

# Privacy in E-Commerce: Examining User Scenarios and Privacy Preferences

Mark S. Ackerman  
Information and Computer  
Science  
University of California, Irvine  
Irvine, CA 92697  
ackerman@ics.uci.edu  
<http://www.ics.uci.edu/~ackerman>

Lorrie Faith Cranor  
AT&T Labs-Research  
Shannon Laboratory  
Florham Park, NJ 07932  
lorrie@research.att.com  
<http://www.research.att.com/~lorrie>

Joseph Reagle  
World Wide Web Consortium  
MIT  
Cambridge, MA 02139  
reagle@w3.org  
<http://www.w3.org/People/Reagle>

## ABSTRACT

Privacy is a necessary concern in electronic commerce. It is difficult, if not impossible, to complete a transaction without revealing some personal data – a shipping address, billing information, or product preference. Users may be unwilling to provide this necessary information or even to browse online if they believe their privacy is invaded or threatened.

Fortunately, there are technologies to help users protect their privacy. P3P (Platform for Privacy Preferences Project) from the World Wide Web Consortium is one such technology. However, there is a need to know more about the range of user concerns and preferences about privacy in order to build usable and effective interface mechanisms for P3P and other privacy technologies. Accordingly, we conducted a survey of 381 U.S. Net users, detailing a range of commerce scenarios and examining the participants' concerns and preferences about privacy. This paper presents both the findings from that study as well as their design implications.

## Keywords

Privacy, World Wide Web, electronic commerce, user survey, Platform for Privacy Preferences, privacy protocols.

## 1. INTRODUCTION

People are concerned about privacy, particularly on the Internet. Nearly everyday, a news organization reports a potential privacy violation on the Net.

Over the past decade, numerous surveys conducted around the world have found consistently high levels of concern about privacy (e.g., Westin 1991, 1994). The more recent studies have found that this concern is as prevalent in the online environment as it is for physical-world interactions. For example, Westin (1998) found 81% of Net users are concerned about threats to their privacy while online. While many studies have measured

the magnitude of privacy concerns, it is still critical to study the concern in detail, especially for the online environment. As Hine and Eve (1998) point out:

Despite this wide range of interests in privacy as a topic, we have little idea of the ways in which people in their ordinary lives conceive of privacy and their reactions to the collection and use of personal information (Hine and Eve 1998, 253)

In this paper, we report on the details of online privacy concerns based on a survey of 381 Internet users from the U.S. This work attempts to look beyond the fact that people are concerned in order to understand what aspects of the problem they are most concerned about. We are primarily concerned with potential disclosures of personal data in online situations, particularly in E-commerce or other Web-based transactions. We believe our findings can inform both Internet policy as well as the development of technology tools to assist Internet users in protecting their privacy.

This analysis should be helpful to ongoing privacy activities for the Web. Efforts such as the World Wide Web Consortium's Platform for Privacy Preferences (P3P) specification and self-regulatory efforts such as TRUSTe and BBBOnline make numerous assumptions about how users perceive privacy. The P3P specification will lead to interoperable client and service programs that represent site privacy practices in ways that can be understood and processed automatically on behalf of the user (Reagle and Cranor 1999). Trust label programs promote guidelines about privacy disclosures and associate a trusted and branded icon with sites that follow those guidelines (Benassi 1999). A better understanding of privacy concerns will lead to designs that best meet users' needs.

We begin by describing the survey and sample population. We then report the findings from the survey analysis. This is divided into two sections, the first analyzing the respondents' general attitudes about online privacy and the second analyzing attitudes about specific current and anticipated online information practices. We then discuss some technical implications of our findings.

## 2. SURVEY METHODOLOGY

### 2.1. Survey development

During the summer of 1998 we developed a series of survey questions designed to provide insight into Internet users'

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, to republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.  
E-COMMERCE '99, Denver, Colorado  
©1999 ACM 1-58113-176-3/99/0011..\$5.00

attitudes about privacy. We were interested in several privacy issues:

- We wanted to know the sensitivity of particular privacy practices. In particular, we wanted to gain an understanding that would inform the development of P3P user agents and vocabulary (or any other privacy labeling protocol). We looked for the reasons behind the respondents' sensitivities through open-ended questions in addition to standard-form survey questions.
- We wanted to know how people would respond to situations where personal information is collected. In our pre-study, we determined that it was important to ask participants about their concerns through specific online scenarios. Again, in addition to the closed form survey questions, we also asked for their reasoning through open-ended questions.
- We wanted to determine participants' general attitudes and demographics. We largely used questions that had appeared on other surveys so we could match our sample against others.

