

OPTING-IN OR OPTING-OUT ON THE INTERNET: DOES IT REALLY MATTER?

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Abstract

*Personal privacy has become one of the pressure points that comprises utmost primacy in the scientific community. An often debated privacy issue concerns the means of soliciting consent on the use of consumer information: **should consumers be asked to object to the use of personal data (opt-out), or should they be asked to consent to the use of such data (opt-in)?** These questions have been the center of controversy in Internet privacy for the past few years; various industry and consumer associations hold contradictory opinions on these questions. This paper integrates various theoretical perspectives that could potentially explain the difference in consumer participation between opt-in and opt-out configurations. Specifically, an experiment was conducted to observe the responses of a group of subjects under both opt-in and opt-out scenarios. In addition, we measured the privacy concerns of the subjects and examined whether these concerns could influence the effectiveness of the two registration mechanisms. Our results show that the use of opt-in and opt-out could induce different participation levels, and the disparity in participation was more substantial among the less privacy-concerned population. These findings provide valuable insights to regulatory bodies in formulating privacy policies and help Internet Web sites design proper data collection practices.*

Keywords: Internet privacy, opt-in, opt-out, privacy concern, participation, information disclosure

Introduction: Privacy Concern, Opt-in, and Opt-out

The issue of privacy is receiving unprecedented attention in Washington, D.C.—the most of any time in our 30 years with this issue.

Direct Marketing Association 1995

The rapid development of powerful computer hardware, high-performance software, and the increasing availability of fast communication links have fueled vast improvements in global information infrastructure. With the exponential growth in computing and communication technologies, an increasing amount of consumer information is being created, transmitted, and stored electronically. These have triggered concerns about the authenticity, integrity, and privacy of consumer information. In particular, an increasing number of privacy bills and public opinion polls have evidenced the mounting intensity of concern about privacy (e.g., Equifax 1992; Lacojo 1991; Miller et al. 1993; O'Harrow 1998). Consumers' apprehension concerning privacy might have resulted in as much as \$2.8 billion lost in online retail revenues in 1999 (Forrester Research 1999). This might severely impede the growth of electronic commerce; hence governments and policy makers are seeking ways to address the significant privacy concerns and ensure proper handling of consumer information on the Internet. Indeed, Mason (1986) insightfully proclaimed information privacy to be one of the most important "ethical issues of the information age."

The escalating significance of consumers' privacy concerns has spawned a contemporary area of interest. Much of the previous research has studied consumers' concerns on information privacy (Smith et al. 1996; Stewart and Segars 2002), and whether these

concerns can be alleviated by proper information policies or practices (Culnan 1993; Culnan and Armstrong 1999). However, the extant literature has not been particularly insightful on the design of operational procedures that impinge privacy protection. While it is commonly acknowledged that fair information practices are important (Culnan and Bies 2003; Federal Trade Commission 1999), it is not evident if *how* they are presented could influence consumer participation in online activities. Specifically, when a firm solicits consumer information, an interesting operational issue involves whether it should ask the consumers to *explicitly disapprove the use of their personal data* (opt-out), or to *acknowledge and permit the use of such data* (opt-in). Although these two actions may serve the same functional purpose (i.e., grant approval to the use of the supplied personal information), various regulatory and industry bodies have exhibited opposing attitudes toward them. For example, the European Union data directive (1995) requires data collectors to offer opt-in mechanisms for consumers to consent to the use of their information. By contrast, the Direct Marketing Association (DMA) recommends an opt-out procedure for consumers to remove their data from future uses. This is typically accomplished by asking consumers to uncheck some boxes on an online form, or directly call (or write) to the data collector. The policy in the United States takes no formal stand on how consumers' consent should be obtained; the most popular practice among U.S. Web sites appears to be opt-out. However, others have suggested that the opt-in approach is preferable and should be recommended (e.g., Godin and Don 1998).

Anecdotal evidence suggests that opt-in and opt-out may trigger different responses from consumers. For example, Yahoo provoked anger among its users when it adopted the opt-out procedure (Delio 2002). Vehement disagreements from the users might be easily avoided if an opt-in configuration were utilized, with appropriate notification to the users. On the other hand, it was also suggested that the opt-in configuration could be costly to the society. Johnson and Varghese (2002) empirically show that opt-in would raise the account acquisition cost and lower the profits of financial firms, and it may possibly lead to more offers being made to uninterested or unqualified consumers. In particular, they contend that an opt-in restriction on third-party data sharing could cost firms and consumers billions of dollars. Despite such an estimate, privacy advocates continue to demand opt-in, and oppose the use of opt-out procedures; many have dismissed the provision of opt-out as a sham that provides no privacy protection that does not command attention (Glasner 2002).

