The effect of effort, control and value frames on online users privacy decision

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Abstract

A frame refers to a decision maker’s perception of a decision problem. Frames affect outcomes of decisions and are partially controlled by how decision problems are formulated. This study investigated the effect of framing alternatives in a privacy decision as gaining or losing value, need to make an effort and gaining control in an online environment. Also a structure among the many effects found in earlier research concerning privacy in the context of Internet based services was sought. For these purposes two experiments and one survey were conducted at a university in Sweden. The study included 238 individuals, 197 of them being in the age range of 19-30. The participants were approached in public areas at the University and were asked to register on a fictive online cloud service. During registration they got a choice of registering automatically with little control and manually with control over what information would be published. The most salient effect found was the impact of framing the low control alternative as time saving, meaning that the participants were willing to give up privacy to save time. The practical implication of these results would be for developers of new online services to focus on making it easy and time efficient to take control over private information. For value and control frames no significant effects were found. Also exploring the result of the survey, a structure with the two components online concern and willingness to take risk online were found.

Keywords: privacy, control, framing, online privacy, privacy decision
We are living in an increasingly connected world. Not only are we connected to the Internet at home and at work, nowadays since the introduction of smartphone’s a few years back, the world and the people in it are in an increasingly manner connected all the time and everywhere. This creates the possibility to design services which might have a severe impact on privacy. One area that has attracted significant attention lately is the usage of online social networks. In a survey published by PEW Internet and American Life project, 67% of Internet users in the USA were using an online social network. The penetrating power is even greater in the age group 18-29 amounting to 83% (Duggan & Brenner, 2013). The biggest of the online social networks Facebook, had during March 2013 1.1 billion active users. This explosion of usage has given rise to growing privacy concern. Users often publish their identities and reveal personal information which makes them vulnerable to abuse from stalkers, bullies, online criminals and even from their own friends and there is an accumulation of personal data that might put the privacy of users at risk through possible security breaches (Hoadley, Xu, Lee, & Rosson, in press). This concern has also been shown to exist among the public. For example one opinion poll showed that there is concern for companies auditing online behavior of consumers. There are cultural differences showing in this poll though. Sweden stands out on the low end, where only 15% are concerned about this issue, compared to Spain and Switzerland who are on the other end of the spectrum, where 47% of the users are concerned (Zhou, 2012).

Privacy

In 1890 Waren and Brandeis (1890) wrote that recent inventions, in this case photography, and business methods called attention to the need for protecting the person and its right to privacy. The world has come a long way since then but the subject of privacy and

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1 Retrieved from Facebook newsroom in may 2013 ( http://newsroom.fb.com/Key-Facts ).
privacy intrusive inventions is still, and probably more due to the introduction of the Internet, an important subject.

Today, on the subject of privacy there seems to be two more prominent theories in the literature that has as Margulis (2003a) puts it, stood the test of time. The first one is Altman’s theory that is focusing on privacy as a process where social interaction is regulated. More specifically, privacy is a process of controlling interpersonal boundaries which means that there is a regulation of interaction with others depending on internal states and external conditions and is thus dynamic as the context change (Altman, 1976). The second one is Westin’s theory that focuses on the states and the functions of privacy (Westin, 1968). Even though the theories have a somewhat different focus they both discuss privacy as a means for groups and individuals to control or regulate access to themselves and Margulis (2003b) summarizes that Altman’s theory is the more comprehensive one, while Westin’s theory is narrower as its focus is on information privacy.

So boundaries and the process of dynamically regulate these boundaries are at the core of Altman’s privacy theory. Palen and Dourich (2003) have described three of these boundaries in a framework they believe are central when describing management of privacy in a networked world. They also describe the specific threats posed to these boundaries due to information technology. First there is the discloser boundary which is the boundary between privacy and publicity. It is the management of what information to disclose and since disclosing information makes it possible to participate in the social world, it is not only a matter of avoiding revealing information but also a matter of what information to actually reveal, which also stands true in the connected world. Palen and Dourich (2003) continue regarding the disclosure boundary, it is when the participation in the networked world isn’t deliberate or when the individual loses
control over the definition of the personal identity that problems might occur. Second there is the identity boundary. This is the boundary between self and others when people are acting as part of a social group, taking into account when people are members or representatives of groups.

Problems regarding technology in the context of the identity boundary, are that in interaction between people when using technology, representation of the other person is often impoverished and the indicators of the boundary between privacy and publicity becomes unclear. Finally there is the temporal boundary or with other words the boundary between past, present and future.

Disclosure of information can’t be seen as individual events, but must be seen as a consequence of past actions and of possible future actions. Technology has the possibility to affect this boundary in that it makes the information persistent. Palen and Dourich (2003) conclude that technology does not in itself support or interfere with personal privacy, but it destabilizes how regulation of privacy is practiced.