We developed our survey and pre-tested it with non-technical employees and summer students at AT&T Labs, as well as with two classes at Harvard and MIT.

## 2.2. Sample characteristics and response

Prospective survey participants were selected from the Digital Research, Inc. (DRI) Family Panel. The DRI Family Panel is a group of Internet users that evaluates products and responds to surveys for *FamilyPC* magazine. Approximately one-third of the panel members are *FamilyPC* subscribers, and most of the panel members who are not subscribers joined the panel after visiting the FamilyPC Web site.

Invitations to complete a Web-based survey were emailed to 1,500 Family Panel members (selected randomly, but weighted so that approximately 20% were sent to members outside the US), resulting in 523 surveys completed in November 1998 – a response rate of 35%.

Out of the total sample, 405 completed surveys were from the United States, 88 were from Canada, and 30 were from other countries. We report on only the United States participants here. We eliminated surveys from respondents who did not answer at least two of our demographic questions, leaving us with 381 respondents in our US sample.

We did not obtain a statistically representative sample of United States citizens. However, our sample holds similar attitudes about privacy as the 460 Internet users in Westin's April 1998 sample, with our sample tending towards slightly more concern about privacy. For example, 87% of our US sample and 81% of the Net users in Westin's sample were somewhat or very concerned about threats to their personal privacy while online.

Our US sample differed from a nationally representative sample in some demographic areas. Most significantly our sample was more educated and had more Internet experience than nationally representative samples of Internet users, such as Westin's April 1998 sample or the IntelliQuest third-quarter 1998 sample. While 37% of Westin's sample and 36% of the IntelliQuest sample reportedly held college and/or postgraduate degrees, 48% of our sample reported such degrees. Furthermore 77% of our sample reported that they make online purchases compared

with 23% of Westin's sample and 20% of the IntelliQuest sample. Finally, fifty-one percent of our sample reported household incomes greater than \$50,000, compared to 43% of Westin's sample and 55% of the IntelliQuest sample. The higher education and income levels coupled with increased number of online purchasers in our sample is consistent with Westin's (1998, 40) finding that online purchasers are more educated and affluent than other members of the public. The demographic and attitudinal differences between our US sample and the Net users in Westin's April 1998 sample are more fully described in Cranor, Reagle, and Ackerman (1999).

Our sample is certainly not statistically representative of US Internet users. Our users are heavy Internet users – 65% report using the Internet several times a day – and quite possibly lead innovators. Our belief that these respondents were lead users is based on the above statistics, their self-selection in an opinion-formation group, and much of our qualitative data. As such, we believe that this sample is important for understanding the future Internet user population. As more people start using the Internet and gaining experience with email, the World Wide Web, and electronic commerce, we would expect their attitudes about privacy, if not their online behavior, to more closely match those of our sample.

In the following sections, we present the findings from our survey. We have separated this analysis into two sections, the respondents' general attitudes about privacy and their attitudes about current and anticipated online practices. We present each in turn.

## 3. GENERAL ATTITUDES ABOUT ONLINE PRIVACY

Overall, our respondents registered a high level of concern about privacy in general and on the Internet. Only 13% of respondents reported they were "not very" or "not at all" concerned. Nonetheless, while the vast majority of our respondents were concerned about privacy, their reactions to scenarios involving online data collection were extremely varied. Some reported that they would rarely be willing to provide personal data online, others showed some willingness to provide data depending on the situation, and others were quite willing to provide data – regardless of whether or not they reported a high level of concern about privacy. Thus it seems unlikely that a one-size-fits all approach to online privacy is likely to succeed.

In order to understand our respondents' attitudes, we used standard multivariate clustering techniques (SAS' partitioning clustering) to group our respondents. We found three clusters, similar to the clusters Westin (1991) found in his privacy survey results. Based on general attitudes about privacy as well as their responses to specific scenarios, the clustering methods classified 17% of our respondents as **privacy fundamentalists**, 56% as members of the **pragmatic majority**, and 27% as **marginally concerned**. We will present each group more fully as we discuss their data below, but some general characteristics are important to note.

- The privacy fundamentalists were extremely concerned about any use of their data and generally unwilling to provide their data to Web sites, even when privacy protection measures were in place. They were twice as likely as the other groups to report having been a victim of an invasion of privacy on the Internet. About a third of the fundamentalists refused to answer our survey question

about their household income (as compared with 14% of the pragmatists and 3% of the marginally concerned).

