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The Watcher and the Watched: Social Judgments About Privacy in a Public Place

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Abstract

Digitally capturing and displaying real-time images of people in public places raises concerns for individual privacy. Applying principles of Value Sensitive

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Design, we conducted two studies of people's social judgments about this topic. In Study I, 750 people were surveyed as they walked through a public plaza that was being captured by a HDTV camera and displayed in real-time in the office of a building overlooking the plaza. In Study II, 120 individuals were interviewed about the same topic. Moreover, Study II controlled for whether the participant was a direct stakeholder of the technology (inside the office watching people on the HDTV large-plasma display window) or an indirect stakeholder (being watched in the public venue). Taking both studies together, results showed the following: (a) the majority of participants upheld some modicum of privacy in public; (b) people's privacy judgments were not a one-dimensional construct, but often involved considerations based on physical harm, psychological wellbeing, and informed consent; and (c) more women than men expressed concerns about the installation, and, unlike the men, equally brought forward their concerns whether they were The Watcher or The Watched.

1. INTRODUCTION

Few would disagree that privacy represents an enduring human value and in some form should be protected in private contexts, such as the home. Some measure of privacy also exists in public places. For example, before the advent of digital information systems, in a city, relatively few people knew when or where you went shopping or what you bought, even though the activity occurred in public purview. Yet such forms of privacy can be undermined by the technological capture and display of people's images.

In the United States, a version of this problem surfaced as far back as the late 1800s with the introduction of photographic equipment. For example, Warren and Brandeis (1985) wrote in 1890 that although in earlier times

> the state of the photographic art was such that one's picture could seldom be taken without his consciously "sitting" for the purpose, the law of contract or of trust might afford the prudent man sufficient safeguards against the improper circulation of his portrait; but since the latest advances in photographic art have rendered it possible to take pictures surreptitiously, the doctrines of contract and of trust are inadequate to support the required protection. (p. 179)

Warren and Brandeis argued that "the protection granted by the law must be placed upon a broader foundation" (p. 179).

With today's technologies—such as surveillance cameras, Web cams, and ubiquitous sensing devices—there is all the more cause to be concerned about privacy in public places (Nissenbaum, 1998).

In the human–computer interaction and computer-supported cooperative work communities, researchers have partly explored this topic through real-time video collected in one part of a work environment and displayed in another. Some studies have involved "office-to-office" video connections on desktop systems (Adler & Henderson, 1994; Dourish, Adler, Bellotti, & Henderson, 1996; Dourish & Bly, 1992; Mantei et al., 1991; Root, 1988; Tang & Rua, 1994). Other studies have involved linking common rooms in research organizations by video (Fish, Kraut, & Chalfonte, 1990; Jancke, Venolia, Grudin, Cadiz, & Gupta, 2001; Olson & Bly, 1991). For example, Jancke et al. (2001) linked three kitchen areas within a workplace by means of video cameras and semipublic displays. Unsolicited responses to their announcement about this proposed application alerted the researchers to privacy concerns. Despite the addition of an Off switch, roughly 20% of the individuals continued to voice concerns about privacy throughout the system's deployment.

As telecommuting became popular, researchers moved from linking offices within the workplace to linking home offices with workplace offices. Hudson and Smith (1996) spoke to resulting privacy issues that can ensue:

> The home is often thought of as a protected and private space and part of the advantage of working at home is being able to operate in that more relaxed and informal setting. For example … home work spaces are often shared by family members who are not part of the work group and who have important expectations of privacy in their home. … Turning an otherwise private physical space into part of a very public virtual space (e.g., with a live video feed) is really not acceptable. On the other hand, working at home can easily cut one off from the rest of a (distributed or co-located) work group if no awareness support is provided. (p. 250)

Hudson and Smith offered various technical solutions, such as the blurring of the video images so that people's presence could be noticed but not their specific activities (see also Boyle, Edwards, & Greenberg, 2000).

More recently, researchers have begun to investigate real-time images and video within home environments in and of themselves. Junestrand, Tollmar, Lenman, and Thuresson (2000), for example, presented a scenario using comTABLE, a video screen and camera in the kitchen that would allow a virtual guest to come to dinner through video-mediated communication. Elsewhere, Hutchinson et al. (2003) described a videoProbe that provided a simple method for sharing impromptu still images among family members living in different households. The images were displayed on a screen that could be mounted on the wall or sit on a desk, much like a picture frame. "Images fade over time and eventually disappear, to encourage families to create new ones" (p. 21).

In all of the aforementioned contexts, people are largely known to one another; people have reasons to be seen by others; and the nature of the interaction is largely reciprocal (e.g., Office Worker A sees Office Worker B, and vice versa). However, what happens when cameras are pointed at the public at large? What do people think about having their images captured by video cameras when they (the people) are out in public and where the purpose is not for maintaining security (e.g., to prevent shoplifting in a store or physical violence in a subway station) but for the enjoyment of the viewer, as occurs all the time with the multitude of Web cams in public places across the globe. More recently, Goldberg (2005) created an installation where multiple remote users controlled the view and zoom of a camera set up over Sproul Plaza on the University of California, Berkeley, campus. The installation allowed the remote users visual access to a good deal of information about a person (e.g., the title of the book that a person was reading while sitting alone on the steps of the plaza or the patterns on a woman's dress). As cameras become more pervasive and powerful in public spaces, do people think that the cam-

eras violate their privacy? Does it matter to people if their images are recorded or not, displayed locally or internationally, or displayed in a single location or in many locations? What if people could be in the position of directly using (benefiting from) the captured video themselves—would that change their views on some or even all of these issues? Do men and women bring different perspectives to bear in the judgments about privacy in public? Our current research sought to address these questions.

Our research draws on principles of Value Sensitive Design: a theoretically grounded, interactional approach to the design of technology that accounts for human values in a principled and comprehensive manner throughout the design process (Friedman, 1997a; Friedman, 2004; Friedman & Kahn, 2003; Friedman, Kahn, & Borning, in press). One principle of Value Sensitive Design central to our investigation entailed consideration of both direct and indirect stakeholders. *Direct stakeholders* are parties, individuals, or organizations who interact directly with the computer system or its output. To date, the majority of work in human–computer interaction considers direct stakeholders, often taking the form of user studies and user experience in experimental settings as well as the home and workplace. *Indirect stakeholders* are all other parties who are affected by the use of the system. Often, indirect stakeholders have been ignored in the design process. For example, computerized medical records systems have often been designed with many of the direct stakeholders in mind (e.g., insurance companies, hospitals, doctors, and nurses) but with too little regard for the values, such as the value of privacy, of a rather important group of indirect stakeholders: the patients.

