Testing A Comic-Based Privacy Policy

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Abstract
Many users find privacy policies to be difficult to read and understand. Thus, a majority of users ignore them, even though this can lead to legal issues and transparency problems. To remedy this, we examined the potential contributions of comic-based privacy communication. Our results showed that comics do not necessarily benefit users and that text-based versions of the same information are, in some cases, better at presenting the information in a comprehensive manner.

Author Keywords
Privacy policy; privacy notice; transparency; comics.

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[1] https://en.wikipedia.org/wiki/Privacy_policy.

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ACM Classification Keywords
CCS → Security and privacy → Human and societal aspects of security and privacy → Usability in security and privacy

Introduction
Online companies are required to have privacy policies if they collect any type of personal information[1]. These policies inform users on how their data is being collected, used and disclosed. To fulfill the legal requirements as well as users' ever increasing concerns about their online privacy [4], the majority of websites currently have a privacy policy available [15].

Privacy policies are filled with critical and complicated information. Presenting such information in an understandable manner that does not overwhelm users is a challenge in HCI research that has yet to be fully addressed [6]. Privacy policies are too complex for the average user to comprehend [10] and attempting to decipher them costs users time and mental effort [12]. This leads to a majority of users simply choosing to skip reading the policies [1]. Large online companies are no exception to this problem: While a comprehensive and readable text should have a Flesch-Kincaid readability test[2] score of at least 60, Google+ with a score of 51.61, and Facebook with one of 15.0, both fail to

[2] http://read-able.com/

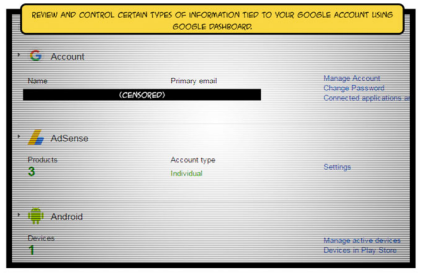

Figure 1: Short comic

Figure 2: Medium comic

present a readable privacy policy to their users. This means that their privacy policies are not comprehensible, even if users were willing to invest time and effort to understand them.

Simplifying privacy policies was the subject to several previous studies. Kelly et al. [8] proposed nutrition labels for privacy which summarizes important privacy information on a small label, similar to how nutrition labels summarize nutritional information. Gideon et al. [3] introduced a privacy finder which classifies the information on privacy policies to facilitate users comprehension. Kay and Terry [7] accommodated privacy information in factoids, vignettes, and iconic symbols to enhance their understanding of the consent statements. However, these methods do not necessarily increase understanding of the actual policy [7,13] and need further investigation. In this study, we further examine the *privacy comics* introduced by Knijnenburg and Cherry [9] and test their potential to increase users' comprehension.

Comics and Privacy

Comics have been used in many different domains to educate individuals on highly complex topics, such as teaching healthcare to youth, non-native speakers, and individuals with low literacy rates [5,11]. Comic pages help present a bigger picture, while individual panels may be used to present more detailed information [2]. Such features could be utilized to better communicate license agreements [7] and privacy policies [9,16]. To that end, we designed a quantitative study to investigate the potential contributions of a set of comic-based privacy communications.

Hypothesis development

Building on Knijnenburg and Cherry's [2] hypotheses about the comic-based presentation of privacy policies, we argue that comic-based presentations can increase users' understanding of the information in comparison to the traditional text-based method:H1: Presenting the privacy information in the form of comics will result in a higher response accuracy to comprehension questions in comparison to using text.

Privacy policies vary in length, from a single page policy to a large document. Milne et al. [14] studied a set of 312 online privacy policies across two periods in a longitudinal study and found that when policy length increases, readability declines. Hence, we hypothesize the following:H2: Longer policies adversely affect users' response accuracy to comprehension questions.

We are also interested in seeing how *comics* function across different lengths of privacy policy. Since comics are more engaging, they might reduce the burden of reading a long privacy policy. Therefore, we also hypothesize that:H3: There is an interaction effect between presentation style and length, in that longer policies are perceived as less burdensome when presented in a comic format rather than a text format.