- The pragmatists were also concerned about data use, but less so than the fundamentalists. They often had specific concerns and particular tactics for addressing them. For example, the concerns of pragmatists were often significantly reduced by the presence of privacy protection measures such as privacy laws or privacy policies on Web sites.
- The marginally concerned were generally willing to provide data to Web sites under almost any condition, although they often expressed a mild general concern about privacy. Nonetheless, under some conditions, the marginally concerned seemed to value their privacy. For example, they highly rated the ability to have themselves removed from marketing mailing lists.

### 3.1. Demographic differences

Westin (1998) and others have found demographic differences, although weak, among groups with different levels of concern about online privacy. For example, Westin found that 87% of female Internet users were very concerned about threats to their personal privacy while only 76% of male Internet users were very concerned. Furthermore, he found that women registered higher levels of concern on every privacy-related issue about which they were questioned. Although we found no statistically significant differences based on gender or other demographics within our sample, the trends in our data were consistent with Westin's findings.

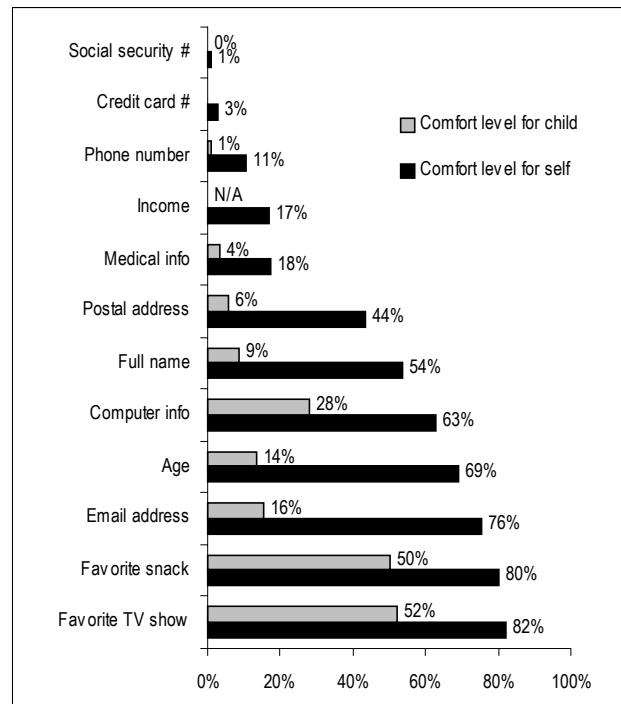
## 4. ATTITUDES ABOUT INFORMATION PRACTICES

Our survey included 14 questions that explored four different scenarios in which the user was asked to provide personal information to Web sites. We asked our respondents whether they would type in the requested information in each situation. We also asked our respondents how comfortable they generally feel providing each of 12 specific pieces of information to Web sites, and we asked for feedback on tools for protecting online privacy. We detail the findings from those questions and scenarios below.

### 4.1. Sensitivity about personal data

An important consideration for online privacy technologies is to distinguish among differing types of personal data. As mentioned above, we asked respondents how comfortable they feel providing each of 12 specific pieces of information to Web sites. We also asked them how comfortable they would be if a child in their care between the ages of 8 and 12 were asked to provide this information.

Not all data is the same. We found significant differences in comfort level across the various types of information. Not surprisingly, the vast majority of respondents said they were always or usually comfortable providing information about their own preferences, including favorite television show (82%) and favorite snack food (80%). A large number also said they were always or usually comfortable providing their email address (76%), age (69%), or information about their computer (63%). About half said they were always or usually comfortable providing their full name (54%) or their postal address (44%). Few said they were always or usually comfortable providing



**Figure 1: Respondents who are always or usually comfortable providing information**

information about their health (18%), income (17%), or phone number (11%). None of the respondents said they were always comfortable providing their credit card number or social security number, and only a very small number said they would usually feel comfortable providing credit card number (3%) or social security number (1%).

Respondents were consistently less comfortable allowing a child to provide each of these types of information than they would be providing it themselves, with the biggest differences reported in the number of respondents who said they were always or usually comfortable with a child providing email address (16%) and age (14%) (all pairwise t-tests  $p < .001$ ).

While each of our clusters reported different levels of comfort, the relative sensitivity to each type of data was consistent across clusters. That is, the members of each cluster held similar views about which types of data were the most and least sensitive.

It is interesting to note the differences in sensitivity to seemingly similar kinds of data. For example, while postal mail address, phone number, and email address can all be used to contact someone, most of our respondents said they would never or rarely feel comfortable providing their phone number but would usually or always feel comfortable providing their email address. The comfort level for postal mail address fell somewhere in between. We suspect this may have to do with different levels of annoyance related to unsolicited communications in each medium as well as the availability of coping strategies to deal with this annoyance (Culnan 1993). For example, Westin (1991) found people were much more likely to describe marketing solicitations as an invasion of privacy when the solicitation was conducted via phone calls than when it was conducted via postal mail.