**Privacy and control**

Privacy of information has often been linked to the concept of control (Brandimarte, Acquisti, & Loewenstein, 2010). Furthermore control has had a significant impact on privacy theories and Margulis (2003a) concludes that many privacy definitions include control over interactions and communications that regulate access to self. For example Altman (1976, p. 8) defines privacy as “Selective control of access to the self or to one’s group” and Westin defines privacy as “the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others” (Westin, 1968, p.7). Even if Westin is not using the word control, control in this case of personal information, is what this definition is all about.
Control has been divided into two different forms concerning information privacy. The first one being to have control over release of personal information and the second to have control over access and usage of personal information by others. People distinguish these two forms of control of information as exemplified by the public outcry in 2007 when Facebook added a news feed function that automatically posted changes made by the user on their front page. This outcry occurred despite no differences had been made in accessibility of the information. Facebook had merely gone from a pull to a push model of information revelation (Brandimarte et al., 2010). These different forms of control have been investigated and Brandimarte et al. (2010) have concluded that when we have greater control over publication of private information, the control over access and use of that information becomes less important. In their research they could see that when someone else was responsible for publication or if the publication in another way was uncertain, the subjects were less inclined to reveal information. These results indicate that people suffer from what the authors call a control paradox. The Control paradox implies that control over publication makes control over access of information less salient, which decreases the privacy concerns of people and consequently increase willingness to publish information. Vice versa individuals with less control over publication face greater privacy concerns and thus will lower their willingness to publish information (Brandimarte et al., 2010).

**Privacy and the Internet**

Privacy in the context of the Internet and Internet based services has received quite some scholarly attention in recent years and much of this research has been focusing on online social networks. The following section summarizes some of the findings of this research.
In one study Young and Quan-Haase (2009) could see that concern for internet privacy is associated with users’ information revelation practices. Students with high level of concern for internet privacy disclosed less personal information on Facebook. Dwyer, Hilz and Passerini (2007) came to a somewhat different conclusion seeing that general privacy concern did just relate to information sharing on one of five items in a survey they conducted. Also Tufekci (2008) could after a series of surveys conclude that general privacy concerns are not of much relevance to self-disclosure. Though what Tufekci (2008) did see was that students who were worried about privacy, were less likely to start using social network sites. Perceived control explains privacy concern where perceived control is associated with lower privacy concern according to Xu (2007) who has made a summary of factors that may have an impact on perceived control or privacy concern. They are prior experience with mobile applications, desire for information control, trust propensity and previous privacy experience.

Young and Quan-Haase (2009) have found that size of the network on Facebook is associated with more information presented on profiles. From interviews they also concluded that there was a difference between strategies to address privacy concerns between concerns related to expressive privacy and informational privacy, where concern for information privacy made users restrict access to profiles and withhold information that could link users to physical location, while expressive privacy lead to untagging and removal of photographs, or limiting of access to personal information to certain contacts or groups of contacts.

Tufekci (2008) found that concern for future audiences did not impact visibility of profiles, though this did not make the writer argue that future audiences doesn’t matter, but that the privacy is handled in a different way than total withdrawal, for example through restriction of who can see their profile.
There are age differences (Tufekci, 2008). Levels of disclosure of political views, romantic status, sexual orientation and phone number decreases with age. One possible interpretation is that younger students are more political, more comfortable with their sexual orientation, more motivated for publicity and more willing to give up their privacy. There are also gender differences. Women use these sites more for maintaining current relationships while men to a higher degree use them to meet new people (Tufekci, 2008). Also women have greater privacy concern and disclose less identity information than men (Fogel & Nehmad, 2009).

Concerning risk taking, having profiles on social networking websites is associated with greater risk taking attitudes than those not having profiles on social networking sites (Fogel & Nehmad, 2009). Finally Acquisti and Grossklags (2005) have listed factors that affect privacy decision making including personal attitudes, knowledge of risk and protection, trust in other parties and faith in the ability to protect information.

**Framing and decision theory**

A decision problem can be described as choices amongst acts or options, consequences or outcomes from these acts or options and contingencies or probabilities of the consequences or outcomes related to these acts or options. The decision frame refer to the decision makers perception of these acts/options, consequences/outcomes and probabilities of consequences/outcomes. This frame is controlled by norms, habits and personal characteristics of the decision maker. Partially the frame is also controlled by how the problem is formulated (Tversky & Kahneman, 1981). This means that a decision problem described in different ways will render different results. Thus the context will have an impact on decisions made in contrary to the invariance criterion of rational choice (Kahneman & Tversky, 1984). The effect of framing
has been demonstrated to cause shifts in preferences, even though formulation of problems have been inconsequential (Tversky & Kahneman, 1981).

Related to framing is prospect theory that states that subjective value of an outcome is the function of size and gain and the same goes with size and losses. Thus, when making decisions, people normally don’t think of outcomes in terms of totals, but rather in terms of losses, gains and neutrals. Research has shown that loss is more aversive to people than gain is attractive. This means that a possible gain of 10 dollars will be valued less than a possible loss of the same amount. This effect is called loss aversion (Kahneman & Tversky, 1984). Combining framing and prospect theory will render the conclusion that framing a decision problem as loss will have a bigger impact on the decision than if framed as gain, due to loss aversion.

