us think, and now the machines think for us. How well does this analogy work to enable us to understand our relationships with information and communication technology?

Water by Ramez Naam (Naam 2013)

Synopsis. Simon, the senior marketing executive for the Pura Vita food group, meets Stephanie, a college acquaintance, for lunch. They live in a world dominated by the attention economy and its relentless advertising. Nexus Corporation holds patents on neural implants that provide enhanced intelligence, a photographic memory, immersive entertainment options, a direct connection with your loved ones, and other cognitive benefits. The only catch was if you can't afford the implant, you could get one in exchange for being served advertisements and receiving neural stimulation associated with the pleasure of using a particular product, designer water for example.

Simon is anticipating a hook-up with Stephanie so he turns on the full and subtle power of his feed into her implant. However, she has other plans. As they part, she attaches a nano bot that contains a worm to the back of his jacket. The nano bot infects the Pura Vita AIs that run all their marketing and supply chain systems. Once

the worm penetrates the Pura Vita IT, Simon's downfall becomes inevitable and irreversible.

Assignments. 'Water' can be used like the previous three stories, as a source for in-class or online discussions. Some potential discussion questions are:

- 1) How does the manipulation of attention and desire in this story illustrate the privacy paradox – that people are willing to trade their privacy for various conveniences?
- 2) Discuss how the internal dependencies of economic systems such as stock markets and supply chains pose a risk so that triggering events such as a hack of critical systems can cause them to spin off beyond the control of human beings.
- 3) Marketers claim Americans give out information about themselves as a tradeoff for benefits they receive. However, an Annenberg survey shows Americans don't believe the trade-off is a fair deal (Turow, Hennessy, and Draper 2015). What are the arguments put forth for the two sides and how are they illustrated in 'Water'?
- 4) Brandon Fischer of GroupM Next consultancy predicted that by 2028 half of all Americans and by 2054 nearly all will have device implants in their bodies that communicate with retailers as they walk down store aisles inspecting various products. Implants will also read emotional states as you examine these products (cited by Turow 2017, p. 2). Do you think his prediction is likely to be close? What factors do you think there are that would induce people to accept device implants? How does this prediction affect the believability of this story?

2.0 RESULTS

Students were able to relate to each of the stories. Some of them produced essays that included a number of personal observations. For example, some essays written about 'Water' included detailed discussions of behavioral advertising and their experiences as targets. One student who was engaged to be married described the push of Facebook ads for wedding rings on her homepage which she related to the behavioral advertising in the story. Several commented on a simulation within the story that showed Stephanie slimmed down and fashionably dressed in the display window of a clothing store. One essay described the

student's participation in an Attention Deficit Workshop where she donned some sensory deprivation technology in order to understand the experience of ADD. She compared that experience with the sensory bombardment described by the characters in 'Water'.

Students' write-ups of 'Business as Usual' also provided examples that suggested a high degree of engagement with the narrative and identification with the characters. One student connected multiple parts of the story with the line from Bob Dylan's song (Ballad of a Thin Man), "And you know something's happening, but you don't know what it is. Do you Mr. Jones?" Several students commented on the virtual assistant Glinda and compared her (it) to Amazon's Alexa and Apple's Siri. They were particularly appalled at Glinda's capability of integrating data from the toilet with data from the refrigerator to infer that Nonna was not following the appropriate diet. They also objected to surveillance from the health insurer that took data from Nonna's insulin pump and fed it to the refrigerator. One student wrote, "Suddenly we find ourselves answering to refrigerators. We find ourselves with software taking the initiative...We find ourselves with mandatory healthy home as part of our coverage." Another student wrote, "I am a Nonna and can see myself acting this way in the future."

3.0 DISCUSSION

Privacy entails the forces of government(s), the private business sector, culture, and technology (broadly conceived) all affecting the individual in that the effects of privacy invasions or privacy harms are borne by the individual. This can lead to resignation and the belief that there is no longer any privacy. There are myths to support such rationalizations such as "In order to have security, you have to give up privacy." or "If you haven't done anything wrong, you have nothing to worry about." In the face of privacy in the news, it may be easy to conclude that "The real threat to privacy is government" or "The real threat to privacy is business." These commonly held viewpoints are obstacles to teaching about privacy. Another obstacle occurs because privacy as a concept draws on many disciplines. Its salience has increased because of developments in the area of information and communication technology (ICT), namely the capabilities of capturing data, storing it in a database, and sharing across networks. The dynamic changes within ICT take place within a complex legal regime, increasing globalism that

affects business, and dramatic cultural change. Instead of parsing the complexities of each of these fields and then synthesizing them into a coherent set of abstract presentations, fiction works here by providing a narrative form that integrates many features from these source fields.