It is also possible that awareness of problems associated with divulging different types of information may affect the level of concern. Publicity surrounding identity theft and credit card fraud may have raised awareness about the dangers of social security numbers and credit card numbers falling into the wrong hands. But there has been less publicity about the dangers associated with disclosure of medical records. This may account for the fact that the concern reported about credit cards and social security numbers is significantly higher than that for medical records – which could be argued to be just as sensitive.

## 4.2. Factors in information disclosure

Web site privacy policies include a wide range of privacy practice details. A number of efforts have tried to find ways of highlighting critical points of these policies for users. For example, initially the TRUSTe privacy seal program offered three seals that varied according to policies on sharing information with other parties. The P3P specification includes a vocabulary for encoding these practices in a standard way. Even so, it is unclear how to best (1) display these practices in a way that users can quickly evaluate the practices and (2) design a user interface that permits users to configure an automated tool for evaluating those practices. Consequently, we asked respondents "If you could configure your Web browser to look for privacy policies and privacy seals of approval on Web sites and let you know when you were visiting a site whose privacy practices might not be acceptable to you, which criteria would be most important to you?" We also asked respondents to rate each of 10 criteria as very important, somewhat important, or not important.

Our respondents rated the sharing of their information with other companies and organizations as the most important factor. Ninety-six percent of respondents said this factor was very or somewhat important, including 79% who said it was very important.

Three other criteria emerged as highly important factors (and were not distinguishable from one another statistically): (1) whether information is used in an identifiable way, (2) the kind of information collected, and (3) the purpose for which the information is collected. All of these criteria were rated as very important by at least 69% of respondents and had the same level of importance statistically.

These top criteria are consistent with the findings of other surveys. For example, the GVVU survey (1998) asked respondents about seven factors that might influence whether they would give demographic information to a Web site. The factors most often selected by respondents were "if a statement was provided regarding how the information was going to be used," "if a statement was provided regarding what information was being collected," and "if the data would only be used in aggregate form." Providing data in exchange for access to Web pages, product discounts, value-added service, or other terms and conditions were less popular options. The top reason respondents gave for not filling out online registration forms at sites was "information is not provided on how the data is going to be used."

We found three additional criteria that were also very important factors: (1) whether a site is run by a trusted company or organization, (2) whether a site will allow people to find out what information about them is stored in their databases, and (3)

whether the site will remove someone from their mailing lists upon request. These criteria, grouped together statistically, were rated as very important by at least 62% of respondents. Interestingly, while none of these criteria were among the top factors for our privacy fundamentalist or pragmatic majority clusters, whether the site will remove someone from their mailing lists upon request was the most important factor for our marginally concerned cluster.

The remaining three criteria were rated as important, but considerably less so than the other factors. Fewer people considered the following factors to be very important: whether a site posts a privacy policy (49%), whether a site has a privacy seal of approval (39%) and whether a site discloses a data retention policy (32%). These three factors were the least important factors for all three clusters of respondents.

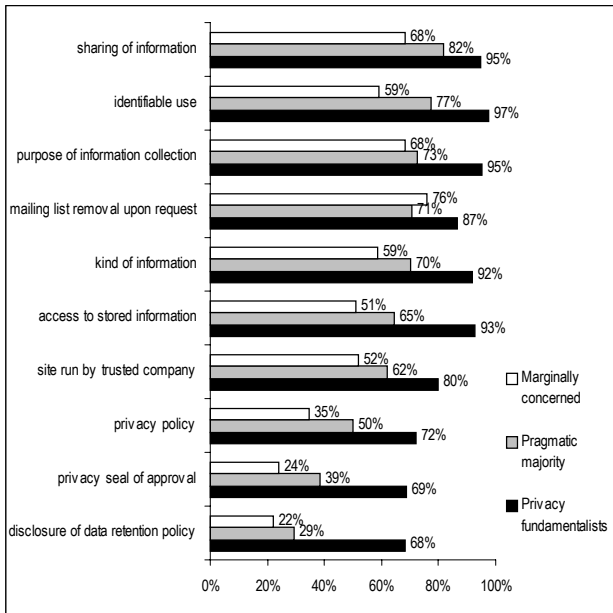
The lack of enthusiasm for knowing whether or not a site posts a privacy policy suggests that it is not enough for people to know *whether* a privacy policy is present – it is more important to know what the policy states. The lack of interest in knowing whether a site has a privacy seal of approval may be indicative of a lack of understanding of privacy seal programs.

