Using Science Fiction Texts to Surface User Reflections on Privacy

Richmond Y. Wong

Deirdre K. Mulligan

John Chuang

University of California, Berkeley

BioSENSE, School of Information

Berkeley, CA 94720, USA

{richmond, dkm, chuang}
@ischool.berekley.edu

Abstract

We explore how an excerpt from a science fiction novel describing a near-future miniature wireless streaming camera technology can be used to elicit privacy concerns from participants. We conduct an online experiment (n=151) to compare participants' responses to a narrative fiction passage and a "plain" functional description of the same imagined technology. Qualitatively we find that participants with the fiction passage raised concerns about different types of

privacy harms and were more likely to suggest design modifications to protect privacy. Quantitatively, we find that participants with the fiction passage provided higher ratings of negative affect, and lower ratings of comfort and acceptability. This suggests that researchers trying to understand users' privacy concerns with new ubiquitous computing technologies may benefit from presenting the technology in multiple formats to elicit a broader range of values reflections.

Author Keywords

Privacy; values in design; fiction; narratives; users

ACM Classification Keywords

K.4.1. Public Policy Issues;

Introduction

Understanding potential users' concerns and conceptions of privacy with regard to emerging technologies has been a reoccurring topic in ubiquitous computing. Prior work shows that participants raise different types of privacy concerns when researchers interact with them differently: such as seeing a working drone versus a model [2], or by using different research methods, such as a focus group, user study, or questionnaire [8]. However, these types of studies often occur after a prototype has been made. We focus on eliciting users' privacy concerns during the ideation stage, before prototyping has occurred, following work

from "values in design" which suggests that by understanding values held by stakeholders throughout the *entire* design process, we can better design anticipating possible values-related issues that may emerge from technologies' use, including privacy concerns [4]. Thus, finding ways to elicit values at the beginning of the design process can be useful for shaping the work of designers and engineers.

We suggest that a *narrative* text passage describing a technology product—sourced from a work of science fiction—can elicit stakeholders' values related to privacy differently than a plain *functional* textual description of a technology. Prior work has shown how science fiction affects values and visons of ubiquitous computing research [3], can be used to create personas or scenarios [1], or used by design researchers to explore privacy implications of emerging technologies [9]. In this work, we are interested in seeing how researchers might engage *users* using science fiction texts.

Study Design & Procedure

One domain where privacy concerns often arise is in camera-based technologies. Prior ubiquitous computing work has investigated privacy implications of mobile camera devices such as smartphone cameras, "lifelogging" cameras or headsets such as Google Glass, or wireless smart home cameras, e.g.[5]. We conduct an experimental survey to compare how participants respond to a fictional narrative passage excerpted from *The Circle*—a 2013 science fiction novel by Dave Eggers—and a functional description describing the same advanced wireless camera technology. *The Circle*'s story is set in a near future and focuses on a powerful technology company which introduces new sensing products that supposedly provide greater user

value, but to the reader, seem increasingly invasive of privacy. The most prominent technology in the story is SeeChange, a small wireless camera that streams live HD video which can be easily publicly shared online. It can be mounted, hidden, or worn on the body. This is the fictional technology used in our experiment.
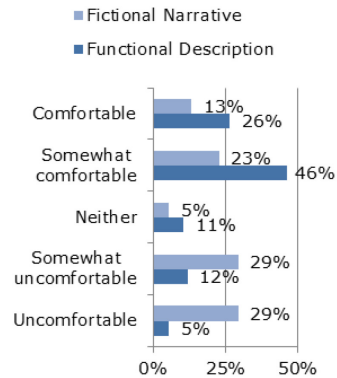
We set up a between-subjects experiment with 2 conditions. Participants are randomly assigned to read 1 of 2 passages: a "Functional Description" which describes the SeeChange camera's capabilities, or a "Fictional Narrative" which consists of an excerpt from *The Circle* describing SeeChange. Both treatments contain the same factual information about SeeChange. After reading a passage, participants answer a set of Likert-type and free-response questions. They then answer a set of demographic questions. We ran our experiment on Amazon Mechanical Turk with 155 participants in the U.S. in summer 2016. Participants received $1.50, averaging 18 minutes for completion. We removed 4 people from our dataset who reported previously reading *The Circle,* providing us with *n=151,* with 76 in the Functional Description and 75 in the Fictional Narrative conditions. Participants reported their ages via ranges (32% were 18-29; 55% were 30-49; 11% were 49-64; 1% were 65 and older; and 1% had no response).

