

# Understanding How People Weigh the Costs and Benefits of Using Facebook

Jack McClary<sup>1</sup>, Sid Stamm<sup>2</sup>

<sup>1</sup>*Independent Researcher, Seattle, WA, USA*

<sup>2</sup>*Rose-Hulman Institute of Technology, Terre Haute, IN, USA*  
*jackmcclary@gmail.com, stamm@rose-hulman.edu*

Keywords: privacy, cost-benefit analysis, social network

Abstract: Much work in privacy focuses on educating a system’s users so they will be better armed to take action based on the benefits and drawbacks of how their data is treated. Intuitively, this makes sense; one may expect people who perceive more benefit than risk in a system will elect to use it, but our research shows that is commonly not the case. We surveyed users of a social network to quantify what they perceive as the benefits and drawbacks of the platform. Given their net “value” perceived, we would have expected those who see mostly drawbacks (or a net cost) in its use to abandon the platform for a more privacy-preserving alternative. What we found was that only 62% of individuals we surveyed acted so rationally—the remainder either chose to use a platform they felt had a negative impact on their life, or chose to abandon one that served them favorably. This result indicates there are strong factors beyond rational cost/benefit analysis that lead people to decide what social platforms they use. This means that privacy professionals must focus not only on building transparency and choice, but also constructing viable alternatives so people do not feel pressured into using a platform they see as a net loss of personal privacy.

## 1 INTRODUCTION

When you interact with a service or entity, you reveal some information about yourself. In the physical world, most people are aware of what information they are giving to those around them and how it can be used (Mayer-Schonberger, 2009). Online, however, this is not always the case: many online services will sell or use the information they gather about their customers for non-obvious purposes. While these services typically provide access to privacy policies that outline this behavior, McDonald et al. showed that even after participants read the privacy policy, generally they still do not fully understand how their information can be used (McDonald et al., 2009). This failure to understand privacy policies implies that there is a disparity between what information is correct and what the reader believes is correct (Staszak, 2016). This gap in understanding, which we refer to as the “privacy perception gap”, may even manifest as animosity and distrust towards the service. While a significant amount of research has been done on how to close this gap (Kay and Terry, 2010; Kunze, 2008; Lavesson et al., 2008), we seek to identify how readers use their understanding to interact with online sys-

tems. For example, Kelley et al. created a graphical representation of privacy policies to help readers understand the information intended to help them. They were successful in creating a chart that allows users to quickly interpret privacy policies more accurately, however, they did not measure the difference in a user’s willingness to continue using the software (Kelley et al., 2009). What we want to understand is, once people know what an online service does with their data, will they act according to their judgment about how respectfully the service treats their data.

## 2 RELATED WORK

Privacy is increasingly important to users of Facebook, according to Dey et al. (Dey et al., 2012). In 2018, Vishwnath et al. showed how people attempt to balance “social fulfillment” with their privacy settings on Facebook (Vishwanath et al., 2018), and Govani et al. show that students who are aware of risks still overvalue social interactions (Govani and Pashley, 2007). Balancing privacy and social fulfillment can only be

rationally done if people are fully aware of how their data is used and can control it. Many have worked on the problem of closing the privacy perception gap by educating users, and the strategies for this vary.

One strategy is to make privacy policies easier to understand. Kelley et al. propose standardized quick summary charts (“nutrition labels”) for privacy policies to enable users quick access to the personal information being used (Kelley et al., 2009). There were many iterations of these labels culminating in a grid of colorful symbols representing what information would always be taken, what information the user could opt-out of being taken, what information the user could opt-into being taken, and what information would not be taken. The researchers found subjects were receptive to this display and also that subjects could more quickly and accurately answer questions about privacy policies represented in this fashion. While this is a successful way to educate users, the authors did not measure how this affected a participant’s *desire* to use the software behind the privacy policy.

Another gap-closing strategy is to standardize the format and language of End User License Agreements (EULAs) themselves. Kunze et al. assert that a standard format would balance power between users and developers and provide a fair mechanism for disputes (Kunze, 2008). This work argued that improving EULAs could improve “virtual world” software, arguing standardization provides both legal and economic improvements. By forcing EULAs to be in plain language, the authors assert companies will benefit from informed consent agreement stronger than what is often standard practice (signing the EULA without reading it). When these standard EULAs giving all the power to the developers are challenged in court, the agreements often failed to hold (Kunze, 2008). By giving more power to the user, these agreements become more reliable, and not just easier to understand. By examining both sides of EULAs, Kunze et al. assert this standardization would help both companies and users by balancing power and making the agreements more binding (Kunze, 2008).