The lack of concern for knowing whether a site discloses a data retention policy appears to be due to a distrust that companies will actually remove people from their databases and a belief that it will be impossible to remove information from all the databases it may have propagated to. Typical comments from our respondents were skeptical: "It doesn't take long for this information to get spread around and a lot of this might have already been done," "too late: the damage would already be done," "who knows where they would sell my address to in the mean time," "once you get on a mailing list, you're on many mailing lists," and "maybe they wouldn't take me off. How would I know?"

Likewise, one of our scenario questions asked respondents whether they would be more or less likely to provide data to a Web site if it had a privacy policy that explained that their information would be removed from the site's database if they did not return to the site for three months. Seventy-eight percent of respondents said that such a retention policy would not influence them in any way. Five percent said they would be less likely to provide information in that case (their comments suggested they viewed having their information removed from the database as an inconvenience should they return to the site after three months). Seventeen percent said that such a retention policy would make them more likely to provide information. However, other factors such as the existence of privacy policies, privacy seals, and privacy laws appeared to be much more influential than retention policies (all  $p < .001$ ).

## 4.3. Identification and information release

Two scenarios further examined the role of identifiability in respondents' willingness to release personal information. Each scenario began with a situation in which a Web site requested only information that was not personally identifiable. The second part of the scenarios described the same situation, but this time the Web site also asked for personally identifiable information. For both scenarios, respondents were much less willing to provide information when personally identifiable information was requested.



**Figure 2: Respondents who consider a factor very important**

In a scenario involving a banking Web site, 58% of respondents said they would provide information about their income, investments, and investment goals in order to receive customized investment advice. However only 35% said they would also supply their name and address so that they could receive an investment guide booklet by mail ( $t = -9.75, p < .001$ ).

In a scenario about a news, weather, and sports Web site, 84% of respondents said they would provide their zip code and answer questions about their interests in order to receive customized information. But only 49% said they would provide information if they were also required to provide their name ( $t = -17.05, p < .001$ ).

#### 4.4. Concerns about persistent identifiers

We also examined respondents' concerns about their online activities being tracked over time. This can be accomplished using persistent identifiers, referred to as *cookies*, stored on a user's computer. When asked about Web cookies, 52% of our respondents indicated they were concerned about them (and another 12% said they were uncertain about what a cookie is). Of those who knew what cookies were, 56% said they had changed their cookie settings to something other than accepting all cookies without warning.

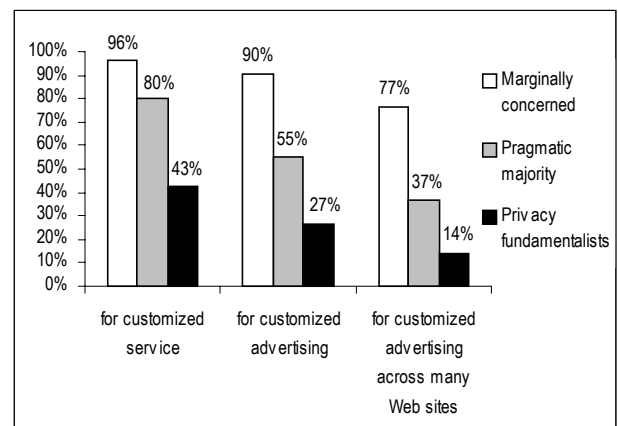
Comments to our free response questions suggest considerable confusion about cookies among our respondents. For example many respondents seemed to believe that cookies could cause identifying information about them to be sent automatically to Web sites. One respondent wrote, "cookies can determine my identity from visiting the site," and another wrote "I may have a false sense of security but I understand that as long as I accept 'no cookies' the site managers cannot access my email address and other personal information." Others understood that cookies need not be used to extract personal information from them, but

did not seem to understand that cookies could be used to track their behavior. One respondent wrote, "A cookie can only provide information I have already given, so what is the harm?" Still another was simply confused: "I am not quite sure what cookie is, but I have an idea."

The survey also included three scenario questions in which we described the use of persistent user identification numbers that browsers could automatically send back to Web sites on return visits. While the behavior we described could be implemented using cookies, we did not refer to cookies in these questions. In a scenario in which a site uses a persistent identifier to provide a customized service, 78% of respondents said they would definitely or probably agree to the site assigning them such an identifier. When we indicated the identifier would be used to provide customized advertising, 60% of respondents said they would definitely or probably agree to the site assigning them an identifier ( $t = -9.40, p < .001$ ). But when we indicated that the identifier would be used to provide customized advertising across many Web sites, only 44% of respondents said they would definitely or probably agree to using such an identifier ( $t = -14.47, p < .001$ ). We found similar trends across all three clusters of respondents, although the magnitude of the concern differed (see figure 3). Thus it appears that most of our respondents are not opposed to the use of persistent identifiers or state management mechanisms such as cookies; however, many have misconceptions about these technologies and concerns about some of their uses.