Oatley (2016) describes the processes that take place when reading fiction as social simulation. Rather than thinking of fiction as an imitation of life it is more productive to think of it as a simulation that functions to enable the exploration of peoples' minds and their complex interactions in different social worlds. The capability of identifying and understanding another person's mental states is referred to as Theory of Mind (ToM). This capacity for understanding another's subjective states is important for navigating and maintaining complex social relationships. ToM consists of two parts, affective (the ability to read another's emotions) and cognitive (understanding a person's beliefs and intentions). ToM enables a person to function effectively in complex social environments and is a source of empathy (Kidd and Castano 2013).

Reading fiction has been found to be a source that provides improvement in empathy and ToM more generally. (See Bal and Veltkamp 2013, Rowe 2018 for reviews of this literature.) But how does it work? There are two processes at play, transportation and identification. While reading a fictional narrative people may become so immersed in the story that they are absorbed or transported into the world presented in the narrative. This state of absorption is sometimes referred to as getting lost in the book. Bal and Veltkamp cite literature that shows that it is the mental journey taken by the reader that brings about change. When readers become transported into the narrative and emotionally identify with the characters, personal change and in particular increased empathy occurs compared to those readers who did not experience transportation. A second process involves the inferences the reader may make about the character, beliefs, and intentions of one or more of the persons portrayed. These are the sorts of inferences people make during conversations in determining the character or personality, and intentions and beliefs of the conversation partner. The transportation process corresponds to the affective part of ToM and the inferential process is the cognitive part.

Oatley (2016) makes the case that reading fiction is cognitive simulation because areas of

the brain activated by reading fiction are identical to those activated for the same cognitive processes in the daily life of the reader. The environment where privacy problems play out is ambiguous, rapidly changing, and ethically challenging. The introduction of fiction into this complex landscape opens the potential of enabling students to mentally experiment with what is likely an unfamiliar environment. They may find it easier to empathize with characters in a fictional account than with the often odious defendants in legal cases. In general simulators have the advantage of providing a venue for low cost rapid experimentation with realistic scenarios. Learning to fly an airplane, especially one that is complex is made much safer and effective through the use of simulators. There is an apt analogy for the use of speculative fiction for learning about the complex and risky worlds where our privacy is at stake. As the Margaret Atwood quote shows, this is fiction about things that could really happen thus making it fertile ground for cognitive simulation.

4.0 REFERENCES

- Amadeo, Ron (2017). Scroogled no more: Gmail won't scan e-mails for ads personalization, *Ars Technica*. Accessed at <https://arstechnica.com/gadgets/2017/06/gmail-will-no-longer-scan-e-mails-for-ad-personalization/>
- Bal, P. Matthijs, and Veltkamp, Martjin (2013). "How Does Fiction Reading Influence Empathy? An Experimental Investigation on the Role of Emotional Transportation." *Plos ONE* 8, no. 1: 1-12. <https://dx.doi.org/10.1371/journal.pone.0055341>
- Cadigan, Pat (2014). *Business as Usual*, in *Twelve Tomorrows*, Bruce Sterling ed., Cambridge, MA: Technology Review, Inc.
- Doctorow, Cory (2007). Scroogled, Accessed at <https://craphound.com/scroogled.html>, February 24, 2019.
- Liu, Ken (2012). The Perfect Match, Accessed at <http://www.lightspeedmagazine.com/fiction/the-perfect-match/>
- Kidd, David Comer and Castano, Emanuele (2013). Reading literary fiction improves theory of mind, *Science*, **342**, 377-380.
- Naam, Ramez (2013). Water, in *An Aura of Familiarity: Visions from the coming age of networked matter*, David Pescovitz, ed., Palo Alto, CA: IFTF.
- Oatley, Keith (2016). Fiction: simulation of social worlds, *Trends in Cognitive Sciences*, **20**, 8, 618-628.
- Potts, Robert (2003). Light in the wilderness, *The Guardian*, Accessed at <https://www.theguardian.com/books/2003/apr/26/fiction.margaretatwood>.
- Rowe, Dora Byrd (2018). The "Novel" Approach: Using Fiction to Increase Empathy, *Virginia Libraries*, **63**, 1, DOI: <http://dx.doi.org/10.21061/valib.v63i1.1474>
- Solove, Daniel J. (2008). *Understanding Privacy*. New Haven, CT: Yale University Press.
- Turow, Joseph (2017). *The Aisles Have Eyes*. New Haven, CT: Yale University Press.
- Turow, Joseph, Hennessey, Michael, and Draper, Nora (2015). The tradeoff fallacy: how marketers are misrepresenting American consumers and setting them up for exploitation, A Report from the Annenberg School for Communication University of Pennsylvania.
- Weiser, Mark (1991). The Computer for the 21st Century, *Scientific American*, **265**, 3, 94 - 105.
- Zuboff, Shoshana (2019). *The age of surveillance capitalism: the fight for a human future at the new frontier of power*. New York: PublicAffairs.

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