To investigate direct and indirect stakeholders' judgments about privacy in a public place, particularly when the application is not primarily one for security, we installed a HDTV camera on top of a university building (Figure 1a) that overlooked a scenic public plaza and fountain area on a university campus. Then we set up a room in an academic office approximately 15 ft (4.57 m)

Figure 1. **The technical installation in context.**

(a) The HDTV Camera

(b) The Watcher

(c) The Watched

below the camera, with its window also facing the plaza and fountain area. On the inside of the window, we installed a 50-inch (127-cm) plasma display vertically covering up the real window. Thus, we displayed on the plasma screen virtually the identical real-time image of the plaza and fountain area as would be viewed from the real window (Figure 1b).

One purpose of this installation was to investigate whether a real-time plasma "window" could garner some if not all of the psychological benefits of working in an office with a real window. Thus in a "classic" direct-stakeholder user study not reported here (manuscript in preparation), we involved participants in one of three conditions. The first condition involved the office that had the real view of the public plaza and fountain area. The second condition involved the same office but with the technical installation described earlier. The third condition involved a blank wall created by covering the real window with light-blocking curtains. Measures during a 2-hr experiment included participants' physiological recovery from low-level stress, eye gaze (coded on a second-by-second basis to ascertain the type and duration of participants' looking behavior), performance on cognitive and creativity tasks, mood, and self-reflective judgments.

To investigate the effects vis-à-vis privacy on indirect stakeholders, we asked ourselves, who else would be affected by the technical installation? Granted, diffuse effects can percolate in many different ways, making it difficult to establish firmly the class of indirect stakeholders; and granted, potentially everyone (including future generations) could be considered an indirect stakeholder. That said, some categories of indirect stakeholders are more significantly affected (positively or negatively) than others, and it is to these that Value Sensitive Design draws focus. Specifically, one group seemed obvious: those people who, in the course of their regular business on the university campus, pass through the scene and would now have their images captured by the HDTV camera and displayed in an adjacent office (Figure 1c). Thus, we sought to bring the perspectives of this group of indirect stakeholders into our research. Accordingly, we conducted two additional studies, which are the focus of this article. In Study I, we surveyed 750 people (indirect stakeholders) as they walked through a public plaza that was being captured by the HDTV camera and displayed in real time in the office of a building overlooking the plaza. In Study II, we interviewed 120 individuals about the same topic. Moreover, in Study II we controlled for whether the participant was a direct stakeholder of the technology (inside the office watching people on the HDTV large-display window) or an indirect stakeholder (being watched in the public venue).

We sought to address four central issues. The first issue derives from the complexity of privacy as a social construct, one still being substantively negotiated in current society. Long-standing philosophical and legal discussions have

sought, for example, to establish a basis for privacy as a right in and of itself, as derivative from other rights, such as property, as being essential for human autonomy and development and critical for social functioning (see Schoeman, 1984, for a discussion). In turn, with the design of information systems with widespread privacy implications, the field of human–computer interaction has begun to respond with emergent models for privacy management that in various ways engage aspects of this complexity (Abowd & Mynatt, 2000; Ackerman, Darrell, & Weitzner, 2001; Jiang, Hong, & Landay, 2002; Langheinrich, 2001; Palen & Dourish, 2003). All such models, however, need to take into account how people understand the construct of privacy in public. Thus, we sought to systematically characterize how direct and indirect stakeholders conceptualize privacy in public. We expected that people's privacy judgments would be multidimensional, accounting, for example, for the legitimate use of information, anonymity, technical functionality, and conventional expectations of current social practices (both local and cultural), as well as other values of import, such as welfare, property, and informed consent.

The second issue builds on previous research that suggests that people's moral behavior and judgments sometimes depend on their spheres of power within hierarchical systems (Hatch, 1983; Wainryb & Turiel, 1994; Wikan, 2002). Typically, people who benefit from societal injustices—such as discrimination on the basis of race, gender, or religion—are more inclined to support the existing social practices than are its victims (Turiel, 2002). Thus in the current study we examined whether people's social judgments about privacy in public shifted whether they were in the vulnerable position (the Watched) or not (the Watcher).

The third issue builds on literature that suggests that judgments of moral harms are often sensitive to where the harm occurs (location) and the severity of the harm (magnitude). In terms of location, think, for example, of how neighborhood groups can rise in opposition to the proposed construction of a garbage dump or nuclear power plant—thus the expression *NIMBY* ("not in my back yard"). Location can also be a factor when people judge what morality demands of them in terms of helping others. For example, people often judge it a moral obligation to help people in need within one's immediate location (e.g., a starving child outside one's home) compared to a far off place (e.g., a starving child in another country; cf. Kahn, 1992, 1999). In terms of magnitude, Friedman (1997b), for example, found that adolescents less often judged that it was morally acceptable to copy software if the magnitude increased from making one copy to many copies. Such a finding is congruent with Milgram's classic study (1963, 1974) on obedience to authority where many participants administrated what they believed to be electric shocks to another person (a confederate of the experimenter), under the guise of a learning experiment. Milgram found that fewer participants continued to ad-

minister shocks when the magnitude of the voltage increased or when the magnitude of the confederate's suffering either appeared to increase or was made more visible to the participant. Thus, in our current study, we expected that both location and magnitude would play pivotal roles in people's judgments about privacy. It was an open question, however, whether magnitude and location would interact and, if so, how. For example, it is plausible that although people deem it worse for their images to be viewed by many versus one, that distinction diminishes when those many others live a long ways away, perhaps because of greater anonymity given increased distance.