A similar practice of making a unified format could be used with privacy policies; many have tried similar approaches, such as icons (Holtz et al., 2011; ?) or short privacy notices (Utz et al., 2019) (cookie notices often used to comply with GDPR). Hoping to automatically standardize privacy policies, Harkous et al. developed Polisis (a machine learning-based privacy policy analyzer) to interpret and present privacy policies at a higher level more accessible to users (Harkous et al., 2018).

Other work turns privacy notices and policies into

something users can interact with to learn more about the site’s privacy practices. The Pribots project (Harkous et al., 2016) attempts to close the privacy perception gap with a virtual entity with which users may converse to learn about their privacy choices and settings. Other work suggests boosting the usability of privacy settings themselves will aid educated users (Lipford et al., 2008; Liu et al., 2011).

In “Noticing notice,” Good et al. used a participant’s acceptance of software as an indication that education was successful (Good et al., 2007). Their work is similar to this paper’s contributions, but does not capture the case where the users identify a product as beneficial yet still avoid using it. In “Noticing notice,” participants were asked to read EULAs and were shown a summary of the EULA before or after the consent page (depending on which group they were assigned). When compared with the group that was not given any summary, Good et al. noted that those who were pre-briefed with a summary spent more time installing the software and often declined agreements. The authors asserted that effective education leads to a change in behavior, but it is not obvious that “knowing” leads to “doing”.

In this paper, we further examine the “Noticing notice” underlying assumption (Good et al., 2007) that education about a site’s data practices will change users’ behaviour.

### 3 DO PEOPLE ACT ON THEIR EDUCATION?

We hypothesize that educating people on risks associated with a social networking site has a smaller effect than expected from rational actors. To limit the scope of this paper we focused on one social network: Facebook. To break down our hypothesis into questions we can test, we split it into three parts.

**Question 1** *Do people realize that there is an inherent risk to using social media?*

We expect they do since many security breaches and controversial policies have been in the news recently, and thus educated people more about risks of using the Internet. This combined with a broad definition of risk (a possible negative impact on one’s life) suggests that most people will be aware of the risks. Identifying whether people see this inherent risk will motivate the other two questions because people must make non-trivial decisions based on their education.

**Question 2** *Do people practice reasonable cost benefit analysis?*

We expect they do not because many people consider social media to be a waste of time. This common perception reduces perceived value in social media, so even if the risk and impact of loss is low, the cost of participation will still outweigh any potential value. *Question 2 is core to this paper:* if people do not behave in alignment with their values, changing their values (via education) will not likely change behaviour.

**Question 3** *Does perceived value from Facebook directly correlate to frequency of use?*

If people employ cost benefit analysis, we expect those who see less (or negative) value from Facebook to have less motivation to use it, or they may perceive more value in aspects of Facebook that do not require consistent use. Furthermore, we anticipate people who fail to practice cost-benefit analysis will see a very small negative value in Facebook, which may indicate the effort of deactivating their account doesn't seem worth the time required.

### 3.1 CONTRIBUTIONS

Much work is being done to see if users can be effectively educated, and some even interpret their reaction as purely a result of their education, but it is not clear if people are truly using their education to make decisions. Our work suggests they don't.

In this paper, we use the results of a survey to show that (1) people realize there is potential risk or costs in using Facebook, (2) even knowing there is a cost, peoples' usage patterns do not commonly align with their perception of cost or benefit in use of the social network, and (3) there is a correlation between a person's perceived value of Facebook and their intensity of use. We also dig deeper into our results to draw some additional insights about what externalities may influence peoples' perception of costs and benefits of using Facebook.

## 4 METHODOLOGY

While we seek general knowledge about all social networking platforms, our survey focused on the most widely used network on our campus: Facebook. To answer the three questions listed in Section 3, we administered a survey to volunteers from the student population of our university to measure their perception of *risks and values*, and their *usage patterns* of Facebook.

Our work was conducted with an exemption granted by our university's ethics board (Institutional Review Board) as protocol #RHS0329. To protect the subjects, all identifying information was separated from survey responses and after data collection was completed, the identifying information was destroyed.

Our survey was split into two parts: (1) we first gathered information on how intensely individuals used the social network if at all, and then (2) identified what attributes people deem to be benefits (values) and costs (risks) of using the social network.