Results
Qualitative Results
Participants provided free-text responses to explain their Likert-ratings, to describe how they would use and not use SeeChange, what uses of SeeChange should be considered inappropriate, and how inappropriate uses should be addressed. Responses were coded according to whether and how they described privacy in relation

■ Fictional Narrative

■ Functional Description

Comfortable	13% / 26%
Somewhat comfortable	23% / 46%
Neither	5% / 11%
Somewhat uncomfortable	29% / 12%
Uncomfortable	29% / 5%

0%   25%   50%

■ Fictional Narrative

■ Functional Description

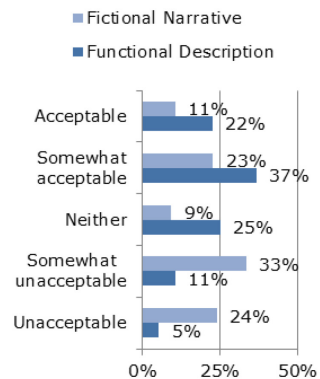|	
Acceptable	11% / 22%
Somewhat acceptable	23% / 37%
Neither	9% / 25%
Somewhat unacceptable	33% / 11%
Unacceptable	24% / 5%

0%   25%   50%

Figure 1. (a) Distribution of participant responses to "How comfortable would you feel using SeeChange?" (b) Distribution of responses to "How acceptable do you find the idea of people using SeeChange?"

to Mulligan et al.'s 5 dimensions of privacy (theory, protection, harm, provision, and scope) [6].

When coding responses for how participants discussed *privacy harms*, we find that in both conditions, most participants raised concerns about the use of cameras to violate private spaces such as bathrooms or bedrooms (mentioned by 53% of participants with the Functional Description and 51% with the Narrative Description), while fewer, but numerous participants mentioned privacy harms in public spaces such as at beaches, pools, or public streets (mentioned by 16% and 15% in the Functional and Narrative Descriptions, respectively). However, participants with the Narrative were more likely to cite the threat of government spying, particularly intelligence agencies such as the FBI, CIA, or NSA. Only 7% of participants with the Functional Description mentioned this as a harm, compared to 32% of participants with the Narrative.

Furthermore, when asked about how to respond to inappropriate uses of SeeChange, most participants suggested some type of legal regulation (83% with the Functional Description and 92% with the Narrative). Interestingly, more participants who read the Narrative mentioned potential technical changes that could protect privacy (such as adding a recording indicator light or encrypting the video streams). 33% of participants with the Functional Description mentioned these types of technical or design changes, compared to 55% of participants with the Narrative.

Quantitative Results
After reading a passage, participants rated how comfortable they felt using SeeChange and how acceptable they thought it was on a 1-5 scale. We then

asked a battery of Likert questions to measure positive and negative affect using the I-PANAS-SF scale [7].

We find that 17% of participants with the Functional Description reported being uncomfortable or somewhat uncomfortable with SeeChange, compared to 58% with the Narrative (Fig 1a). Using the Pearson Chi-Squared test we find, $\chi^2(4) = 28.81$, $p<.001$, which supports that the differences in the distributions between the two conditions are significant. With the Narrative, the distribution shifts significantly toward the negative categories. A similar pattern emerges in the distribution of SeeChange's acceptability (Fig 1b). With the Functional Description, 16% of participants rated the use of SeeChange as unacceptable or somewhat unacceptable, compared to 57% with the Narrative. The Pearson Chi-Squared test $\chi^2(4) = 29.13$, $p<.001$ suggests that these differences in distributions are significant. These suggest that the Narrative provoked a more critical and skeptical reaction.

The I-PANAS-SF scale [7] provides separate positive and negative affect scores out of 25, with higher scores corresponding to greater affect. We use the Mann-Whitney U test for significance. For positive affect, we find that the differences are not significant between those with the Functional Description (*Mdn* = 12.5) and the Fictional Narrative (*Mdn* = 14). However we find that the negative affect was significantly greater for participants with the Fictional Narrative (*Mdn* = 9) than those with the Functional Description (*Mdn* = 5), with a medium effect size $U = 1425.00$, $p<.001$, $r = -.41$.

Implications
Our results suggest that when describing the same technology through a Functional Description or a

Fictional Narrative passage, participants think about different types of privacy harms and solutions, and have different affective reactions. While it is perhaps not surprising that reading an excerpt from a novel critical about technology resulted in lower comfort and acceptability, and in greater negative affect, we find this significant as it suggests that participants are more likely to provide critical and contextualized feedback on proposed products when they are presented in narrative form. Such feedback gathered early in the design process can be utilized to address privacy in ways that are built into systems, rather than addressing privacy after-the-fact. User researchers may consider presenting the same technology to users in multiple ways (such as using a narrative and functional description) to understand a broader set of potential privacy harms that users might identify. Further work may explore the effects of other types of narratives.

Acknowledgements

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