The fourth issue focuses on whether gender differences exist in people's judgments about privacy in public. The implications of gender for people's understandings and need for privacy has been of long-standing interest and concern within the social sciences. For example, legal scholar Allen in her 1988 book *Uneasy Access: Privacy for Women in a Free Society* called attention to gendered dimensions of privacy and devoted a chapter to the legal basis for women's privacy in public. Key issues for Allen entailed unreasonable intrusion, sexual harassment, public display of pornography, and exclusion and group privacy. Sociologists, public health researchers, and psychologists empirically investigated dimensions of privacy preferences, often with a focus on interpersonal relationships, personal space, and commerce. Results from this body of research suggest that on some dimensions men and women view privacy similarly (e.g., functions of privacy, judgments of abstract privacy rights), but on other dimensions women tend to be more concerned about privacy than men or may achieve privacy through different means than those of men (e.g., Friedman, 1997b; Idehen, 1997; Marshall, 1974; Newell, 1998; Pedersen, 1987, 1999; Rustemi & Kokdemir, 1993). Pedersen (1987), for example, suggested that women and men may differentially experience the social reality of public space. Moreover, other research suggests that women's greater sensitivity to issues of privacy in public may extend beyond security concerns. For example, a recent study conducted in the semipublic venue of an emergency room (Karro, Dent, & Farish, 2005) found that significantly more women than men (a) judged their privacy to be important to them while in the emergency department and (b) were likely to perceive both auditory (e.g., overhearing other's medical or personal information) and visual (e.g., seeing other's body parts) privacy incidents in the emergency department.

What, then, does the literature in human–computer interaction show with respect to privacy and gender? To answer this question, we conducted a systematic search of that literature from 2000 to 2004 for gender findings related to privacy. A total corpus of 1,574 journal articles and conference papers were examined, by searching for relevant content terms and then reading the papers that contained them. Sources included *Human–Computer Interaction* (59 articles), *ACM Transactions on Computer-Human Interaction* (72 articles), *Proceed-*

ings and Extended Abstracts of CHI Conference (370 full papers, 752 extended abstracts), *Proceedings of CSCW Conference* (150 full papers), *Proceedings of ECSCW Conference* (41 full papers), and *Proceedings of Ubicomp Conference* (and its predecessor, the *Handheld and Ubiquitous Computing Conference;* 130 full papers). There were 32 papers reporting empirical findings on privacy. Surprisingly, not a single paper analyzed gender effects. Thus the current study sought to provide empirical data on similarities and differences, by gender, on people's social judgments of privacy in public.

2. STUDY I: "THE WATCHED" SURVEY

2.1. Methods

Participants

In sum, 750 individuals participated in this study (384 males, 364 females, 2 gender no response; age ranges: 18–25, 56%; 26–40, 26%; 41–55, 14%; 55+, 4%). Participants were solicited by research staff sitting at a card table in the plaza of the university.

Procedures and Measures

Participants completed a brief paper-and-pencil survey. The introductory text read as follows: "Currently there is a camera in M[…] Hall [the name of the university building] that is pointed toward the fountain. What the camera sees is being displayed live on a screen in someone's office in M[…] Hall. People's faces and gestures are recognizable."

The first set of questions were designed to get at participants' evaluations of the camera installation prior to introducing the term *privacy:* (1a) "Are you surprised to learn that your live image is being displayed in someone's office in M[…] Hall?" (1b) "How do you feel about this happening? Circle as many as apply: shocked, that's cool, so what?, curious, embarrassed, delighted, glamorous, worried, violated, puzzled, doesn't hurt anyone, excited." Thus the latter question (1b) equally encouraged responses that were positive ("that's cool," "delighted," "glamorous," "excited"), *neutral* ("so what?," "curious," "puzzled," "doesn't hurt anyone") and *negative* ("shocked," "embarrassed," "worried," "violated").

The next set of questions focused directly on participants' evaluations of the installation in terms of a privacy violation and, if so, what they thought about a legal remedy or of being informed as a remedy: (2) "As stated above, right now the fountain area is being displayed live on a screen in a nearby office. Do you think this violates your privacy?" (2a) "If you said 'yes' to Question 2 above, do

you think there should be some sort of law that restricts displaying live video from public places like the fountain?" (2b) "If you said 'yes' to Question 2 above, let's say there was a big sign posted in the fountain area that said: 'A camera continually films this fountain area and displays the live image in nearby offices.' In this case, do you think your privacy would be violated?"

Next, we offered participants two equally balanced reasons for judging the installation as not a problem or as troubling: (3) "Here are two ideas. Idea 1: Some people say it's OK to have a camera pointed at the fountain and display the live image in someone's *interior* office (an inside office without windows) in M[…] Hall. After all, the fountain is a public place. Anyone can see you. There's really no problem. Idea 2: Other people find it troubling to think that when they walk by the fountain, their image is being collected by a video camera and displayed live in someone's *interior* office (an inside office without window). After all, they can't see the person, they don't know who is seeing them. They don't even know that their image is being collected. Do you tend to agree with Idea 1 or with Idea 2?"

Finally, we asked seven context-of-use questions that assessed judgments that might be sensitive to location (where the image is displayed) and magnitude (the number of people viewing the image): (4a–g) "For each of the 7 situations below a camera is pointed at the fountain area. Images are not recorded [for this version of the survey]. For each situation, please put an 'X' in one of the columns to indicate if you think the situation is 'all right' or 'not all right': (a) in an office with an *outside* window in M[…] Hall. (b) in an *inside* office with no windows in M[…] Hall. (c) in an apartment on University Ave [half mile away]. (d) in an apartment in a residential neighborhood in Tokyo. (e) in the homes of thousands of people living in the local area. (f) in the homes of thousands of people living in Tokyo. (g) in the homes of millions of people across the globe."

To assess whether participants' responses substantially depended on whether the survey said that their images were being recorded or not, we administered three versions of the survey, 250 of each version. The versions differed in only one respect: Version 1 specified that the live video from the installation was not recorded; Version 2 specified that the live video was recorded; and Version 3 made no reference about the matter one way or another (the "ambiguous" version).

2.2. Results

Similarities Among the Three Versions of the Survey

Using logistic regression models, no differences were found between the "ambiguous" and "not recorded" versions of the surveys, whereas one differ-

ence was found with the "recorded" version. Specifically, more participants agreed with the statement that the installation violates privacy in the "recorded" version (28%), compared to the "ambiguous" version (20%) and the "not recorded" version (22%; $p = .018$, based on a likelihood ratio test in the logistic regression model). Given the small difference in percentages on this one question and the lack of any other statistical differences among the three versions of the surveys, the survey data were combined for further analyses (see Figure 2).