### 4.1 Identifying Value and Risk Perceptions

Perceived value ratings are relevant to all three questions we seek to answer. We asked survey respondents what they perceive as both positive and negative aspects of using Facebook. From their answers, we can identify where the population generally perceives risk, where they see benefit, and the intensity of these feelings.

We hypothesized that the net perceived value (sum of benefits minus sum of costs) directly correlates with intensity of use on the social network. Specifically, respondents who see more value than risk to their activities on the site will choose to use it and those who see more risk than value will choose not to use it. This leads us to classify "rational" actors as those whose usage follows their perceived value.

On one hand, those who see Facebook as a net positive are rational actors if their perceived benefit (value) outweighs the perceived cost (risk), and it would follow that such a respondent would use the platform. On the other hand, those who perceive Facebook to be a net negative (more risk than value) are rational actors if they choose to avoid or lessen their use of the platform.

### 4.2 Identifying Usage Patterns

Usage pattern questions are needed to gather data on how often or with what intensity a respondent uses Facebook. These patterns are identified by the user's frequency of use, account history with Facebook, and whether they have decided to deactivate their account (and how long ago). This part of the survey is not only necessary to find a correlation between usage intensity and value seen, but also informed us about respondents' decisions on whether to use Facebook or not.

Combining this usage information with that of the value and risk parts of the survey, we can estimate

whether or not the respondents are rationally applying cost-benefit analysis on their use of Facebook.

### 4.3 Survey Design

At first we sought mainly to answer Question 2, so the surveys were designed with information needed to determine if people weigh the costs and benefits of using Facebook. Question 3 is an extension of Question 2, seeking whether people use Facebook with intensity matching their perception of its net value. Related, we anticipated existence of a specific value perception below which users deactivate their accounts. To find this “minimum-bar”, we first needed to quantify what peoples perceive as benefits and costs of using Facebook.

We initially planned to present a series of positive and negative “aspects”, where respondents were asked to rate how valuable they perceived the positive aspects, and how costly they perceived the negative ones. We noticed that classification into positive and negative categories would introduce bias so we revised our survey to allow respondents to rate all aspects on a scale including both costs and benefits. The survey questions used a scale of -5 to 5, where -5 was the highest cost and 5 was the highest benefit. This way the authors’ judgment about “good” and “bad” aspects should not influence the responses. To create each aspect, we looked at different features of Facebook and attempted to generalize their function, for example the feature of showing a specific day in a past year was isolated into “A way to connect with your past”.

**Iterative Bias Removal.** Before administering the survey, we attempted to remove bias (attempting to make each aspect appear as it could be a cost or a benefit) by making the language we used as neutral as possible. Then we repeatedly asked a small set of people how biased our set of “aspect” phrases sounded and then revised the phrases. Our goal was to obtain phrases as neutral or factual as possible, changing biased phrases like “a way for trackers to spy on me” to more outcome-driven phrases like “a way for content providers to target my interests”.

### 4.4 Collection

We offered the resulting email survey to the student population of our university, offering five \$10 gift cards to randomly selected respondents to encourage responses. To handle the random reward, we needed to collect personally identifying information

about our respondents in addition to their survey responses. In the interest of smooth IRB approval, we split survey responses into two isolated data sets: one that contained the research questions and one that contained the respondent’s contact information. To avoid “ballot box stuffing”, our survey verified a respondent’s contact information was not yet in our data set before splitting and recording the entire response. This entire process was vetted and approved by our university’s IRB, the survey data was collected by a third party, and then only provided to us after being scrubbed of potentially personal information. We protected privacy of our respondents by separating their PII from their research question responses, and only having access to contact information of the five randomly-selected gift card winners. Once the gift cards were distributed, the contact information data set was destroyed.

We initially attempted to gather responses in person, at our university’s dining hall. Given the large majority of students walk through there every day, we expected a good response rate. It turned out that very few were willing to stop and take a short survey on their way through the dining hall, so we elected to request responses to the survey by sending a single message to all 2200 university students. Within two weeks we had collected 555 responses to the survey with 450 unique and complete responses.

## 5 RESULTS

Before analyzing the results we removed any responses that did not fully complete the entire survey. To our surprise, each question received a full range of responses (-5 to 5) and so we were not able to remove “outliers” based on any sort of response pattern.