#### 4.5. Unsolicited communications

On several questions, respondents displayed a desire not to receive unsolicited communications resulting from the provision of information to Web sites. For example, after describing a scenario in which a Web site would offer visitors free pamphlets and coupons, we asked respondents whether they would be more or less likely to provide information to the same Web site with a new condition. Specifically we described a site that had a privacy policy that permitted the site to send periodic updates on products *and* to share identifiable information with other companies that sold products of potential interest. Sixty-one percent of respondents who said they would provide their information to receive pamphlets and coupons said they would be less likely to provide that information if it would be shared for future marketing. However, nearly half of those respondents



**Figure 3: Respondents who would probably or definitely agree to a site assigning persistent identifier**

said they would be more likely to provide the information if the site offered a way to get off their mailing list in the future.

The reasons for this were obvious in the written comments. As one respondent noted, "I already get too much junk mail." Others expressed concerns about unsolicited marketing: "I would not want to have telemarketers, email messages, direct mail, etc. coming as I get too much of that anyway." and "I don't mind receiving literature that I request, but I DO NOT like to receive unsolicited mail, e-mail or phone calls."

While respondents indicated a clear dislike for unsolicited communications, they were less concerned (but not unconcerned) about unsolicited email. As discussed earlier, respondents were more comfortable providing their email address than they were their postal address or their phone number. Furthermore, they expressed less concern about unsolicited email and about Web sites collecting email addresses for marketing lists than they did about Web sites collecting personal information from children, or someone tracking what Web sites people visit and using that information improperly.

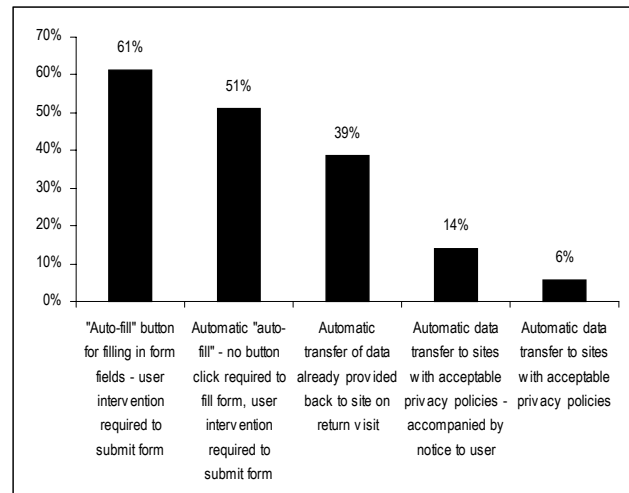
#### 4.6. Automatic data transfer

In the survey, we also described a number of browser features that would make it easier to provide information to Web sites and asked respondents which features they would use. We found that while our respondents said they were interested in tools that make using the Web more convenient, most do not want these tools to transfer information about them to Web sites automatically.

The most popular feature we described was an "auto-fill" button that users could click on their browsers to have information they had already provided to another Web site automatically filled in to the appropriate fields in a Web form. Sixty-one percent of our respondents said they would be interested in such a feature, while 51% said they would be interested in a similar feature that would automatically fill out forms at sites that have the same privacy policies as other sites the user had provided information to (no button click would be necessary to activate the auto-fill). Both of these features would require a user to click a submit button before any information was actually transferred to a Web site. Thirty-nine percent of respondents said they would be interested in a feature that automatically sent information they had provided to a Web site back on a return visit.

However, there was little interest in two features that would automatically send information to Web sites without any user intervention: a feature that notified the user that it had sent the information was of interest to 14% of respondents, and a feature that provided no indication that it had transferred data was of interest to only 6%. Thus 86% of our respondents reported no interest in features that would automatically transfer their data to Web sites without any user intervention.

Respondents in our privacy fundamentalist cluster had much less interest in any of the described features than the members of the other clusters – only about one-fourth of the privacy fundamentalists were interested in any of the features. However, even the marginally concerned cluster members had little interest in features that would automatically transfer their data to Web sites without any user intervention – only 12% of the marginally concerned were interested in a feature that transferred data without notification.



**Figure 4: Respondents who would use proposed browser features**

These findings are consistent with other surveys that found Web users value privacy over convenience. For example, on the GVV survey (1998) 78% of respondents said privacy is more important to them than convenience. Our results show how this concern plays out over specific technical features.