Clearly, the choice over opt-in and opt-out is not a trivial policy decision, and it deserves special attention. In particular, when the preferences of consumers are unclear or ambiguous, the presentation of information may lead to significant differences in their responses. Instead of a cautious recollection and calculation of their utilities, consumers may respond instantaneously to the cleverly arranged question formats. Although the popular press has fervently discussed this controversial issue, little academic research has been conducted to examine the implications of adopting these two types of procedures. Does consumer participation of online activities differ across opt-in and opt-out procedures? If so, do people who are more cognizant of their privacy make more informed decisions regardless of the procedure that is being employed? In other words, does the difference between opt-in and opt-out depend on the privacy concerns of consumers?

In this study, we conducted an online experiment to address these research questions. Specifically, we created two community Web sites to solicit consumer participation via either an opt-in or opt-out configuration, and administered a survey to measure the privacy concerns of the consumers. We found that the levels of participation were vastly different when opt-in and opt-out configurations were used, and the disparity was greater among the less privacy-concerned consumers.

Our results provide useful insights to firms and policy makers in devising and regulating data collection practices. In particular, the finding—that consumer participation under opt-in and opt-out converges when privacy concern is high—suggests that much of the debate on opt-in versus opt-out is secondary to raising the privacy concerns of consumers. Information-collecting factions can utilize our results and incorporate various design concepts (such as the customization of Web pages according to the degree of privacy concern) that may subtly attain agreeable outcomes with their major antagonist, privacy advocates.

The paper is organized as follows: The next section discusses the relevant theories that motivate our research hypotheses. The experimental design and procedures are then outlined. The data analysis and results are reported and the implications of our findings are discussed. Finally, conclusions are presented.

Theory and Hypotheses

To scrutinize the differential effects due to opt-in and opt-out, it is instrumental to consider the reaction of consumers. Several theories are relevant for this purpose. First, the norm theory of Kahneman and Miller (1986) posits that individuals may exhibit escalated affective responses to an event if the cause of the event is abnormal. In particular, an action that is performed in response to an event is often considered abnormal (compared with non-action), because it is easier for people to imagine abstaining from performing the action than to envision the outcome of performing an action that has not occurred.

A direct implication of the norm theory is that people may perceive actions as being disruptive to an otherwise regular system. Hence, they may anticipate more regret if their actions actually result in negative outcomes (Kahneman and Tversky 1982). There is a tendency for people to attribute an outcome as a consequence of an action, as compared to a non-action. To illustrate, a subject is likely to experience more regret when losses occur in buying less profitable stocks (action) than in failing to sell the less profitable stocks (omission). Because of this, they may refrain from performing actions (to minimize regret in the case of a negative outcome) to switch away from a default environment, indicating that there could be a tendency for people to be attracted to default options in social interactions. Applying this line of argument to our context, it is straightforward to expect a higher level of participation if opt-out is selected as the consent mechanism.¹

Second, the anchoring effect may also explain the difference in participation levels caused by opt-in and opt-out configurations. Anchoring occurs when a consumer is systematically influenced by random and uninformative starting points that are presented only at the time of questioning (Chapman and Johnson 1999). The existence of anchors suggests that the formation of value and belief by consumers may not be directly retrieved from memory; instead, value and belief may be dynamically constructed in response to a query (Payne et al. 1992; Sudman et al. 1996). Anchoring has also been shown to affect social judgment of the self and others (Cervone and Peake 1986). It could potentially serve as a source of bias in utility assessments (Hershey and Schoemaker 1985).

Jacowitz and Kahneman (1995) propose that an anchor may serve as a suggestion or candidate response, or perhaps a transient belief, which could influence the target value under consideration. Therefore, the presence or absence of checked options may motivate different outcomes. In the case of opt-out, presenting checked defaults may function as anchors that influence a person's judgment, and may cause overestimation of actual interest in the selected options. Conversely, presenting unchecked defaults (opt-in) may cause the person to underestimate her actual interests in the options.

Finally, it is also possible for people to select default options due to cognitive or physical laziness. Because it incurs some cost for people to read, comprehend, and then move away from the defaults (in our context, deselecting the checked options), they may simply circumvent all these phases and accept the provided arrangements.