The majority of respondents’ behavior regarding Facebook does in fact reflect their net values. This implies that further education of Facebook users about how the platform uses their data would result in overall behavior change. However, the number of students failing to practice risk analysis suggests that education is not as effective as many believe.

**Question 1 (Results)** People realize there is risk in the use of the social network platform. 98.6% of respondents acknowledge risk existed in the platform. This was identified by finding all respondents who identified at least one negative response in the values section of the survey; as prompted, this was a respondent’s indication of a “cost” to using Facebook.

**Question 2 (Results)** People do not always practice reasonable cost benefit analysis. 62%, less than two-thirds of respondents were identified as practicing and acting on valid cost benefit analysis. This was measured by comparing the sum of the values assigned to aspects for each individual’s response to whether or not the individual has an active account. If the respondent perceived an overall negative value (cost) and yet still uses the platform, we marked this as not practicing cost benefit analysis. Value sums of zero indicate neutrality, and we considered all such respondents to be practicing cost-benefit analysis. (The net-zero values are included in the 62% figure and were less than two percent of responses.) The breakdown of the four possible groups is seen in Figure 1.

**Question 3 (Results)** There does seem to be a slight correlation between perceived net value and intensity of use. The positive correlation can be seen in the trend displayed by the mean value results in Figure 2: the more positive value respondents perceive in the platform, the more frequently they use it. It is important to note that the range of perceived values is not very wide; this suggests that as a whole, users of the platform are fairly neutral.

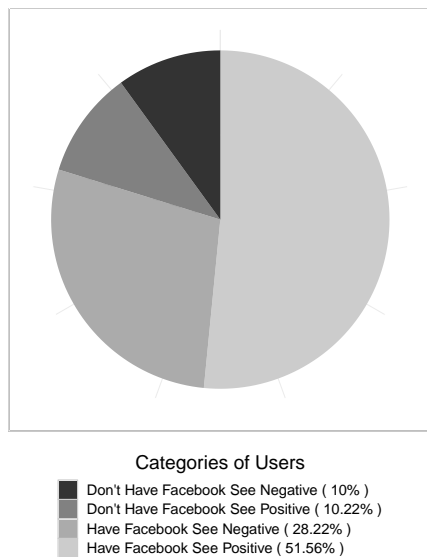


Figure 1: The breakdown of the net value respondents assign to Facebook and whether they use it. 62% of respondents either see a net negative value and have no account or see net positive value and have an account. The remaining 38% seem to behave contrary to their value judgment of the social network.

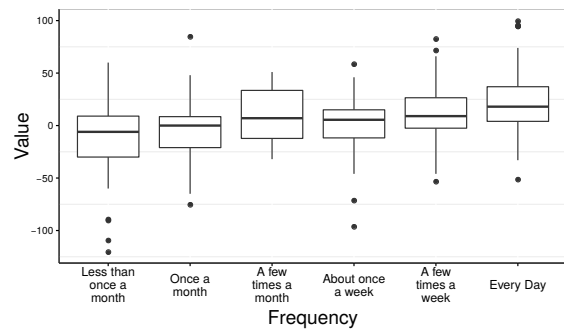


Figure 2: A comparison of use frequency and value seen. Respondents who see more value also seem to use Facebook more often.

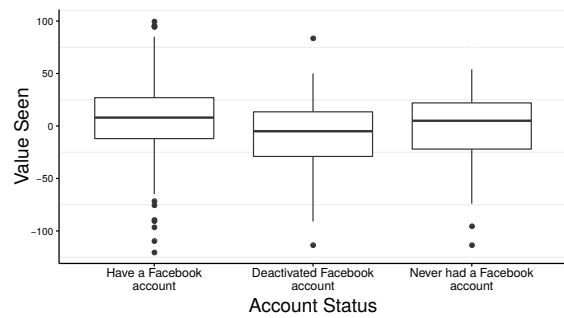


Figure 3: Comparison between net value perceived and account status. Those with no account tend to perceive less net value in the use of Facebook, but not by a substantial amount.

## 6 FURTHER INTERPRETATION

By administering a survey through an all-student email, we were able to collect survey responses from a large, *strongly representative* sample of the student body. We compared the demographics of the responses to those of the entire population of students to identify how representative our sample was. The largest difference we saw was that of male students; the male student population of our university was 75.3%, but was 64.9% of the sample responses. All race demographic sizes we measured fell within 10% of those of the student population, with many within 5% of expected. This all indicates the sample is a strong representation of our University’s student population.