**Purpose of research and hypotheses**

This study is focusing on how different frames will affect users’ acceptance to lose control of information release (ALCIR) when making privacy decisions. More specifically the frames control, effort and value are investigated. Within the context of value, the effect of gain and loss framing is also evaluated. This research will serve to empirically describe the relationship between privacy and control and is important due to the lack of systematic integration of control into privacy theories, despite the fact that control is featured in many of these theories (Margulis, 2003). Practically this knowledge will hopefully lead to better constructed online services where the matter of privacy is taken into consideration as an integrated and natural part of the design process. The prior review of theory leads to the following hypotheses investigated through two experiments.
Experiment 1:

H1.1: Users accept loss of control of information release to a greater extent when the low control alternative is framed as demanding less effort.

It is expected that a cost in the form of effort will diminish the will to keep control of private information. Thus framing a low control alternative in a decision problem as demanding less effort will make decision makers less prone to keep control over the release of their private information.

H1.2: Users accept loss of control of information release to a lesser extent when the high control alternative is framed as having full control.

Control is an integrated part of privacy, and it is expected that framing a high control alternative as a way to gain control is enough in itself to make decision makers more prone to take control over the release of their private information.

Experiment 2:

H2.1: Users accept loss of control of information release to a greater extent compared to no framing, when the low control alternative is framed with value gain.

It is expected that getting a benefit for diminishing the control of the release of private information will lessen the will to keep the control. Thus framing a low control alternative in a decision problem as a way to gain value will make decision makers less prone to keep control over their privacy.

H2.2: Users accept loss of control of information release to a greater extent compared to no framing, when the high control alternative is framed with value loss.
It is expected that a cost for keeping the control of the release of private information, will diminish the will to keep control. Thus framing a high control alternative in a decision problem as a way to lose value will make decision makers less prone to keep control over their privacy. H2.3: Users are more willing to accept loss of control of information release when the high control alternative is framed with value loss than when the low control alternative is framed with value gain.

It is expected due to loss aversion (Kahneman & Tversky, 1984) that even though the value is equal, framing the high control alternative with gain is less effective than framing the low control alternative with loss, in making the participant chose to accept loss of control of information release.

Furthermore, this study search for a structure among the many effects found in earlier research concerning privacy in the context of the Internet and Internet based services. For this purpose a survey and an exploratory principal component analysis was done.

**General method**

**Participant characteristics and sampling procedure**

Recruitment was done at Karlstad University in Sweden. This had the effect that the 238 participants were mostly students and younger adults. The respondents were recruited in public places such as cafés and study areas. People sitting alone or in groups of between two and four in size were approached. Only individuals proficient in Swedish were allowed to participate since the tests were in Swedish. The tests were conducted on site, where the respondents were approached. As part of the experiments, the respondents were offered free storage space for participating, an offer that was later withdrawn when exposing the true nature of the study.
Design

Two experiments were conducted and one survey.

Tools

A website with the fictive service Sheepcloud was used for manipulation and data collection and it was a development of a site used in other research in the same field at Karlstad University. The Sheepcloud site posed itself as being a combined social network and file-sharing service. It consisted of three web pages that were used during the deception. The first page described the Sheepcloud service. This page also asked the respondent to participate in a test of the service and offered free storage space for participating. The second page requested the participants to answer some simple non-sensitive personal questions and it also asked the respondent to enter their name and their email. Finally the last page asked the respondent to make the decision between manual or automatic registration. On this page the framing of the decision was done.

The technologies used for development were HTML, PHP, Java script and CSS. A database was used for storing the collected information and the database management system used was MySQL. Mozilla Firefox was used in full screen mode for delivering the website to the user.

Procedure

The participants were approached at public areas such as cafés and study areas and they were asked if they were willing to participate in a test that was part of a master’s thesis. If they agreed they were told that they had to register on a combined social network and file-sharing service developed at the university. They were also told that the goal of this test was to evaluate a matching function between users and that they had to answer some personal questions. Finally
they were informed that they were allowed too, would they change their mind of participating, stop the test at any time. At this point the respondent was handed a laptop with the Sheepcloud webpage open. The first page informed the respondent that they had to register and that since they were participating they would gain storage space for free on Sheepcloud. After finishing the fictitious registration, they were informed by the software that this was an experiment and they were asked for consent before sending any information to the researcher. They were also asked to complete the test by finishing a questioner.

Manipulation was used and was implemented through the cover story of the Sheepcloud website and the fact that they were registering seemingly using their name and e-mail, creating a sense that they were not anonymous. After giving away their registration information and answers to the personal questions they got a choice between manual or automatic registration, where automatic registration meant collecting information from Facebook, Linked in and Skype and that this information would be used when registering. When making the choice between automatic and manual registration the participants were exposed to the second part of the manipulation, the framing, which was unique to the different conditions of the experiments.