Synthesizing the above theoretic conjectures, we posit

H1: When seeking consumers' consent to participate in online activities, opt-out will generate more positive responses than opt-in.

Note that the tendency for people to follow default suggestions may relate to the subjective importance of, or the exposure to, the associated task. Connolly and Zeelenberg (2002) suggest that prior outcomes could influence the actions performed by a person. Specifically, they posit that negative prior outcomes may induce a tendency of people to act and convert an action into a "normal" state (cf. abnormal, as originally posited by the norm theory). That is, when the prior outcome is negative, people may regret more if they do not take actions to prevent further losses should the same negative outcome reappears.² In contrast, if they did act to prevent the potential losses, even if their actions were not effective, the regret or affective feeling may be less significant.

In the online context, negative prior outcomes are often publicized by press reports that highlight the misuse of customer data, or the escalation of spam and unsolicited e-mail. Hence people who are generally more concerned about privacy may tend to associate negative outcomes with participation in online activities. That is, it is more likely for privacy-concerned consumers to study the offered options carefully, and they do not necessarily regard the default option as the "norm."

Similarly, Wilson et al. (1996) posit that the salience of anchoring may depend on the prior knowledge of the decision maker. If a person is more certain with the implications of performing an action, then the anchoring effect that is induced by default options may be weaker (Chapman and Johnson 1994). In other words, people who are more concerned and familiar about the consequence of a certain action are less susceptible to anchoring effects. Intuitively, if a person is apprehensive about the outcomes of an action (e.g., to opt-in or opt-out of online activities), then it is more likely for her to spend the time/cost to study the options carefully. It is also less likely for her to be biased by the default suggestions. Hence we posit the following moderating effect:

¹*Ceteris paribus*, if consumers choose not to perform any action and go by the default, then obviously opt-out will lead to more yes responses than opt-in.

²They might then ask themselves, "Why didn't I do something to prevent this?"

H2: The difference between opt-in and opt-out in inducing participation in online activities is moderated by the privacy concerns of consumers; the higher the privacy concern, the smaller the difference.

Methodology

Experimental Design

A controlled experiment to test the above hypotheses was designed. Specifically, two real-life community Web sites were created that allow consumers to register as members and receive news or promotions about an identical set of topics. The two Web sites are of the same nature and offer identical amenities, such as discussion boards and chat rooms, to their members.

On both Web sites, a registration page that consisted of two parts was presented to the subjects. The first part was identical across the two conditions and contained a few questions to collect some basic information about the subjects. The experimental treatment was incorporated into the second part, where we asked the subjects to consent to receiving promotions, news, and discounts from a set of topics. In one Web site, all of the topics were preselected for the subjects (**opt-out**), whereas in the other case, none was selected (**opt-in**). A snapshot of the two versions of the registration page is shown in Figures 1(a) and 1(b).

After the subjects registered with both Web sites, they were directed to another page to answer a short survey. The purpose of the survey was to measure the privacy concerns of the subjects, which were subsequently used in testing H2. We administered the survey after all the experimental responses (i.e., after the subjects have signed up for the topics) to prevent any bias due to demand effect.

Measures

The dependent variable—extent of participation in online activities (**participation**)—was constructed by summing the number of topics selected by the subjects on the registration page. To measure an individual's **privacy concern** (the moderating variable), we adopted the instrument developed by Smith et al. (1996), who constructed and tested 15 questions to assess an individual's privacy concern pertaining to the excessive collection of, error in storing or maintaining, improper access to, and unauthorized secondary use of personal information. The questions were framed in seven-point Likert scales, ranging from "strongly disagree" to "strongly agree." Appendix A shows the privacy concern questions used in this study.

Procedures and Subjects

An e-mail was sent to 60 undergraduate and postgraduate students in a large university to seek their participation in the two community Web sites. In the e-mail, the subjects were informed of the two Web sites that offered free discussion forums and community benefits. They were asked to sign up with both Web sites. Therefore, the independent variable (opt-in versus opt-out) was a within-subject factor, whereas the moderator (privacy concern) was a between-subject factor. The primary strength of using a within-subject design for the opt-in and opt-out configurations is that any observed disparity in participation levels is not susceptible to alternative elucidations related to heterogeneity in taste or individual characteristics (Hutchinson et al. 2000).