### 6.1 Demographic Cross-Sections

Across all race and sex sub-groups, percentages of those who saw and didn’t see benefit in Facebook, and those with or without an account, varied widely. For every subgroup, the portion of respondents who practiced valid cost benefit analysis fell within  $\pm 4\%$  of

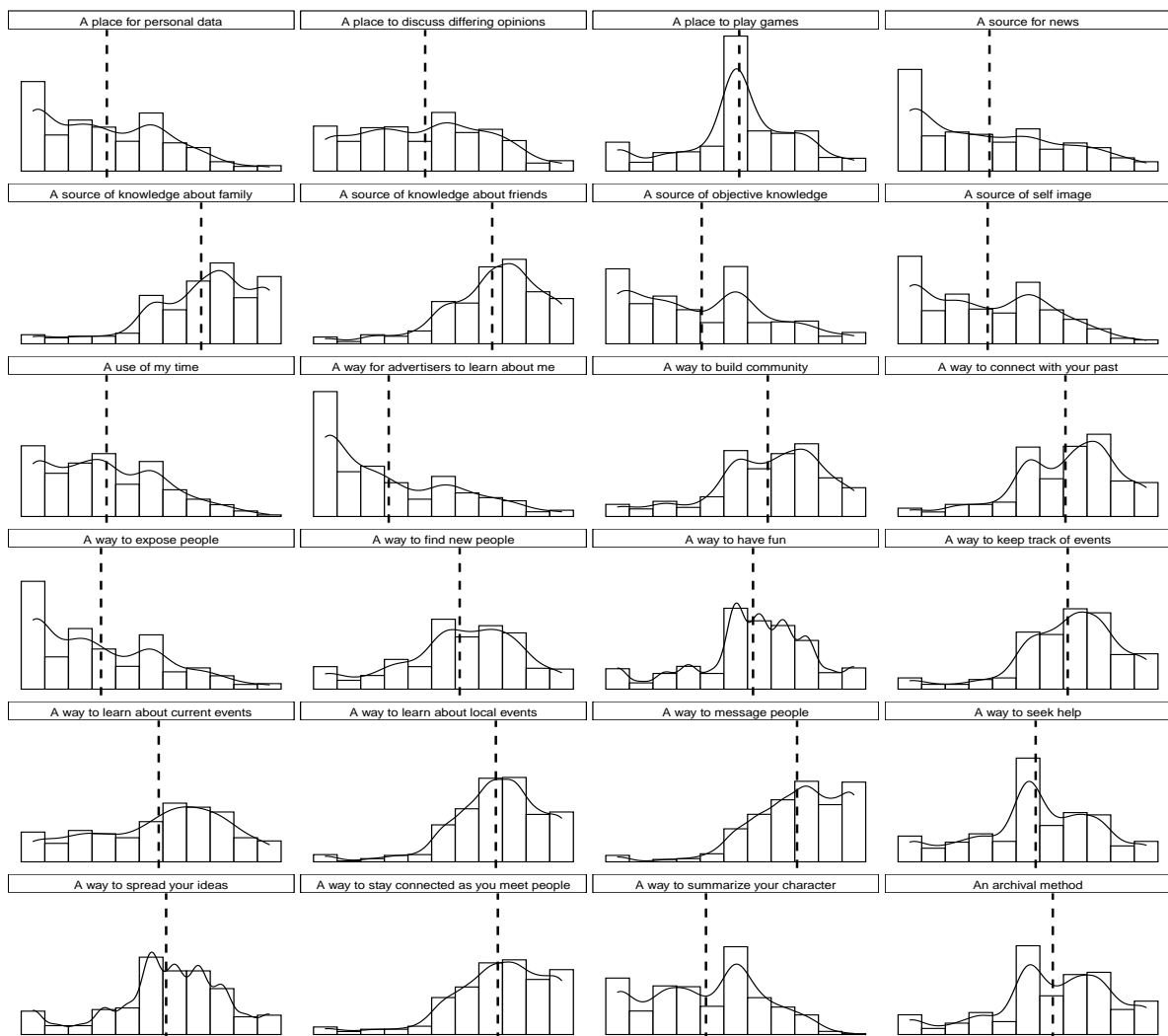


Figure 4: Survey respondents were asked to rate each of these aspects of Facebook on a scale of -5 (most costly, left side of each histogram) to 5 (most beneficial, right side of each histogram). Here histograms can be seen for each aspect including a mean response as a vertical dotted line. Participants were presented these “value” questions in random order.

the result of the whole sample. This did not hold for subgroups based on academic major.