Our respondents provided strong comments about automatic data transfer. A large number of respondents made comments about wanting to remain in control over their information and stating that they had no desire for automatic data transfer. Some respondents were concerned with the perils of automatic data transfer in general. For example, one respondent noted that "I want to be in charge of all information sent to other companies. Just because they are similar, doesn't mean I [want] my information shared with them." Another noted the need for updating personal information: "To be able to update or correct the previous info is a good thing." However, most comments revolved around the respondents' desire to maintain control of the process. For example: "Auto[matic] features save time. ...However, I do like to know when information about me is being transmitted," "I want to be in control of what is done. This way I know what was done," and "I don't want anything sent automatically. I want to check out everything I am applying for."

### 5. DESIGN IMPLICATIONS

As the software engineering community attempts to implement P3P or similar privacy protocols, one of the major issues will be the design of easy-to-use systems for end-users. Users would likely benefit from systems that assist them in identifying situations where a site's privacy practices is counter to their interest. As well, users would likely benefit from systems that help in reaching agreement and then in exchanging data when the agreement is acceptable.

However, a user interface must not only present an extremely complex information and decision space, it must do so seamlessly and without a distracting interface (Ackerman and Cranor 1999). A matrix-style user interface for private information over each of P3P's ten dimensions would be overwhelming for most users. However, properly designed and abstracted interfaces or borrowed settings (Cranor and Reagle 1997) may help.

One of our goals for this survey was to investigate consumer-driven design issues in privacy protocols and their user clients. We found several items of interest in considering the feasibility of P3P or any other privacy protocol:

- It seems unlikely that a one-size-fits-all approach to online privacy will work. There are critical differences among the privacy fundamentalists, the pragmatic majority, and the marginally concerned clusters in how they perceive disclosures of personal data, information practices, and technical possibilities.
- The cluster of privacy fundamentalists and marginally concerned may find extremely simplified interfaces to be adequate for their purposes. For example, a privacy fundamentalist may only want to release information under a small number of circumstances, such as when sites use information only for completing a purchasing transaction. A marginally concerned user would only need to specify those few (already constrained) instances in which she would not permit information collection practices. However, the pragmatists (who are the majority of users) will require more sophisticated and varied interface mechanisms to be most at ease. This cluster of users employs many strategies across a wide range of finely weighed situations. It is unlikely that a highly simplified interface will satisfy them.
- Automatic transfer of data and computerized negotiations with sites are unlikely to be interesting to most consumers.
- Designers should permit users to have differing views of – or ways of looking at – their information. For instance, while it makes sense to include phone number in a contact information category, our respondents considered it to be more sensitive than postal information. Consequently, a user should be able to enter contact information on one page, but be able to drag those pieces of information to different sensitivity buckets or to simply manipulate information as grouped by sensitivity.
- Additional augmentative assistance to consumers will be useful. Many of our respondents expressed confusion over potential risks and rewards for their dissemination of personal information. Having agents that help users (e.g., that provide warnings based on third-party databases of rogue sites) could well be helpful instead of placing the full burden on users themselves.
- Finally, technical mechanisms clearly have limitations. Our respondents were very aware (and vocal) about these limitations.

## 6. LIMITATIONS AND FUTURE WORK

What do our results say to those concerned with privacy in E-commerce? In the previous sections, we presented findings about the respondents' attitudes about current information practices. We found a number of "hot" issues, such as whether they can be identified and the sensitivity of the data items to the individual. We also found a number of important differences in how our privacy clusters (privacy fundamentalists, privacy pragmatics, and privacy unconcerned) weighed these criteria. We also presented findings suggesting that there are some surprising similarities: People do not like unsolicited communications, they can be tolerant of persistent identifiers,

and they dislike automatic transfer, although the degree of preference varies among the respondent clusters.

These results do permit us to compare assumptions made about Internet users' approaches to privacy with the responses of actual users. For instance, present day US public policy does make a distinction between children and adults, and this seems well founded on the basis of our results. We also found that our respondents cared a great deal about the perceived trustworthiness of the data collecting organization, the purpose of the data collection, and its redistribution policies. Proposed privacy solutions need to squarely address each of these topics.

We would also echo Hine and Eve's concluding remarks:

Our research showed that, in the absence of straightforward explanations on the purposes of data collection, people were able to produce their own versions of the organization's motivation that were unlikely to be favorable. Clear and readily available explanations might alleviate some of the unfavorable speculation (Hine and Eve 1998, 261).

Seemingly, much of the discomfort with the Web today results from not knowing, or not trusting the information practices of a site. If we wish to raise the comfort level, we must ensure users are informed and can trust whatever policies are disclosed.