All information given the respondents including the text on the Sheepcloud website and the questioner was in Swedish.

**Ethical considerations**

In the experiments deception was used which was considered crucial for being able to accomplish the goal of this study. Steps were taken to adhere to the Swedish Research Councils principles of ethical research (Vetenskapsrådet, 2002). To relieve the respondents from the possible distress and disappointment of not getting access to Sheepcloud and the free storage space offered, debriefing was conducted after the tests describing the purpose of the study. They
were also offered a chocolate bar as compensation for participating. Three participants actually commented on the fact that a lie had been used. In these cases a more profound briefing was conducted, explaining the purpose of the study more in depth and also explaining why sometimes, research in psychology demands deception. All respondents were also asked for consent after they were informed they had been part of an experiment, before any information was sent to the researcher. They were also informed before the test began that they could stop at any time, would they so choose. No data was collected about the respondents that was sensitive or that could be used to identify the participants.

The manipulation used was not considered being able to cause distress for the respondents and except for debriefing no action was taken specifically to handle this issue.

**Experiment 1**

**Method**

**Participant characteristics.** The total number of participants was 121. Among them 54 were within the age range 19-23, 45 within 24-30, 11 within 31-40, 9 within 41-50 and 2 within 51-60. Fifty-five of the participants were men and 62 were woman. Information on gender was missing for two participants. About 65 percent of the approached persons participated in the study. The distribution of age and gender among the experimental groups is presented in table 1.
Table 1

Distribution of age and gender among the experimental groups

<table>
<thead>
<tr>
<th>Age</th>
<th>Full control (n = 37)</th>
<th>Save time (n = 41)</th>
<th>No frame (n = 43)</th>
</tr>
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<tbody>
<tr>
<td>19-23</td>
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<td>24-30</td>
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<td>31-40</td>
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<td>5</td>
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<td>41-50</td>
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<td>51-60</td>
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<td>Gender</td>
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<tr>
<td>Male</td>
<td>16</td>
<td>21</td>
<td>18</td>
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<tr>
<td>Female</td>
<td>21</td>
<td>20</td>
<td>21</td>
</tr>
</tbody>
</table>

**Design.** The experiment had a 1x3 between subjects design. Participants were assigned to experimental groups randomly until all conditions had about 40 tests. The independent variable framing was used and could take the form of “no framing”, “full control” and “save time”. It was used in the second part of the manipulation and was presented when the respondents were making the choice between automatic or manual registration. Thus three conditions were tested; the first one being the baseline condition where no framing was used. The text presented for this condition was “You can choose automatic or manual registration”. The second condition framed automatic registration as a way to save five minutes and the text “You can save five minutes by choosing automatic registration” was presented to the respondent. The third condition framed the manual registration as a way to get full control of what information to give away. In this case the text “You can control exactly what information you want to give us by choosing manual registration” was used.

**Tools.** The Sheepcloud website was used for manipulation and data collection.
Measures. The dependent variable ALCIR was measured through the user’s choice of automatic or manual registration. The automatic registration is in this case the low control option and manual registration is the high control option. Thus the operational definition of ALCIR is the propensity for users to choose automatic over manual release of information.

Result

A Pearson chi-square test for independence was conducted showing that the independent variable framing caused a significant change, $\chi^2 (2, n = 121) = 13.20$, $p < .001$, on the dependent variable ALCIR with a medium (Cramer’s $V = .33$) effect size according to Cohen’s conventions for Cramer’s $V$ (Aron, Aron, & Coups, 2009). Comparing the individual frames post hoc, two Pearson chi-square tests (with Yates continuity correction) were conducted. Using Bonferroni adjusted alpha levels of $.025 (.05/2)$ there was a significant increase in ALCIR $\chi^2 (1, n = 84) = 7.00$, $p = .008$, with a medium (Cramer’s $V = .31$) effect size according to Cohen’s conventions for Cramer’s $V$ (Aron, Aron, & Coups, 2009), when the low control option (automatic registration) was framed as time saving compared to no framing. This effect was not seen when the high control option (manual registration), was framed as having full control $\chi^2 (1, n = 80) = .039$, $p = .842$, compared to no framing. Descriptive statistics for the test is laid out in Table 2.

Table 2

<table>
<thead>
<tr>
<th>Chosen level of control</th>
<th>Full control frame ($n = 37$)</th>
<th>Save time frame ($n = 41$)</th>
<th>No frame ($n = 43$)</th>
</tr>
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<tbody>
<tr>
<td>High (Manual registration)</td>
<td>81.1</td>
<td>46.3</td>
<td>76.7</td>
</tr>
<tr>
<td>Low (Automatic registration)</td>
<td>18.9</td>
<td>53.7</td>
<td>23.3</td>
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</table>

For the purpose of finding the cause of the failure to find the expected result for experiment 2, a linear contrast was made comparing the time to decide level of control for the
framed conditions and for the no frame condition. First an analysis of outliers was made resulting in the removal of two cases using a cutoff level of $\alpha = .001$. Logarithmic transformation was done to meet the assumption of normality. There was no significant difference for experiment 1, $F(1, 116) = .22, p = .64$ with the no frame group having a mean time to decide of 10.2 seconds and the framed groups having a mean time to decide of 11.4 seconds.