**Insight 1** There was no clear correlation between perceived net value of Facebook and the student’s academic major. It’s important to note that our sample was all math, science and engineering majors, so this may not be very significant.

**Insight 2** On average, female respondents reported a higher perceived net value (11.4) than male respondents (1.3) in a possible range of -120 to +120.

## 6.2 Insights About Perception

Because most of our survey gathered value judgments on the different aspects of Facebook, we can combine those results with intensity-of-use data to identify the population’s general opinion of the platform. These types of insights may potentially be used by Facebook or other social media platforms to identify how favorably their users perceive them.

**Insight 3** Facebook is generally seen as beneficial. The average net value measured was 4.35 and the median was 6, showing that Facebook is generally seen as positive but with low confidence due to a standard deviation of 33.32.

**Insight 4** The least frequent users are in general what we call “reluctant users”. These are those who see a net negative value to using Facebook and yet still use it. Most who use the platform less than once a week are in this category (see Figure 2, leftmost box).

**Insight 5** Respondents who had deactivated their Facebook account reported the lowest average net value seen in Facebook. This can be seen in Figure 3.

**Insight 6** People see the most valuable part of Facebook to be messaging (average 2.59 and median 3 with range -5 to 5). The next most valuable aspect was “A way to stay connected as you meet people” with average 2.34 and median 3. Results for each aspect can be found in Figure 4.

**Insight 7** The aspect of Facebook with the most negative perceived value was “A way for advertisers to learn about me” with average -2.32 and median -3. This suggests people generally do not like that their data is being used for targeted ads.

### 6.3 Limitations and Future Work

The survey we developed was not rigorously tested for reliability and these results could be improved by measuring the reliability of the responses. One way this could be accomplished is by executing another experiment with a slightly adjusted survey: we would add a second question for all existing value questions that is similar to the original, but differently worded. A result showing the originally-asked questions answered in the same way as the rephrased ones would indicate reliability in the original data set. We could also administer the same survey twice to a subset of the respondents with a substantial delay between requests to measure changes over time. Less change indicates stable responses.

Our survey, while a large sample (n=450), is only representative of our school’s student body. This does not map to the demographic composition of Internet users as a whole, and to measure how an average person acts, we would need to expand the survey to a representative sample of the general population.

We would also like to know if the survey respondents knew they often acted contrary to their value judgment: using Facebook even when they claim it is a negative impact on their lives. By sharing these results with the survey respondents and following up after some time, we may be able to see if *educating individuals about their proficiency using their education* is beneficial.

If the respondents do indeed understand they seem to behave irrationally, it would be beneficial to learn what is motivating the reluctant users to exist; perhaps there are externalities (such as using Facebook as an identity provider for other websites) that coerce these users into keeping their Facebook account alive.

Finally, Facebook is not the only social media platform. It is possible that individuals rely differently on their value judgments when using other platforms. A similar study could be done with other social media platforms such as Instagram or Twitter to reveal how the aspects of each platform are perceived by its users. This would also allow a deeper understanding of social media use in general instead of simply one platform.

## 7 CONCLUSIONS

Through a survey administered to our university’s student body, we were able to answer a few questions about whether people practice cost–benefit analysis when choosing how to use a social networking platform. While our results do not show strongly “Yes” or “No”, we did identify that people who perceive more benefit in the use of a social networking platform tend to use it more frequently.

It’s important to note, however, that some people are “reluctant users”: while they perceive a negative value to using a social network, they still engage. This suggests that educating users about the risks and benefits to use of a system may not be sufficient to empower them to act on their preferences.

## ACKNOWLEDGEMENTS

The authors would like to thank Jordan Trachtenberg, Diane Evans, and Paul Christensen for their help with survey design, development, deployment, and reliability measures. Thanks also go to Dan Morris, who was instrumental in helping navigate the institutional review board process.