The experiment was concluded after three weeks. Altogether, 32 subjects responded and registered in both Web sites. The average age of the subjects was 24.7, and around 40 percent of them are female.

Data Analysis

Before we tested the hypotheses, we first examined the measurement properties of the 15 privacy concern items. Confirmatory factor analysis indicated that most of the items loaded onto the corresponding privacy concern dimensions.³ The reliability (measured by Cronbach's α) of the final instrument was 0.891. These indicated that the instrument adequately measured the privacy concern construct, and they are consistent with previous studies (Smith et al. 1996; Stewart and Segars 2002).

³One item pertaining to *Collection* and one pertaining to *Improper Access* were dropped, because they did not load onto the corresponding privacy concern dimensions. The confirmatory factor analysis results are reported in Appendix B.

Personal Information		
Current Email:	<input type="text"/>	
First Name:	<input type="text"/>	
Last Name:	<input type="text"/>	
Gender:	— <input type="button" value="v"/>	
Country:	United States <input type="button" value="v"/>	
ZIP/Postal Code:	<input type="text"/>	

Interests		
<input checked="" type="checkbox"/> I am interested in receiving promotions, news and discounts regarding the following interests.		
Interests:		
<input checked="" type="checkbox"/> Automotive	<input checked="" type="checkbox"/> Computers & Technology	<input checked="" type="checkbox"/> Entertainment
<input checked="" type="checkbox"/> Health	<input checked="" type="checkbox"/> Home & Family	<input checked="" type="checkbox"/> Music
<input checked="" type="checkbox"/> Personal Finance	<input checked="" type="checkbox"/> Shopping	<input checked="" type="checkbox"/> Small Business
<input checked="" type="checkbox"/> Sport & Outdoors	<input checked="" type="checkbox"/> Travel	<input checked="" type="checkbox"/> Wireless & Mobile

(a). Opt-out Registration

Personal Information		
Current Email:	<input type="text"/>	
First Name:	<input type="text"/>	
Last Name:	<input type="text"/>	
Gender:	— <input type="button" value="v"/>	
Country:	United States <input type="button" value="v"/>	
ZIP/Postal Code:	<input type="text"/>	

Interests		
<input type="checkbox"/> I am interested in receiving promotions, news and discounts regarding the following interests.		
Interests:		
<input type="checkbox"/> Automotive	<input type="checkbox"/> Computers & Technology	<input type="checkbox"/> Entertainment
<input type="checkbox"/> Health	<input type="checkbox"/> Home & Family	<input type="checkbox"/> Music
<input type="checkbox"/> Personal Finance	<input type="checkbox"/> Shopping	<input type="checkbox"/> Small Business
<input type="checkbox"/> Sport & Outdoors	<input type="checkbox"/> Travel	<input type="checkbox"/> Wireless & Mobile

(b). Opt-in Registration

Figure 1. Two Versions of the Registration Page

The responses to these items were then averaged to generate an overall privacy concern score for each subject. The mean privacy concern score was 5.844, with a standard deviation of 0.774. These values are consistent with those reported in Smith et al. (1996).⁴ Using the median score as a cutoff, we separated the subjects into two groups, one with high privacy concerns and the other with low privacy concerns. To ensure that these two groups of subjects exhibited sufficiently varied attitudes toward privacy, we performed an independent sample t-test to assess their differences in privacy concerns. The t-statistic was 7.06, with a p-value less than 0.01. Hence, we concluded that there were significant differences in privacy concerns.⁵

We performed independent sample t-tests to assess the hypotheses. H1 posits that the level of participation (i.e., the number of topics that the subjects chose) should be higher under opt-out than opt-in. To test this main effect, we computed the mean participations in the two experimental treatments, and constructed a t-statistic to assess their difference. The result shows that the responses were statistically different. On average, opt-in would reduce the number of selected topics by 2.94 (standard error = 1.12; $p < 0.02$). Clearly, the opt-out approach had led to more consumers agreeing to the use of their personal data (particularly their e-mail addresses for receiving news or promotions). Indeed, for the two community Web sites that we used, the opt-out configuration could raise around 22.6 percent more yes responses than opt-in. Therefore, H1 was supported.

H2 posits that the difference in levels of participation that are induced by opt-in and opt-out would be smaller among privacy-concerned consumers than among privacy-unconcerned consumers. That is, for people who are more concerned about information privacy, whether opt-in or opt-out is used as the interface should not affect the number of topics that they select in the registration. In contrast, we expect to see more topics being selected by unconcerned consumers if opt-out is used as the selection interface.