Discussion

The result of the experiment showed that users accept loss of control of information release to a greater extent when the low control alternative is framed as demanding less effort meaning that the hypotheses H1:1 was supported. This was not the case when the high control alternative was framed as getting full control meaning that H1:2 was not supported.

Altman describes privacy as a process of dynamically regulate interpersonal boundaries and that these boundaries are affected by internal and external conditions (Altman, 1976). The effect of the time frame experiment has shown this dynamism. In changing an external condition, in this case framing one option in a privacy decision, as a way of saving five minutes there was a clear effect, with a medium effect size. This means that effort, in this case measured as time, has mitigated the demand for control over information release, or in terms of Altman (1976) and Palen and Dourich (2003), has caused a regulation of the disclosure boundary. Also looking at time and its effect from the perspective as a decision problem (Tversky & Kahneman, 1981), the gain of time has in this case probably been seen as certain and the consequences have been clear and valued by the user meaning that multiple factors have been working in the direction of the hypotheses.

And how can the lack of effect within the control frame condition of the experiment be explained. One answer to this question might be found in the concept of illusion of control.
People often don’t respond differently to events when they are and when they are not in control, and they normally overestimate the control that they have (Langer, 1975). In this experiment, what might have happened is that the frame of full control only stated something that is already in the mind of the participants, namely that they have control. Furthermore looking at the full control condition from the perspective of a decision problem (Tversky & Kahneman, 1981), one might argue that the consequences of not choosing the full control alternative are unclear. This meaning that even if the participant values control, they won’t put as much emphasis on this as if the consequences had been more salient.

Considering the result that people will sacrifice their privacy for saving time, the interest now turns to what might affect this tendency. The second experiment investigates the effect on the choice of level of control when the low control alternative of the decision is framed with value gain and the high control alternative is framed with value loss, while keeping the frame of saving time for the low control alternative constant.

**Experiment 2**

**Method**

**Participant characteristics.** The total number of participants was 117. Among them 61 were within the age range of 19-23, 37 within 24-30, 15 within 31-40 and 4 within 41-50. Thirty-nine of the participants were men and 74 were woman. Information on gender was missing for four participants. Distribution of age and gender among the experimental groups is presented in table 3. About 75 percent of the approached persons participated in the study which was slightly higher than in experiment 1. During the experiment, at times the same persons that had already been approached before were by mistake asked to participate again. This was normally noted by
the approached individuals and there is no indication that respondents have made the test multiple times.

Table 3

*Distribution of age and gender among the experimental groups*

<table>
<thead>
<tr>
<th></th>
<th>Loss</th>
<th>Gain</th>
<th>No frame</th>
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<tbody>
<tr>
<td></td>
<td>(n = 38)</td>
<td>(n = 40)</td>
<td>(n = 39)</td>
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<td>Age</td>
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<td>19-23</td>
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<td>31-40</td>
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<td>41-50</td>
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<td>Gender</td>
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<tr>
<td>Female</td>
<td>23</td>
<td>23</td>
<td>30</td>
</tr>
</tbody>
</table>

**Design.** The experiment had a 1x3 between subjects design. Participants were assigned to experimental groups randomly until all conditions had about 40 tests.

Manipulation was used and was implemented through the change of free storage space offered the participant presented as a gain or as a loss. Three conditions were tested, the first being a baseline where the neutral text “You can choose automatic or manual registration” was exposed to the respondent. The second condition framed the automatic registration as a way to gain extra free storage space by showing the text “You will gain 10 GB of extra storage space by registering automatically”. The third condition framed the manual registration as a way to lose some of the earlier offered storage space by exposing the text “You will get 10 GB less storage space when registering manually”. On the page for selecting manual or automatic registration both the control frame and the time frame from experiment 1 was present for all conditions.

**Tools.** The Sheepcloud website was used for manipulation and data collection.
Measures. The dependent variable ALCIR was measured through the user’s choice of automatic over manual registration, thus using the same variable and the same operational definition as in experiment 1.