## REFERENCES

- N. S. Good, J. Grossklags, D. K. Mulligan, and J. A. Konstan, “Noticing notice,” Proceedings of the SIGCHI conference on Human factors in computing systems - CHI '07. 2007. DOI 10.1145/1240624.1240720

- H. Harkous, K. Fawaz, K. G. Shin, and K. Aberer. 2016. "PriBots: Conversational Privacy with Chatbots." In Proceedings of the 12th Symposium on Usable Privacy and Security (SOUPS 2016), Denver, CO. USENIX Association, USA.
- H. Harkous, K. Fawaz, R. Lebret, F. Schaub, K. G. Shin, and K. Aberer. 2018. "Polisis: automated analysis and presentation of privacy policies using deep learning." In Proceedings of the 27th USENIX Conference on Security Symposium (SEC'18). USENIX Association, USA, 531–548.
- L. Holtz, K. Nocun, and M. Hansen. "Towards Displaying Privacy Information with Icons." In Privacy and Identity Management for Life (Berlin, Heidelberg, Germany, 2011). Vol 352 of IFIP Advances in Information and Communication Technology, Springer, pp 338-348. DOI 10.1007/978-3-642-20769-3\_27.
- M. Kay and M. Terry, "Textured agreements," Proceedings of the Sixth Symposium on Usable Privacy and Security - SOUPS '10. 2010. DOI 10.1145/1837110.1837127
- P. G. Kelley, J. Bresee, L. F. Cranor, and R. W. Reeder, "A 'nutrition label' for privacy," of the 5th Symposium on Usable Privacy and Security - SOUPS '09. 2009. DOI 10.1145/1572532.1572538
- J. T. Kunze, "Regulating Virtual Realms Optimally: The Model End User License Agreement," Northwestern Journal of Technology and Intellectual Property, vol. 7, no. 1, Fall 2008.
- N. Lavesson, P. Davidsson, M. Boldt, and A. Jacobsson, "Spyware Prevention by Classifying End User License Agreements," New Challenges in Applied Intelligence Technologies. pp. 373–382. DOI 10.1007/978-3-540-79355-7\_36
- V. Mayer-Schonberger, Delete: The Virtue of Forgetting in the Digital Age. Princeton University Press, 2009.
- A. M. McDonald, R. W. Reeder, P. G. Kelley, and L. F. Cranor, "Comparative Study of Online Privacy Policies and Formats," Privacy Enhancing Technologies. pp. 37-55, 2009. DOI 10.1007/978-3-642-03168-7\_3.
- Mozilla. "Privacy Icons", published online June 28, 2011. Accessed March 1, 2020. [https://wiki.mozilla.org/Privacy\\_Icons](https://wiki.mozilla.org/Privacy_Icons)
- S. Staszak, "Privacy Protection Online: Measuring the Gap of User Understanding." Senior Thesis. May 2016. Rose-Hulman Institute of Technology.
- C. Utz, M. Degeling, S. Fahl, F. Schaub, and T. Holz. 2019. "(Un)informed Consent: Studying GDPR Consent Notices in the Field." In Proceedings of the 2019 ACM SIGSAC Conference on Computer and Communications Security (CCS '19). Association for Computing Machinery, New York, NY, USA, 973–990. DOI 10.1145/3319535.3354212
- T. Govani and H. Pashley. "Student awareness of the privacy implications when using Facebook." Proceedings of The IEEE - PIEEE. 2007.
- R. Dey, Z. Jelveh and K. Ross, "Facebook users have become much more private: A large-scale study," 2012 IEEE International Conference on Pervasive Computing and Communications Workshops, Lugano, 2012, pp. 346-352, DOI 10.1109/PerComW.2012.6197508.
- B. Debatin, J. P. Lovejoy, A. Horn, M.A., Brittany N. Hughes, "Facebook and Online Privacy: Attitudes, Behaviors, and Unintended Consequences," Journal of Computer-Mediated Communication, Volume 15, Issue 1, 1 October 2009, Pages 83–108, DOI 10.1111/j.1083-6101.2009.01494.x
- A. Vishwanath, W. Xu, and Z. Ngoh, "How people protect their privacy on Facebook: A cost-benefit view," Journal of the Association for Information Science and Technology. 2018. 58. DOI 10.1002/asi.23894
- H. R. Lipford, A. Besmer, and J. Watson. "Understanding Privacy Settings in Facebook with an Audience View." UPSEC, 2008, 8, 1-8.
- Y. Liu, K. P. Gummadi, B. Krishnamurthy, and A. Mislove. "Analyzing facebook privacy settings: user expectations vs. reality," In Proceedings of the 2011 ACM SIGCOMM conference on Internet measurement conference (IMC '11). 2011. 61–70. DOI 10.1145/2068816.2068823