Figure 2. **Study I: Percentage of The Watched Survey Responses by Gender.**

Survey Response	Male $N = 384$	Female $N = 364$		All $N = 750$
1a. Surprised to learn your live image is being displayed in an office in M[…].	61	43	*	53
1b. Feel …				
… positive about displaying your live image in an office in M[…] (1+ positive adjective).	18	10	*	14
… neutral about displaying your live image in an office in M[…] (1+ neutral adjective).	87	83		85
… negative about displaying your live image in an office in M[…] (1+ negative adjective).	25	31	*	28
2. Displaying live video from the fountain area on a screen in M[…] violates privacy.	17	27	*	22
a. … If a privacy violation ("yes" to 2; n = 165), then there should be a legal remedy.	77	68		72
b. … If a privacy violation ("yes" to 2; n = 165), then even with a sign, still a privacy viol.	42	32		36
3. Agree with Idea 2: Find displaying the live video troubling.	17	31	*	23
4. It's "not all right" if the camera displays live video from the fountain area on a screen in …				
a. … Office with outside window M[…]	19	28	*	24
b. … Office without a window in M[…]	21	35	*	28
c. … Apartment on University Ave.	37	59	*	47
d. … Apartment in Tokyo	35	57	*	46
e. … Thousands of homes in the local city	32	52	*	42
f. … Thousands of homes in Tokyo	34	55	*	44
g. … Millions of homes across the globe	33	54	*	43

Notes. (1) Values in the table are the percentage of participants who gave the indicated response. (2) Two participants did not provide their gender on the survey, so the total n from the male and female columns does not add up to 750. (3) Asterisks indicate questions with significant gender differences (Fisher's exact test, $\alpha = .05$). (4) M[…] Hall stands for the name of the building on which the HDTV camera was mounted. (5) Questions 2a and 2b were only asked of the 165 participants who judged the live video to be a privacy violation (question 2).

Initial Reactions to the Installation

The first set of questions tapped participants' initial reactions to the camera installation. Based on Question 1a, approximately half (53%) of the participants were surprised to learn about the camera and large display. Overall, 85% of participants selected at least one of the neutral responses on Question 1b, whereas only 28% selected at least one of the negative responses and 14% selected at least one positive response.

Judgments of Privacy in Public

When asked explicitly about the installation in terms of privacy, roughly one quarter (22%) of the participants judged the display of real-time video from the fountain area to be a privacy violation. In addition, of those men and women who judged the display of real-time video from the fountain area to be a privacy violation (Question 2), 72% believed there should be a law against it (Question 2a) and 36% believed that even if there were a sign informing them of the video camera, it would still be a privacy violation (Question 2b).

Effects of Location and Magnitude

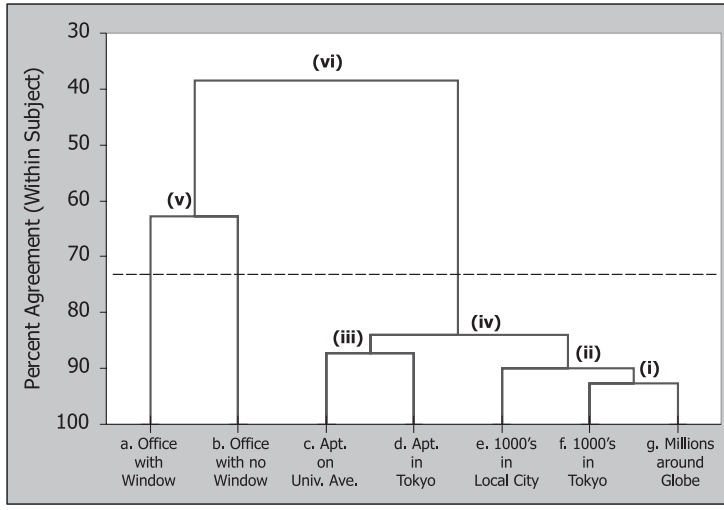
For the majority of participants, neither location nor magnitude affected their privacy judgments about the installation. Specifically, more than half of the participants (61%, $p = .000$, binomial test) held to a consistent view of privacy across all the context-of-use questions (4a–g), answering all these questions in the same way (16% of all items, "not all right"; 45% of all items, "all right") regardless of location (where the image was viewed) or magnitude (how many people viewed the image).

For the roughly 40% of participants whose privacy judgments were sensitive to location and magnitude, location (on the university campus versus elsewhere) was the greatest demarcation, with other nuanced interactions among location and magnitude thereafter. Specifically, the remaining 39% of the participants who did not hold a consistent view of privacy across the seven context-of-use questions more often indicated that it was not all right to display the image in a remote location (4c–g) than in a local location in M[…] Hall (4a–b). All pairwise comparisons between either of questions 4a and 4b and any of questions 4c through 4g yielded p values smaller than .0005 in a McNemar test. Furthermore, although the difference was smaller in magnitude, participants who did not hold a consistent view across questions were also significantly more likely ($p = .003$, McNemar) to indicate that it was not all right to display the image in an office without a window in M[…] Hall (4b, 30%) than in an office with a window in M[…] Hall (4a, 19%).

To further explore the patterns of acceptability within the seven parts of Question 4, a cluster analysis was conducted using a dendogram (see Figure 3) that clustered together questions based on similarity of responses (within subject) among the 294 participants who did not provide the same answer to all seven of the context-of-use questions. Questions linked together low in the graph (with smaller roman numerals) had similar responses, whereas questions linked together high in the graph had different responses. The dashed line in Figure 3 indicates a reasonable cut point in the data. This cut visually shows that responses to questions 4a and 4b were quite different, both from each other and from the five other questions (4c–4g). Thus Figure 3 visually illustrates the statistical differences in acceptability noted earlier between a remote location (4c–4g) and a local location in M[…] Hall (4a–4b) as well as between offices in M[…] Hall with a window (4a) and without a window (4b).

The patterns of acceptability within the five remote locations (4c–4g) were somewhat more subtle. The cluster analysis in Figure 3 indicates that responses to 4c and 4d formed one cluster and 4e, 4f, and 4g a separate cluster.