Results

A Pearson chi-square test for independence was conducted showing that the independent variable framing did not cause a significant change, $\chi^2 (2, \ n = 121) = .64, \ p = .72$, on the dependent variable ALCIR. Post hoc, three Pearson chi-square tests for independence (with Yates continuity correction) were conducted comparing the individual frames. Using Bonferroni adjusted alpha levels of .017 (.05/3) there was no significant difference when the low control option, the automatic option, was framed with gain compared to the no framing option $\chi^2 (1, \ n = 79) = .14, \ p = .91$, or when the high control option, the manual option, was framed with loss compared to the no framing option $\chi^2 (1, \ n = 77) = .33, \ p = .57$. Also the effect on ALCIR was not significantly bigger when the high control option was framed with loss compared to when the low control option was framed with gain $\chi^2 (1, \ n = 78) = .57, \ p = .81$. Descriptive statistics for the test is laid out in Table 4.

Table 4

<table>
<thead>
<tr>
<th>Chosen level of control</th>
<th>Loss frame ($n = 38$)</th>
<th>Gain frame ($n = 40$)</th>
<th>No frame ($n = 39$)</th>
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<tr>
<td>High (Manual registration)</td>
<td>55.3</td>
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<td>46.2</td>
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<td>Low (Automatic registration)</td>
<td>44.7</td>
<td>50</td>
<td>53.8</td>
</tr>
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</table>

For the purpose of finding the cause of the failure to find the expected result, a linear contrast was made comparing the time to decide level of control for the framed conditions and for the no frame condition. An analysis of outliers was made for the time to decide resulting in
the removal of three cases using a cutoff level of $\alpha = .001$. Logarithmic transformation was done to meet the assumption of normality. There was a significant difference, $F (1, 111) = 4.03, p = .030$ with the no frame group having a mean time to decide of 16.18 seconds and the framed groups having a mean time to decide of 21.45. This effect did not occur in experiment 1.

**Discussion**

None of the hypotheses (H2:1, H2:2, H2:3) regarding value did show a significant result which means that framing options with loss or gain of value in the form of storage space did not affect the level of control chosen. It is also worth mentioning that the result did not have a tendency of going in the direction of the hypotheses but was rather pointing in the opposite direction. Since this experiment didn’t yield a significant result no specific conclusions can be drawn.

One explanation of the failure of this experiment might be found in the experiment per se. There was a significant, and also practical, difference in the time it took to make the privacy decision between the framed conditions and the no frame condition. This difference might be due to the somewhat technical terms of the amount of storage space offered leaving the respondents with problems making the decision. According to Payne, Bettman and Johnson (1993) complexity of a problem affect which decision strategy an individual is using. The longer decision time might be an indication of a different level of complexity which has forced the participant into using a different decision strategy which in itself affected the decision.

Another explanation of the failure of this experiment might be found in the perception of the options (Tversky & Kahneman, 1981) between conditions. The respondents might not find the storage space offered valuable leaving them indifferent to the frames in the conditions.
Survey

Method

Participant characteristics. Since the survey was conducted in addition to the experiments, the same participants were used as in the two experiments presented above. Six responses were missing compared to the number of participants of the experiments. This is explained by the fact that two respondents stopped the survey halfway through due to time constraints. There were also technical problems with the Google docs questionnaire on two occasions explaining the other four missing answers.

Summing up the demographic data, the total number of participants was 232. Among these 197 were within the age range of 19-30 and 41 were in the age range of 31-60. Ninety-four of the participants were men and 138 were women.

Tools. A questionnaire created in Google Docs was used. It was presented to the participants on the Sheepcloud website after the experiments had been conducted.

Measures. For the survey the measurements used have to a great extent been utilized and validated in earlier research. One property looked for when choosing measures, was that they included few items which was considered important to keep time down for answering the questioner. The measures have been translated from English to Swedish and all likert scales used are 7-point scales. In the cases the original scale had a different number of points, these were transformed into 7-point scales to avoid mixing formats.

Internet privacy concern. Internet privacy concern was measured through a one item likert scale adopted from Tufekci (2008). The participants were asked “How concerned are you with your online privacy?”
Risk taking attitude. Risk taking attitude was measured with a four item likert scale adopted from Pan and Zinkhan (2006). The scale has been tested for reliability by Fogel and Nehmad (2009) showing a Cronbach alpha of .76. The scale is based on four claims that the respondent can agree with to different degrees. The claims were “To gain high profit in business, one has to take high risks”, “If there is a great chance of a reward, I will take high risks”, “If there was a great chance to multiply my earning, I would invest my money even in the shares of a completely new and uncertain firm” and “To achieve something in life, one has to take risks”.

Concern for audience. Concern for audience was measured with a one item likert scale earlier used by Tufekci (2008). The question used was “How concerned were you that someone that you did not want to see your information would see it”. The question was somewhat changed from the original. The original question focused on Facebook profiles while in this study the focus is on “information”, which as a more generic term did fit this study better.

Disposition to trust. Disposition to trust was measured with a three item likert scale adopted from Chau, Hu, Lee and Au (2007) that also tested the measure for validity and reliability with satisfying results. The scale is based on three claims that the respondents can agree with to different degrees. The claims have been slightly reworded in this study. The original words “online vendor” has been changed to “online company”. This was done to reflect the focus on other types of companies than vendors in this study. The questions used were “Most online companies are reliable”, “Most online companies keep their promise and commitments” and “Most online companies are honest”.