Several important caveats and considerations remain. We must caution that people's self-reported preferences often do not match their real world behavior (Turner and Martin 1984). Indeed, we found notable mismatches in our results. For example, while 39% of respondents said they are very concerned about online privacy, only half the members of that group were classified as privacy fundamentalists based on their responses to our scenario questions. Second, design or policy making based solely on survey results can be described as *self-deprecating*: if the standard of what constitutes reasonable privacy is based on people's expectations, the standard and expectations are mutually influencing, resulting in a downward trend. This meltdown was reflected in some pre-study interviews: Students felt concern would only be frustrating or futile, since they felt they had few choices. Finally, we must also acknowledge that even though we have concentrated on technical issues here, an eventual privacy solution might rely upon elements of legal, self-regulatory, and technical approaches to the problem.

Nonetheless, we believe that present day E-commerce and privacy technologies and policies can only improve with more concrete data about users' actual attitudes and expectations of online privacy – if for no other reason to understand the ways in which people's expectations change over time.

## 7. ACKNOWLEDGMENTS

We would like to thank the members of the P3P Working Groups and our other colleagues for their ideas about privacy and privacy technologies. We would like to thank especially Rebecca Grant, Bonnie Nardi, and Steve Greenspan for pointing us towards relevant literature and reviewing preliminary drafts of our survey instrument. We would also like to thank Parni Dasu for her assistance with cluster analysis, Bob Cuzner and Bob Domine at DRI, Robin Raskin at *FamilyPC*, Roger Clarke for maintaining an online reference list of privacy surveys (<http://www.anu.edu.au/people/Roger.Clarke/DV/Surveys.html>), and the students and professors at Harvard and MIT who helped

pre-test our survey instrument. Finally, would like to thank AT&T Labs-Research for its generous support of this survey.

## 8. REFERENCES

- Ackerman, Mark S. and Lorrie F. Cranor (1999). Privacy Critics: UI Components to Safeguard Users' Privacy. *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI'99)*, short papers (v.2.), 258-259.
- Benassi, Paola. TRUSTe: an online privacy seal program (1999). *Communications of the ACM* 42(2):56-59.
- Cranor, Lorrie F. and Joseph Reagle (1998). Designing a Social Protocol: Lessons Learned from the Platform for Privacy Preferences Project. In Jeffrey K. MacKie-Mason and David Waterman, eds., *Telephony, the Internet, and the Media*. Mahwah: Lawrence Erlbaum Associates.
- Cranor, Lorrie F., Joseph Reagle, and Mark S. Ackerman (1999). Beyond Concern: Understanding Net Users' Attitudes about Online Privacy. AT&T Labs-Research technical report TR 99.4.3. <http://www.research.att.com/library/trs/TRs/99/99.4>.
- Culnan, Mary J. (1993). "How did they get my name?": an exploratory investigation of consumer attitudes toward secondary information use. *MIS Quarterly* 17: 341-364.
- Georgia Tech Graphics, Visualization & Usability Center (1998). GVU's 10th WWW User Survey. [http://www.gvu.gatech.edu/user\\_surveys](http://www.gvu.gatech.edu/user_surveys)
- Hine, Christine and Juliet Eve (1998). Privacy in the marketplace. *The Information Society* 14(4):253-262.
- Milne, George R. and Maria-Eugenia Boza (1998). *Trust and Concern in Consumers' Perceptions of Marketing Information Management Practices*. Marketing Science Institute Working Paper Report No. 98-117.
- Pew Research Center for the People & the Press (1999). *Online Newcomers More Middle-Brow, Less Work-Oriented : The Internet News Audience Goes Ordinary*. <http://www.peoplepress.org/tech98sum.htm>
- Raab, Charles D. and Colin J. Bennett (1998). The Distribution of Privacy Risks: Who Needs Protection? *The Information Society* 14(4):253-262.
- Reagle, Joseph and Lorrie Faith Cranor (1999). The platform for privacy preferences. *Communications of the ACM* 42(2):48-55.
- Turner, Charles, and Elizabeth Martin, ed. (1984). *Surveying Subjective Phenomena*. New York: Russell Sage Foundation.
- Westin, Alan F. (1991). *Harris-Equifax Consumer Privacy Survey 1991*. Atlanta, GA: Equifax Inc.
- Westin, Alan F. (1994). *Equifax-Harris Consumer Privacy Survey 1994*. Atlanta, GA: Equifax Inc.
- Westin, Alan F. (1996). *The 1996 Equifax-Harris Consumer Privacy Survey*. Atlanta, GA: Equifax Inc.
- Westin, Alan F. (1998). *E-commerce & Privacy: What Net Users Want*. Hackensack, NJ: Privacy & American Business.