Figure 3. **Study I: Clustering of the Watched survey responses to the seven context-of-use questions. This graph represents only the 294 individuals who did not give the same response for all seven context-of-use questions. Percent agreement (within subject): The lines represent links between questions or clusters of questions; the roman numerals represent the order in which the links were established. When two individual variables are linked together, the values on the vertical axis represent the percentage of individuals who gave the same answer (within subject) to the two questions. When two clusters of questions are linked together, the values represent the percentage of within-subject agreement for the two most similar questions from the two clusters.**



There is also some statistical support for this observation. Based on Cochran's Q test ($p < .0005$), there were statistically significant differences in acceptability among these five questions. This test was followed with pairwise comparisons among the five questions using McNemar tests, with the significance levels of the tests adjusted using Holm's sequential Bonferroni method to account for multiple comparisons. Significant differences were found in 5 of the 10 pairwise comparisons. Specifically, displaying the image in a single apartment on University Avenue was less acceptable (80%, "not all right") than displaying the image in thousands of homes in the local city (66%, $p < .0005$), millions of homes across the globe (69%, $p < .0005$), or thousands of homes in Tokyo (71%, $p = .006$). A single apartment in Tokyo (76%) was also deemed less acceptable than thousands of homes in the local city (66%, $p = .001$). Finally, thousands of apartments in Tokyo was less acceptable than thousands of apartments in the local city ($p = .007$).

Effects by Gender

Fisher's exact test was used to test for gender differences in Questions 1–3. In responses to questions that involved participants' initial impressions of the installation, results showed that more males (62%) expressed surprise than females (43%; $p = .000$); females (31%) were more likely than males (25%) to select at least one negative response on Question 1b ($p = .05$); and males (18%) were more likely than females (10%) to select at least one positive response on Question 1b ($p = .001$). In addition, women more than men viewed the display of live video from the fountain area as a privacy violation (women, 27%; men, 17%; $p = .000$) and troubling (women, 31%; men, 17%; $p = .000$).

To test for gender differences on Question 4 (4a–4g), a general linear model was used, treating the seven parts of the question as a repeated-measures within-subject variable and gender as a between-subject variable. Gender differences were found on all seven items. Specifically, women more than men viewed the display of live video from the fountain area as "not all right" across all seven context-of-use questions ($p = .000$).

3. STUDY II: "THE WATCHER AND THE WATCHED" INTERVIEW

Surveys readily allow for large sample sizes and thus provide greater confidence in the generalizability of one's findings. Yet surveys also represent a blunt instrument for exploring the complexities of how people understand the topic at hand (Kellert, 1996; Krathwohl, 1998). Thus this second study, in the context of the same installation, used a semistructured interview methodology (Damon, 1977; Helwig, 1995; Kahn, 1999; Killen, 1990; Piaget, 1929/

1960; Turiel, 1983) to investigate in more depth the issues uncovered in the survey study. In addition, this second study examined possible differences in the social judgments about privacy in a public place between direct and indirect stakeholders—the users of the technology (the Watcher) and those individuals whose images are captured by the technology (the Watched).

3.1. Methods

Participants

In sum, 120 people, with equal numbers of males and females, participated individually in a 20-minute semistructured interview (age range: 18–25, 90%; 26–40, 8%; 41–55, 2%; 55+, 0%). Participants were recruited by local flyers and research staff sitting at a card table in the plaza of the university.

Procedures and Methods

As described in the introduction, a HDTV camera was mounted on the roof of building overlooking a public plaza, and the real-time image was displayed in an office in that building. The four conditions in this study entailed (a) the Watched—30 individuals like those in the survey who walked across or briefly inhabited the public plaza in the course of their daily activities; (b) the Watcher large display—30 individuals in an office in M[…] Hall with a large display showing the real-time image of the public plaza; (c) the Watcher real window—30 individuals in the same office of M[…] Hall with a window overlooking the public plaza wherein participants were asked to imagine a large-display window; and (d) the Watcher blank wall—30 individuals in the same office in M[…] Hall with a closed curtain covering the window wherein participants were asked to imagine a large-display window.

The interview included a question about the technological installation ("Currently there is a camera in M[…] Hall that is pointed toward the fountain. What the camera sees is being displayed live on a screen in someone's office in M[…] Hall. Do you think this it is all right or not all right that this is happening?"); 9 of the questions found on the survey (Questions 2, 3, 4a–g); and an 11th question, about the impact of recording the video ("Let's say that in addition to your live image at the fountain being shown on a screen in someone's office in M[…] Hall, your image was also being recorded. Would that be all right or not all right?"). For participants in the Watched condition, this later question and Question 2 were asked in terms of "your image" and "your privacy," but the questions were rephrased for participants in the Watcher conditions in terms of "people's images" and "people's privacy." In addition, participants in the Watched condition were asked three

non-video-based questions about privacy expectations ("Do you think a handwritten diary is private?" "Do you think the same diary online is private?" and "Do you think that a whispered conversation in an outdoor café is private?").

The interviews were tape-recorded and then transcribed for analysis. Individual interviews averaged approximately 10 single-spaced transcript pages. In total, the data set comprised approximately 1,160 single-spaced transcript pages.

Coding

A detailed coding manual was developed from half of the data (approximately 550 transcript pages) and then applied to the entire data set. By *coding manual* we mean a systematic document that explicates how to interpret and characterize (and thereby "code") the qualitative data. Our approach followed well-established methods in the social–cognitive literature (Damon, 1977; Kahn, 1999; Kohlberg, 1984; Turiel, 1983). We began with close textual readings of interviews, seeking to characterize not only forms of reasoning but their interrelationships. We also moved back and forth between the empirical data and conceptual coherence, in part driven by philosophically informed categories but always tested and often modified by the data itself. In addition, our coding manual drew—as most do in this line of work, when appropriate—from other coding manuals (Davidson, Turiel, & Black, 1983; Friedman, 1997b; Kahn, 1992; Kahn, Friedman, Freier, & Severson, 2003; Nucci, 1981; Turiel, Hildebrandt, & Wainryb, 1991).

As our coding manual took shape, we discovered, as is also typical, that some of our qualitative data resisted single interpretations. Such difficulties often emerged in one of three ways. First, the difficulty sometimes arose because the segment contained two or more independent justifications. We solved this difficulty by coding multiple justifications for a single evaluation. Second, the difficulty sometimes arose because two categories were conceptually intertwined. We often adjudicated this situation by moving forward with the conceptually dominant category while retaining their interconnections within the hierarchy. Third, the difficulty sometimes arose when there was more than one legitimate way to code the data. In this situation, the coding categories were driven not only by the data but by our theoretical commitments and research questions (see Kahn, 1999, chap. 5, for a chapter-length discussion about the interview methodology and coding manual development). The complete version of our coding manual can be found as a technical report (Friedman, Kahn, Hagman, & Severson, 2005).