Previous privacy experience. Previous privacy experience was measured with a two item likert scale adopted from Xu, Luo, Carroll and Rosson (2011). The scale is based on claims that
the respondents can agree with to different degrees. The claims were; “I have often been victim of what I felt was an invasion of privacy on the Internet” and “During the last year I have heard and read a lot about the use and misuse of personal information on the Internet”.

*Usage and demographic data.* Information regarding usage of social networking sites was collected with a five point scale ranging from “daily use” to “never use”. Demographic data was collected including age, gender, location of birth and location of residency.

*Time to decide level of control.* For exploratory purposes the variable time to decide level of control was measured. The operational definition for this variable was the time it took to chose between automatic or manual registration.

**Results**

Earlier research has found many effects concerning privacy in the context of the Internet and Internet based services. An exploratory principal components analysis was conducted to search for a structure among these effects. All variables included in the analysis were initially screened for outliers and with a cutoff level $\alpha = .001$ no cases were removed. First oblique rotation was requested showing correlation among components < .32 leading to the choice of using the orthogonal rotation Varimax (Tabachnick & Fidell, 2013). The analysis was made on five variables. The extraction revealed two components with eigenvalues above one cumulative explaining 53.1% of the variance of the model. Individually the first component explained 31.0% and the second explained 22.1% of the variance. The analysis revealed a structure showing clear loadings on both components. All variables loaded on only one component. Table 5 shows the rotated component matrix and communalities.
Table 5

*Rotated component matrix and communalities for PCA using Varimax*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Online Concern</th>
<th>WTRO</th>
<th>Communalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous privacy experience</td>
<td>.74</td>
<td>.01</td>
<td>.54</td>
</tr>
<tr>
<td>Risk taking attitude</td>
<td>.24</td>
<td>.76</td>
<td>.62</td>
</tr>
<tr>
<td>Concern over audience</td>
<td>.61</td>
<td>.15</td>
<td>.40</td>
</tr>
<tr>
<td>Internet privacy concern</td>
<td>.74</td>
<td>.18</td>
<td>.58</td>
</tr>
<tr>
<td>Trust propensity</td>
<td>-.19</td>
<td>.69</td>
<td>.52</td>
</tr>
</tbody>
</table>

In sum, the two factors based on previous research in this area for these respondents are willingness to take risk online (WTRO) and online concern (OC).

Continuing the exploration of the data using the found components WTRO and OC, a standard multiple regression was conducted analyzing time to decide the level of control. First an analysis of outliers was made, resulting in the removal of five cases with a cutoff level of $\alpha = .001$. Time to decide was transformed using logarithmic transformation to meet the assumption of normality. Also the assumptions of multicolinearity, linearity and homoscedasticity were checked. The analysis yielded a significant result $F(2, 223) = 3.23, p = .042$, with an adjusted $R^2 = .020$, showing that 2% of the variance is explained by the model. Looking at the specific components none of them predicts time to decide level of control significantly. The results for the analysis of the specific components can be found in table 6.

Table 6

*Standard multiple regression analyzing time to decide level of control and its relation to WTRO and OC*

<table>
<thead>
<tr>
<th>Component</th>
<th>$B$</th>
<th>SE $B$</th>
<th>$\beta$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>OC</td>
<td>.031</td>
<td>.016</td>
<td>.13</td>
<td>.059</td>
</tr>
<tr>
<td>WTRO</td>
<td>.027</td>
<td>.016</td>
<td>.11</td>
<td>.092</td>
</tr>
</tbody>
</table>
Also a logistic regression was conducted exploring the relationship between the chosen level of control and WTRO. An analysis of outliers was made but no cases were removed. Also the assumption of normality was met. The model gave a significant result $\chi^2 (1, N = 228) = 4.05$, $p = .045$ and explained between 1.8% (Cox and Snell $R^2$) and 2.4% (Nagelkerke $R^2$) of the variance in the level of control.

**Discussion**

The variables trust propensity and risk taking attitude were both loading on the same component. This integration of trust and risk can be found in current theory. A risk-based approach of trust is gaining acceptance among theorists, and it has been argued that trust can be treated as a subset of risk (Das & Teng, 2004). According to Mayer, Davis and Schoorman (1995, p. 712) trust is defined as “the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party”. In this definition being vulnerable is to take risks. Mayer et al. (1995) concludes that trust in itself is not the same thing as taking risk, but it is the willingness to take risk. Interestingly, willingness to take risk, that in this case is the same thing as trust following previous arguments, looks to be conceptually very close to risk taking attitude, why the loading of these two variables on the same component seems fully understandable.