To test these predictions, we computed the average number of topics selected by the subjects under each of the four conditions—(1) high privacy concern, opt-out; (2) high privacy concern, opt-in; (3) low privacy concern, opt-out; and (4) low privacy concern, opt-in—and subsequently conducted pair-wise comparisons between (1) and (2), and also (3) and (4). Table 1 tabulates the mean responses in the four experimental conditions.

Evidently, the subjects selected to receive promotions on more topics in the “low privacy concern, opt-out” condition than the other three conditions, whereas the “high privacy concern, opt-in” condition received the least positive responses. For people who were more concerned about privacy, the difference in responses between opt-in and opt-out was somewhat narrow (4.11 vs. 1.95), and not statistically significant ($t = 1.44$, $p = 0.16$). By contrast, for those who were less concerned about privacy, the difference was larger (6.29 vs. 2.36) and statistically significant ($t = 2.36$, $p < 0.03$). These indicate that the use of opt-in and opt-out mechanisms in obtaining consumers’ consent may have a strong impact on the responses of people who are less worried about privacy. For people who are aware and concerned about privacy, the two designs may not make much of a difference. From Table 1, we can see that the difference in participation levels between opt-in and opt-out was approximately 55 percent smaller among the privacy-concerned individuals (compared with those who were less concerned about privacy). We conclude that H2 was also supported.

Table 1. Mean Responses

	High concern	Low concern
Opt-out	4.11 (5.54) N = 16	6.29 (5.41) N = 16
Opt-in	1.94 (3.19) N = 16	2.36 (3.10) N = 16
Average	3.02	4.32

⁴In Smith et al.’s study, the mean privacy concern of MBA students was 5.63 (standard deviation = 0.78) and that of undergraduate students was 5.56 (standard deviation = 0.83). Their numbers are strikingly similar to those reported in this paper.

⁵To ensure the robustness of our results, we also repeated all of the analyses by using the mean to classify the high and low privacy concern subjects, or selecting 20 subjects who had the highest and lowest privacy concern scores. All of the subsequent results remained unchanged in these variations.

Discussion and Implications

Based on a carefully designed field experiment, this study generates two main findings. First, consumer response to participation (receiving news or promotions from a Web site) increases if opt-out (cf. opt-in) is used as the registration mechanism. Second, this result is moderated by the privacy concerns of consumers; the difference in participation levels between opt-in and opt-out is smaller if the consumers are highly concerned about online privacy.

These results yield interesting and useful implications for policy makers in facilitating the growth of electronic commerce. According to the Harris Poll interactive survey (Taylor 2003), an increasing number of U.S. adults are becoming more sensitive to privacy and abuses of personal information. Specifically, the survey found that only 10 percent of the respondents were privacy unconcerned in April 2003 (cf. 20 percent in April 1995). The remaining 90 percent were classified as either privacy fundamentalists or pragmatists, who were interested in protecting against the misuse of their personal data. Given that the popular press and consumer associations regularly report incidents of privacy invasions, and that Web users are being gradually educated about the importance of protecting their information,⁶ it is reasonable to expect the number of privacy fundamentalists or pragmatists to increase further in the near future. According to our findings, these people are likely to scrutinize the choices that are presented to them in online transactions. Therefore, whether a firm uses opt-in or opt-out mechanisms may not create much difference. It appears that much of the opt-in or opt-out debate between online firms or trade associations (e.g., DMA) and privacy advocates may not be that important after all.

Nevertheless, from the firm's perspective, opt-out does carry a slight advantage over opt-in, because it could lead to more positive responses from unconcerned people. These people may have a lower cost of privacy invasion, and they may be more willing to experience the promotions that are subsequently generated by the firm. By using opt-out, the privacy-concerned people would study the provided options carefully and uncheck the items that they do not appreciate, which could help them minimize their privacy costs. The unconcerned population, on the other hand, may continue to follow the defaults and eventually commit transactions with the firm that were otherwise not feasible if an opt-in mechanism were utilized. Provided that these unconcerned people have low privacy costs, opt-out could potentially raise transaction efficiency and should be preferable.

Given the findings of this study, what should online firms do to solicit participation from consumers? Although opt-out is preferable, a uniform implementation of opt-out to all people may possibly invoke resentment from privacy advocates and damage the reputation of the firms.⁷ Hence an online firm should seek to identify the types of consumers before using any opt-in or opt-out configurations.