Reliability

Interviews from 24 participants (20% of the data) were recoded by a second individual trained in the use of the coding manual, 6 randomly chosen from each of the groups. Intercoder reliability was assessed through testing Cohen's kappa at the $\alpha = .05$ significance level. All tests were statistically significant. For evaluations, $\kappa = .92$ ($Z = 17.92$), and for justifications, $\kappa = .82$ ($Z = 38.94$). Reliability for justifications was established on the subcategory level as reported in Figure 5.

3.2. Results

Figure 4 reports the percentage of participant responses to the evaluation questions in both the survey and the interview. For Questions 1–3 and 5, Fisher's exact test was used both for gender comparisons and for pairwise comparisons between different conditions in the study. On Question 4, general linear models were used, treating the parts of the question (4a–4g) as a repeated-measures within-subject variable and treating condition and gender as between-subject variables.

The Surveys Versus the Interviews

On Questions 2, 3, and 4a–4g, there were no statistically significant differences in the evaluation responses of the Watched between the 750 survey participants and the 30 interview participants. Thus there is no evidence of a difference between the views of the people in the interview compared to the views of the people in the larger population of those surveyed. As a result, for the remainder of this study, the interview data were used when comparing the views of the Watcher and the Watched.

The Watcher and the Watched

One central question of this study was whether there were differences between the social judgments about privacy for participants in the Watcher large display condition (i.e., people who were directly using and potentially benefiting from the technology) and the Watched condition (i.e., people who had no voice in and potentially incur harms by the technological installation). Results revealed an interesting interaction between condition and gender: The males (but not the females) expressed less concern about the installation when being the Watcher rather than the Watched. Specifically, as shown in Figure 4 across all the seven context-of-use questions (Questions 4a–4g), re-

Figure 4. **Study I and II Combined: Percentage of The Watcher and The Watched Interview and Survey Responses by Gender.**

			The Watcher				The Watched			
	Display interview		Window interview		Wall interview		Plaza interview		Plaza survey	
Interview/Survey Response	*M* *n* = 15	*F* *n* = 15	*M* *n* = 15	*F* *n* = 15	*M* *n* = 15	*F* *n* = 15	*M* *n* = 15	*F* *n* = 15	*M* *n* = 384	*F* *n* = 364
1. Live video from the fountain is displayed in someone's office in M[…] Hall. It's not all right this is happening.	0	13	13	13	7	27	13	42	–	–
2. Displaying live video from the fountain are on a screen in M[…] Hall violates privacy.	23	36	20	27	50	47	21	21	17	27
3. Agree with Idea 2: Find displaying the live video troubling.	13	40	13	27	13	33	20	36	17	31
4. It's "not all right" if the camera displays live video from the fountain area on a screen in …										
a. … Office with outside window M[…] Hall	0	27	27	40	7	46	27	33	19	28
b. … Office without a window in M[…] Hall	0	27	13	20	0	7	13	29	21	35
c. … Apartment on University Ave.	0	53	40	67	47	69	21	47	37	59
d. … Apartment in Tokyo	0	53	33	67	33	67	27	50	35	57
e. … Thousands of homes in the local city	7	47	33	53	47	67	27	50	32	52
f. … Thousands of homes in Tokyo	7	40	40	73	53	80	27	57	34	55
g. … Millions of homes across the globe	0	47	33	73	47	73	40	50	33	54
5. It's not all right if the video is recorded.	53	79	73	87	67	87	60	93	–	–

Note. Values in the table are the percentage of participants who gave the indicated response. M[…] Hall stands for the university building on which the HDTV camera was mounted.

sults showed the following: First, in the Watcher large display condition, more women than men expressed concerns about the HDTV camera ($p = .002$); second, more men in the Watched condition expressed concerns about the HDTV camera than men in the Watcher large display condition ($p = .014$).

Interestingly, there were no gender differences for the three questions in the Watched condition that represented canonical examples of private and semiprivate information. Specifically, all of the Watched interview participants considered a handwritten diary as being private (males, 100%; females, 100%); virtually all of them viewed that same diary as being public when it is placed online (males, 93%; females, 93%); and slightly more than half viewed a whispered conversation in an outdoor café as being private (males, 53%; females, 60%).

As with the survey data, at least half of the interview participants in both the Watcher large display condition (77% overall; 10% of all items, "not all right"; 67% of all items, "all right") and the Watched condition (50% overall; 10% of all items, "not all right"; 40% of all items, "all right") held a consistent view about privacy in a public place that applied across all of the seven context-of-use questions (Questions 4a–4g). Moreover, for those participants (the Watcher large display, 23%; the Watched, 50%) who did not hold a consistent view, the pattern of evaluations was similar to that found in the survey data, with more participants saying it was "not all right" to display the image in a remote location (in the participants' city, in Tokyo, and across the globe; Questions 4c–4g) than in a local location (outside and inside offices in M[…] Hall; Questions 4a–4b).

Using the McNemar test, results showed that participants more often objected to the recording of the live video (Question 5) as compared to not recording the live video (Questions 1 and 4a–4g) in both the Watcher large display condition ($p \leq .001$ for all tests) and the Watched condition ($p \leq .004$ for all tests).

The Watchers: In Situ Condition Versus Hypothetical Conditions

Another question of interest was whether participants' social judgments differed while actually looking at the real-time images on the large display (in situ) compared to imagining the comparable circumstance while physically in the office overlooking the plaza (as a hypothetical scenario). Two conditions involved participants in such a hypothetical situation: the Watcher real window condition and the Watcher blank wall condition. Results showed no significant differences between these two hypothetical conditions; thus, these data were combined and then compared to participants in the Watcher large display condition. These results showed differences for males but not for females. Specifically, fewer males in the Watcher large display condition ex-

pressed concerns about the HDTV camera for the seven context-of-use questions (Questions 4a–4g) compared to males in the Watcher real window condition and the Watcher blank wall condition ($p = .003$). The same comparison for females showed no statistically significant differences ($p = .347$).