Finally, in line with Knijnenburg and Cherry [9], we hypothesize the following subjective outcomes:H4: Presenting the privacy information in the form of comics results in a higher self-efficacy, ease of use, motivation to read, effectiveness, understandability, and perceived value in comparison to using text.

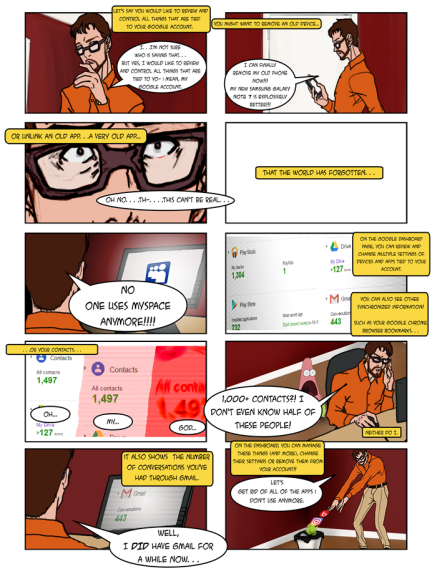

Figure 3: Long comic

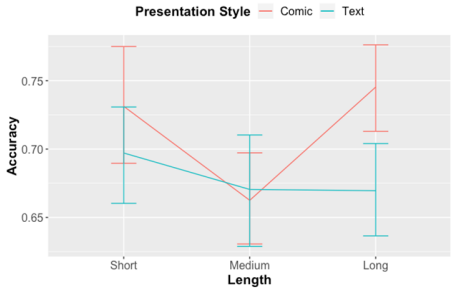

Figure 4: The effect of presentation style and length on accuracy.

Experimental setup

We developed an experiment based on the "transparency and choice" part of Google's privacy policy[3]. This section explains how Google collects user data and provides links to seven pages where users can make choices about how this information is being used.

We conducted a 3 by 2 between-subjects experiment with policy length (Figure 1: short—verbatim versions of the bullets in Google's transparency and choice text,Figure 2: medium—the same descriptions but with 1-2 additional sentences describing situations in which a user would like to access the described settings page, andFigure 3: long— describing in even more detail the situation in which a user would like to access the page, linking it to higher-level user goals) and presentation style (a textual description, or the same description incorporated into a comic strip) as independent variables.

164 participants were invited via MTurk to participate in a "usability study of Google's product settings". They were randomly assigned to one of the six conditions. They then faced seven information page evaluations, each of which consisted of: 1) a comic or text explanation, 2) a screenshot of the page itself, and 3) a quiz with four multiple-choice questions about the page. After going through all seven pages, participants answered questions subjectively evaluating the comics. These subjective factors, and the accuracy with which participants answered the multiple-choice questions, were our dependent variables.

[3] https://policies.google.com/privacy#infochoices

Results

Accuracy

To analyze participants' accuracy on the 28 multiple-choice questions, we fit a generalized linear mixed effect model with a random intercept for participant. Although the use of comics increased the odds of users answering the questions accurately, this effect was not significant and H1 is therefore rejected. Furthermore, the policy length did not have any significant effects, nor could we find a significant interaction between the policy length and its presentation style. This rejects H2 and H3. Table 1 shows the regression model, and Figure 4 shows the results per condition.

	Odds Ratio	P-value
Overall odds	2.459	
Comic (Vs text)	1.183	0.456
Description (Vs Short)		
Medium	0.880	0.564
Long	0.872	0.507
Medium X Comic	0.809	0.502
Long X Comic	1.278	0.428

Table 1: The effect of experimental manipulations on multiple-choice questions.