In the past, some studies have noted differing degrees of privacy concerns across different segments of the online population. For instance, it was observed that the degree of privacy concern varies with the type of Web site that a person is visiting. Consumers who visit e-commerce Web sites are more likely to read the privacy policies of the sites than those who visit other Web sites; people who visit news or e-commerce Web sites more frequently read the "About Us" pages that are published on the sites than those who do not visit such sites (Consumer WebWatch 2002). These imply that people may have dissimilar attitudes toward Web sites of different natures, and it is instructive for the "usual suspects" (in the above cases, news or e-commerce Web sites) to carefully consider whether to use an opt-in or opt-out procedure in seeking consumers' consent to participate in online activities.

The detection of the peruse of privacy statements or seals may also be employed as an estimate of a Web user's privacy concern. As defined by Cranor et al. (1999), privacy-concerned individuals (privacy fundamentalists or pragmatists) are extremely concerned about the use of their personal data, whereas privacy-unconcerned consumers are usually willing to provide data to Web sites under general conditions, and they are known to be only marginally concerned about privacy. It is, therefore, more likely for the privacy-concerned consumers to visit these privacy statements or seals as compared to the less concerned consumers. A Web site could incorporate this thinking and manipulate the use of opt-in and opt-out procedures based on the click streams of consumers.

⁶For example, the U.S. Senate Judiciary Committee publishes a booklet entitled *Know the Rules, Use the Tools*, to educate the public about various computer technologies that could be used to infringe or protect online privacy.

⁷Another minor drawback of a uniform opt-out policy is that it increases the processing cost of privacy-concerned consumers who need to spend time to clear all the default selections.

Finally, another prescriptive suggestion for Web sites to gauge the privacy attitude of consumers is to rely on the setting of browser cookies. A cookie is a small piece of text that is manipulated by Web sites to store session-related information. Currently, many Internet Web sites use cookies to identify visitors and trace their activities. This has led to significant anxiety among privacy advocates, since cookies could potentially be used for surveillance. Hence the more concerned consumers may elect to block the usage of cookies by changing the preferences in their Web browsers. According to a report published by the Consumer WebWatch (2002), among consumers who know about browser cookies, 31 percent have configured their Web browsers to reject cookies. Further, the views on privacy and credit card protection among those who accept and reject cookies differ substantially. Among those who are open to the use of cookies, 90 percent had previously provided personal information to Web sites. Among those who reject cookies, only 65 percent had done the same. These indicate that cookie setting (which is easily detectable by a Web site) may serve as an indicator of the privacy concern of consumers.

Specifically, for people who consistently block the usage of browser cookies, their privacy concerns are likely too high, because they are willing to compromise their convenience just to avoid being monitored. Based on our findings, these people are more likely to appreciate an opt-in mechanism. By contrast, it might be more difficult to gauge the privacy concerns of people who accept cookies, because even privacy-concerned individuals may opt to enable cookies to facilitate their Internet browsing experience. It is thus not obvious whether opt-in or opt-out is more preferable for this group of Internet users.

Our research also generates useful implications for researchers. First, the support of H1 shows that consumers do occasionally go for the recommended options. This indicates that the predictions made by classical decision theories continue to apply to the online context, even though it is widely acknowledged that the processing cost in the online environment is much lower (e.g., to opt-out from a Web site requires only a few mouse clicks, whereas to opt-out from a physical store may require making a few phone calls or writing and posting a letter). Similar decision theories could potentially be applied to study other online settings, such as the selection of Web-based vendors from third-party recommendation agents, or the construction and design of search engines.

Second, the significant moderation effect of privacy concerns deserves special attention from researchers. If privacy concerns could influence the way people interact with different sign-up procedures, then one could also speculate that it might affect how people interpret or consider other commonly deployed privacy solutions, such as publishing detailed policy statements or displaying trusted third-party seals. It is important for researchers to explore the psychological state of consumers related to information privacy, and understand how consumers allocate their effort, time, or attention to interact with various facilities that are posted on Web sites.

Conclusions and Future Research Directions

The primary objective of this study is to tackle the contentious debate on the use of opt-in and opt-out mechanisms in collecting consumer information. In essence, we investigated the roles that opt-in and opt-out play in affecting consumer participation, and confirmed the moderating role of privacy concerns in influencing consumers' responses. The controversy regarding opt-in and opt-out measures has been discussed extensively in recent years. However, research in this area is still at its infancy. This study represents a pioneering effort to examine this issue.