No significant differences were found for males ($p = .675$) or females ($p = .349$) in comparing the responses to Questions 4a–4g for the Watchers in the hypothetical conditions (the real window and blank wall conditions combined) versus the Watched condition. In other words, the aforementioned interaction between gender and condition disappeared when the questions were asked hypothetically (in the Watcher real window and blank wall conditions) rather than in situ (in the Watcher large display condition). Females responded similarly to these questions regardless of condition (Watcher or Watched) and regardless of whether the questions were asked hypothetically or in situ. Males also responded similarly when they were in the Watched condition or when they were asked hypothetically about being a Watcher, but males showed significantly fewer concerns when they were actually in the situation of being the Watcher.

Reasoning About Privacy in Public

One major thrust of this study was to characterize people's reasoning about privacy in public. Toward this end, we asked participants to explain why they judged the above activities as "all right" or "not all right"–and through this process engaged them in substantive discussion. Then, through extensive systematic qualitative analyses of the transcribed interviews (discussed in Methods), we generated a hierarchical typology of reasoning about privacy in public. Figure 5 summarizes the 10 overarching categories. In this section, we report on each of these categories in more depth so as to explicate more of the complexity of the ideas and the context within which they emerged. Each category description contains a concise definition of the category (with brief illustrative examples from the interviews in parentheses) followed by one somewhat longer segment from an interview that provides a fuller sense of participants' thoughts and means of expression. The goal here is to provide a "thicker" (Geertz, 1984; Spradly, 1970/2000) description of people's reasoning, before moving forward with reporting on the quantitative reasoning results. In the qualitative protocols that follow, participants' verbatim words are in regular font, and the interviewer's words are in italics.

Personal Interests. Personal Interests refers to an appeal based on individual likes and dislikes, including personal indifference (e.g., "It doesn't really matter to me"), connection through information (e.g., "People can see a different part of the world and feel connected across the globe"), personal en-

joyment (e.g., "It'd be interesting to watch … fun for people"), and aesthetics of view (e.g., "just to add a little more ambience to the room … a little touch of nature").

One of the most direct forms of the Personal Interest justification category is an appeal to "fun."

> *Do you think that it is all right or not all right that this is happening?* I think it's all right. *Why?* Because we're people and we have eyes and we're gonna end up watching other people. We're interested in other people so if we weren't interested in other people you'd just sit there by yourself and that's not fun.

This response also received a second code for "biological naturalism" wherein the participant says that given the nature of human biology (that "we have eyes") it is in effect natural to use one's eyes to watch other people through a window.

External Sanctions. External Sanctions refers to an appeal based on consequences, rules, and norms established by others, including punishment avoidance (not found in this data set), social condemnation (e.g., "I won't do anything that weird out here"), and rules and laws (e.g., "Certain things are allowed when they're contained within the university, but once you get out of it, there's different rules that apply").

In the moral developmental literature as framed by Kohlberg and colleagues (e.g., Colby, Kohlberg, Gibbs, & Lieberman, 1983; Kohlberg, 1969, 1984; Power, 1991), avoidance of punishment—a canonical external sanction—is a common early form of moral reasoning. Typical examples include "because I could get in trouble," "because you could get caught by the police," "because one could be put in jail." In the current study, one might imagine an individual's objecting to the installation because he or she might be seen doing something improper if not illegal and does not want to be caught and potentially punished. However, not a single individual used this form of external sanction reasoning. Perhaps the closest that emerged from the data was in the following passage:

> *Let's say the screen's in an apartment in a residential neighborhood in Tokyo. Is that all right or not all right?* It's starting to feel stranger and stranger the more I think about this. Umm, I don't see any difference between putting it in Tokyo or putting it here. But the more I think about it, you know I don't like the idea of not being able to sneak around, when I think no one's looking.

Here the participant objects to the installation because it would prevent him from "being able to sneak around"—an idea that seems more aligned with a

concern with what others might think of him, in terms of socially condemning the sneaking, rather than in terms of being directly punished for it.

Functionality. Functionality refers to an appeal based on how the technology mimics or augments human biology, the physical world, or other technology, including biology (e.g., "Yeah that's fine. … They could probably see down here anyway"), technological isomorphism (e.g., "because [the large display] is just like another window"), and technological augmentation (e.g., "Not only are your actions viewable to anyone here … they'd be viewable to anyone there").

Perhaps the clearest examples of functionality involve technological isomorphisms, wherein the technical installation is viewed to function like other existing technologies. One technology was a Web cam ("It's just like looking at the webcam on K[…] Hall on your computer so I don't see the difference"). Another involved television, videos, and movies ("I don't know how it's gonna be viewed any different than TV"). And another involved a window itself ("You can watch people out a window and this is the same thing"). Yet for some participants the technology also functioned as a means to extend features of the physical world:

> *Let's say the large screen is in an apartment on University Avenue. Is that all right or not all right?* Hmmm, that's fine. *Okay, how come?* It opens up the publicness of the space so that not only are your actions viewable to anyone here, they'd be viewable to anyone there. But it's still a public place.

Here the technology is conceptualized as extending the boundaries of public space ("It opens up the publicness of the space") to include remote watchers. Other times, the technology was conceptualized as extending the boundaries of time beyond what was biologically normal ("It wouldn't be all right [to record] because then you'd be able to watch it over and over and over again whereas if it's just a live feed, you just watch it once and that's pretty much it").

Social Expectations. Social Expectations refers to an appeal based on current and expected practices in socially situated contexts, including sociotechnical isomorphism (e.g., "People do it anyway on TV so it's not like it's new"), biological capabilities (e.g., "Everybody does it. … I mean it's part of life, seeing people"), place (e.g., "Well you're out in public and it's showing a public image of a fountain at a public university"), current technological practices (e.g., "Technology's all around us. … They come in many tiny forms"), and work practice (e.g., "When you're in an office … there's certain things that you do and you don't do").

The main idea here is that for some participants their social judgments (and potentially their corresponding behaviors) drew heavily on how they understood conventional practices. In its unelaborated form, this category characterizes how participants spoke about the way that social life is ("We're watched a lot more than we know, everywhere we go, so it's just one of those facts of life"). Along these lines, another participant made the following analogy: "Like in your home, you don't expect anybody to be watching you, even through your windows." Because participants sometimes assumed that different social contexts engendered different moral practices in terms of publicity and privacy, the same technical installation appropriate in one place may not be appropriate in another. Here is an example:

> *Let's say the screen is in an apartment on University Avenue. Is that all right or not all right?* Kind of interesting question. … When you're in your personal apartment, there's no-holds-barred. Like you can do anything you want to. … there's no supervision, there can be a lot of exploitation. Whereas in the work environment, there's no exploitation, there's no chance of it, there's no chance of like any kind of stalking behavior.