Subjective aspects

We measured six constructs with multiple 7-point scale items from strongly agree to strongly disagree. These constructs include 4 items on self-efficacy (e.g. "I feel the comics(text) explain the purpose of each Google product setting.."), 5 items on perceived ease of use (e.g. "The comics(text) made me feel that it is worthwhile to put in the effort to carefully set my Google product settings."), 8 items on motivation to read (e.g. "I felt that reading the comics(text) was

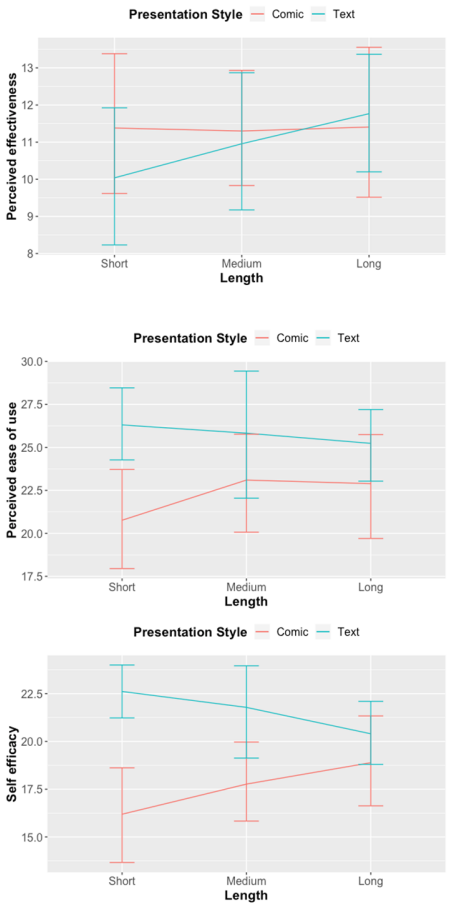

Figure 5: The effect of experimental manipulations on Perceived effectiveness, Perceived ease of use and Self efficacy

tedious."), 6 items on perceived effectiveness (e.g. "I feel I would be able to set the product settings that I would want."), 5 items on perceived understandability (e.g. "After reading the material, I have a very solid understanding of how my Google product settings work."), and 5 items on perceived value (e.g. "I feel the comics(text) would help me to decide what product settings to change."). The subjective aspects were submitted to Confirmatory Factor Analysis and regressed on the experimental conditions using Structural Equation Modeling. Table 2 reports the average variance extracted for each construct as well as the regressions of the consturcts on the experimental manipulations and Figure 5 shows the results per condition. Contrary to our expectations, we found that users who receive comics report *lower* self-efficacy, and *lower* ease of use which rejects H4.

		Style (vs. text)	Length (vs. short)		Style X Length	
Construct	AVE	comic	medium	long	comic X medium	comic X long
Self-efficacy	.879	-1.216 (p<.001)	-0.089	-0.478	0.341	0.976 (p=.031)
Perceived ease of use	.856	-0.763 (p=.032)	0.110	-0.198	0.236	0.516
Motivation to read	.850	-0.253	0.001	0.036	-0.256	-0.107
Perceived effectiveness	.760	0.343	0.230	0.369	-0.260	-0.383
Perceived underst.	.668	-0.269	0.181	-0.175	0.110	0.343
Perceived value	.636	-1.414	-0.073	-0.508	0.109	0.857

Table 2: Regressions of measured constructs on experimental conditions. Significant p-values are noted in the parenthesis.

Discussion and Conclusion

We studied the potential benefits of using comics as a means of privacy communication. We did not find any significant effects of presentation style on response accuracy. Figure 4Figure 4: The effect of presentation style and length on accuracy. suggests that the accuracy for a comic-based presentation seems to be higher than the text-based presentation for the long version. Hence, as a post hoc analysis, we compared these two versions, and found that the odds of participants answering questions correctly for the long comic presentation style was 1.526 higher than for long text version; but this effect is small and only marginally significant (p=0.059). Furthermore, Figure 5 suggests that comics adversely affect self-efficacy and perceived ease of use. Overall, our results suggest that a comic-based presentation of privacy policy is not necessarily beneficial and might actually increase users' burden when trying to understand privacy.

Limitations and future work

The comics were not effective when tested on a random sample of MTurk participants. However, comics might still work better for particular groups of people, such as those with low literacy levels, those more attuned to comics (e.g. younger people), or those with compromised memorization skills. Hence, we recommend future research to target these specific populations. Finally, we studied a small portion of a privacy policy; comics may be more beneficial when communicating entire policies.

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