In interpreting the results of this study, it is important to recognize that we employed a group of undergraduate students whose demographics may not be representative of the general population. It would be useful for future research to extend our study to working adults or other segments of Internet users.

Further, we operationalized the extent of participation by counting the number of options that were selected by the subjects. Another possible way to study the reaction of consumers is to treat each selection as a yes-no decision, and then build a binary response model to inspect what leads to the selection of a particular option. This could help assess the impacts of both consumer-level (e.g., privacy concern, opt-in vs. opt-out) and Web site-level (e.g., the specific topics that were presented) characteristics on consumer participation. We have not been able to estimate such a response function in our study because we had a small sample. It is worthwhile for future work to employ larger samples to scrutinize the decisions of consumers.

Related to this, we included 13 topics on the registration form, which might have dissuaded some lazy consumers from changing the default options. A more accurate test of the norm theory and anchoring effect (and to separate them from the laziness explanation) might be to ask subjects to sign up for only one single topic. This might help assess the applicability of the various theoretical perspectives that we have proposed for the hypotheses.

It would also be instructive for future work to consider consumer satisfaction as another dependent measure. Although opt-out (cf. opt-in) may help a firm collect more consumer data, it might arouse dissatisfaction and in the long run hurt the reputation of the firm. It would be interesting to assess the real impact of consent mechanisms on satisfaction. Finally, we have employed a within-subject design for the opt-in/out treatment. While this helps control for the influences due to other extraneous variables, it might introduce a memory effect which tends to weaken the effect size of the treatments. It would be interesting to compare our results with a study that treats opt-in and opt-out as a between-subject factor.

Overall, the results reported in this paper provide an informative perspective regarding the configuration and design of Web sites. Hopefully, with the aid of these results and future research findings, firms and consumers can soon agree on the best practices in soliciting consents through the Internet.

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Appendix A. Privacy Concern Instrument⁸

- A. It usually bothers me when companies ask me for personal information.
- B. All the personal information in computer databases should be double checked for accuracy – no matter how much this costs.
- C. Companies should not use personal information for any purpose unless it has been authorized by the individuals who provided the information.
- D. Companies should devote more time and effort in preventing unauthorized access to personal information.
- E. When companies ask me for personal information, I sometimes think twice before providing it.
- F. Companies should take more steps to make sure that the personal information in their files is accurate.
- G. When people give personal information to a company for some reason, the company should never use the information for any other reason.
- H. Companies should have better procedures to correct errors in personal information.
- I. Computer databases that contain personal information should be protected from unauthorized access – no matter how much it costs.
- J. It bothers me to give personal information to so many companies.
- K. Companies should never sell the personal information in their computer databases to other companies.
- L. Companies should devote more time and effort to verifying the accuracy of the personal information in their databases.
- M. Companies should never share personal information with other companies unless it has been authorized by the individuals who provided the information.
- N. Companies should take more steps to make sure that unauthorized people cannot access personal information in their computers.
- O. I'm concerned that companies are collecting too much personal information about me.

⁸Table 1 from H. J. Smith, S. J. Milberg, and S. J. Burke, "Information Privacy: Measuring Individuals' Concerns about Organizational Practices," *MIS Quarterly* (20:2), 1996, p. 170. Copyright © 1996 Regents of the University of Minnesota; used with permission.

Appendix B. Results of Confirmatory Factor Analysis

Construct and Questions	Standardized Factor Loading	T-value	Composite Reliability	Average Variance Extracted (AVE)
Information Collection (IC)			0.806	0.588
IC1	0.67	5.87		
IC2	0.93	9.12		
IC3	0.67	5.87		
Unauthorized Secondary Use (U)			0.943	0.806
U1	0.93	10.03		
U2	0.94	10.16		
U3	0.94	10.12		
U4	0.77	7.42		
Errors (E)			0.934	0.780
E1	0.89	9.34		
E2	0.94	10.11		
E3	0.75	7.16		
E4	0.94	10.19		
Improper Access (IA)			0.757	0.609
SA1	0.81	7.33		
SA2	0.75	6.73		
Chi-square	158.28			
GFI	0.73			
AGFI	0.59			
RMR	0.089			
RMSEA	0.158			