Both concern over audience and Internet privacy concern loaded on the same component. This isn’t very surprising since they both are different aspects of concern. Previous privacy experience also loaded on the same factor which is more interesting, meaning that what has been found is an OC component in part being based on experience.
The relationship between these two found components and the variables choice of level of control and time to decide level of control were explored. A significant result was found on the relationship between WTRO and choice of level of control showing that this factor is able to, in the context of this study, to point in the same direction as earlier research (Fogel & Nehmad, 2009; Acquisti & Grossklags, 2005; Xu, 2007).

Looking at time to decide level of control, the full model of the multiple regression gave a significant result but none of the specific factors did. Interestingly though the tendency was leaning toward a significant result, implying that there might be an effect to find.

**General discussion**

This study has shown the importance of framing an option as time saving when users are making privacy decisions in an online context. Also the two factors WTRO and OC were found in the principal components analysis. Further exploration of these two factors showed that WTRO does predict the choice of level of control and that both OC and WTRO might be able to predict time to decide the level of control.

The effect of the external condition of framing the low control alternative in a decision problem as time saving is an example of the dynamism of interpersonal boundaries (Altman, 1976) where the frame caused a regulation of the disclosure boundary (Altman, 1976; Palen & Dourish, 2003) by mitigating the demand for control over information release. Seen as a decision problem less effort, in this case measured as time saving, has been valued by the participants when making the privacy decision. The practical implication of this result is for developers to make it simple for users in an online environment to take control of their private information. If users will have to take control of their information through complex functions, they might not
put in the effort. Thus it might be better to leave the user with simple choices even if this sometimes means a loss of flexibility.

The result of the principal component analysis has given some interesting preliminary findings. Risk and trust in an online context might be connected as shown by both variables loading on the WTRO component. This connection can also be found in earlier research. It has for example been concluded by Mayer et al (1995) that trust is the willingness to take risk. Furthermore an OC component was found that was loaded by previous privacy experience.

Exploring the data WTRO with a small effect successfully predicts the choice of level of control which gives some insight into how this trait of personality is affecting the online privacy decision. Furthermore OC and WTRO together predicted, though also in this case with a small effect, the time to decide level of control. Individually they did not predict time to decide, even though the result was leaning toward a significant result for both components. Interestingly decision time has to the knowledge of the author not been investigated in the context of decision problems of online privacy before, and it might be a useful way in which to understand the conduct of decision-making in an online environment in future research. Also finding an OC component loaded by previous experience is interesting, since understanding the concern of users might help in designing services that will not be rejected by users. For example Xu (2007) concludes from prior research that consumers resist technologies when having privacy concerns. Important to say regarding the exploration of the data is that since the effect of the predictions are small, or even non significant which is the case when predicting time to decide level of control for the individual components, the interpretation of these results must be done with caution and confirmatory research is needed to draw any conclusions.
As with many experiments there might be problems with generalizability. In this case there might be problems generalizing the result of the time frame experiment to a different situation. Since most of the participants were approached in cafés, many of them were on breaks between lectures causing a time constraint. This means that time might have been more important in this experimental setting than for a normal situation.

For future research, since the conclusion of this study is that effort plays an important part in user’s privacy decision, the logical next step is to investigate how to develop user interfaces that makes it easy for users to take control. Another interesting question worth attention is if the illusion of control (Langer, 1975) plays a part in why the control frame didn’t have any effect, and if this is the case, how this illusion is mitigated. Due to the control paradox (Brandimarte et al., 2010) the feeling of being in control decrease the privacy concern and consequently increase willingness to publish information, why this is an important part in learning how to make users take control of their private information. Looking at time to decide level of control, the full model based on WTRO and OC from the principal components analyses gave a significant result but none of the specific components did. Interestingly though the tendency was leaning toward a significant result, implying that there might be an effect to find. An experiment designed for this specific purpose, thus hopefully yielding higher power, might be able to show this effect better. Furthermore this study has operationalised less effort as saving time. Other kinds of efforts could also be investigated focusing more on the cognitive effort of the participants. Finally research on the topic of mitigating OC is suggested. As pointed out earlier Xu (2007) concluded that consumers will resist technologies when having privacy concerns, so for the purpose of learning how to increase usage of online services, the result of such research would be beneficial.
In this study deception was used. This was considered crucial for the study to work and as described earlier, steps were taken to minimize the discomfort of the participants due to the deception used in the experiments. Not only the possible discomfort but also the importance of the research must be considered when taking a decision to conduct deception. One of the practical implication of finding ways to make people more comfortable with leaving their private information on online sites might for example be to collect information from patients before seeing health workers. This could make meetings more effective and it might also be possible to extract more information from the patient due to the lack of time constraint. This could possibly increase the quality of the care due to more detailed basis for decisions, and ultimately this could actually save lives.

The knowledge of control and privacy has through this study been extended. There was an effect of the frame of effort saving found and used practically, it will hopefully help creating better online services. The study has also found some interesting results leading to suggestions for future research that further might extend the knowledge of privacy and control which in the future hopefully will lead to the development of better online services that will be used and appreciated in the connected world.
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