For this participant, work environments are considered free of exploitation. Presumably if at some point this participant became convinced that in his location, or in a location elsewhere, work environments were rife with exploitation, his judgment about the appropriateness of the installation would change accordingly.

Welfare. Welfare refers to an appeal based on people's well-being, including physical welfare (e.g., "Safety is a good reason"), material welfare (e.g., "It's a waste of money and time … [to have] two of the same pictures"), psychological welfare (e.g., "There are some people who are going to be uncomfortable with this"), and educational welfare (e.g., "There might be some educational value … learn about different places").

Participants sometimes sought to balance what they perceived as potential harms and benefits, as in the following example:

> *Let's say in addition to your live image at the fountain being shown on a screen in someone's office in M[…] Hall, your image is also being recorded. So would that be all right or not all right?* It'd be better for security reasons, better for the safety of us the students. Otherwise I would have a problem with that because that's something they can replay and replay, and they can put that stuff on the Internet; they can do stuff with that that can really, you know, damage people. Say you're walking down the street and you know you pick a wedgie and someone could like blow that up on the Internet, and the next thing you know you're just the hot spot next to the hamster dance in Napster. That's embarrassing, and nobody needs

> to see that sort of thing. Um so yeah, if it were for security reasons, then yeah sure I would not have a problem with that at all. Otherwise I think I might.

This participant recognizes that recording the public images could cause psychological harm ("Someone could like blow that up on the Internet, and the next thing you know you're just the hot spot next to the hamster dance in Napster") but could also "be better for security" for students. In this particular segment, it is not clear whether the participant would judge in favor of the installation if it could be used for both purposes (psychological harm and physical security). What is clear is that both considerations are central to this person's orientation.

Privacy. Privacy refers to an appeal based on a claim, an entitlement, or a right of an individual to determine what information about himself or herself is communicated to others, including private content (not found in this data set; retained as a canonical example of the Privacy category; Margulis, 2003), legitimate use (e.g., "There's absolutely no reason for anybody … to need to know"); maintain anonymity (e.g., "Because we can't pick up details of people's faces. I mean, you get body shapes, that sort of things. … It's all very anonymous"), and control (e.g., "It depends on how closely you guard it").

Often privacy justifications were overlaid with multiple considerations.

> *Let's say the screen is in an apartment on University Avenue. Is that all right or not all right?* Oh no. No, no, no, no, no. *Why is it not all right?* It's footage of public place. Because if I chose to be on the five o'clock news and I put myself in the path of the camera, then that would be my choice. But if I walked by the fountain and had no idea that I'd be, effectively speaking, on the five o'clock news, I would resent it. … That would be problematic for me … just seems like an invasion of privacy.

This participant begins with a statement about context: "It's footage of public place." Then she asserts a claim or entitlement to determine what information about her may be communicated to others in that context ("if I chose to be on the five o'clock news and I put myself in the path of the camera"). She also touches on the idea of the need to be informed when public places are being filmed (see the justification category Informed Consent). Only then does she end with a straightforward claim to privacy ("just seems like an invasion of privacy").

Property. Property refers to an appeal based on a concept of tangible property (e.g., "[The] university … is owned by somebody … and they have

the same right that someone who owns a store does when someone is on their property so it's all right") and intangible property (e.g., "My image is a different property right").

> *Let's say in addition to your live image at the fountain being shown on a screen in someone's office in M[…] Hall, it was also being recorded. In that case would it be all right or not all right?* Not all right. *Why?* For the same reason that it's not all right even to flash it up there, because of nonconsent. And because of property rights. My image, if I'm being looked at is a different, I feel a different property right even then if I'm being recorded. Because if I'm being recorded it's like any recording, a song or a book, you have copyright laws and intellectual property laws and those kinds of things. For someone to take that image and record it without my consent, it violates my privacy.

This example illustrates a prototypic property justification ("I feel a different property right") with a clear analogy of one's image in public being like other forms of intellectual property ("Because if I'm being recorded it's like any recording, a song or a book, you have copyright laws and intellectual property laws"). This example also illustrates how closely intertwined many of these justifications are in participants' reasoning insofar as this participant's property reasoning led readily into a consideration based on informed consent ("For someone to take that image and record it without my consent …") and privacy ("… it violates my privacy").

Informed Consent. Informed Consent refers to an appeal based on being informed of the risks and benefits of an activity and the opportunity to choose to participate, including being informed (e.g., "It's okay with me if it's disclosed"), providing consent (e.g., "It kinda reminds me of like the reality TV, but you didn't sign up for anything like that"), and providing informed consent (e.g., "Outright consent like not even just a sign saying this is being recorded but opting in rather than opting out").

As noted, there are close linkages between informed consent and privacy:

> *Do you think this violates your privacy?* Because it's not disclosed, it violates my privacy—again because it's a form of observation, private observation without any consent.

This participant succinctly captures both the idea of being informed ("It's not disclosed") and the need for individuals to provide consent ("It's a form of observation … without any consent"). Moreover, this passage shows that the identical act can invade privacy or not depending on whether individuals

have been informed about the act and given a meaningful opportunity to opt out.

Fairness. Fairness refers to an appeal based on freedom from misrepresentation (e.g., "There have been a number of cases where recorded images matched up with facial profiles of [innocent people apprehended for crimes])" and reciprocity (e.g., "They can see us, I can possibly see them, so yeah I don't mind").

One of the distinguishing features of someone's looking out a window and observing others in a public place is that, at least usually, others in the public place can reciprocally look back through the window and look at the person who is looking at them. Thus, the person in the public place can both know that someone is looking and, reciprocally, be able to see (to some extent) the person who is looking. For some participants, this feature established conditions of fairness, which this large display could not duplicate.

> *Let's say the screens are in homes of thousands of people living in the local area. Is that all right or not all right?* It's not all right. *How come?* Mostly because I'm starting to feel weirder and weirder that people are looking at me when I can't tell if anyone's looking or not. … If everyone in [this city] has a view … chances are, someone I know is [watching], but I have no way of knowing. It's a little disconcerting.

This participant feels "weirder and weirder" that the large display could allow acquaintances to look at him without his knowing. Moreover, the reciprocity afforded by real windows appears to check perceived harms that can occur through watchers' watching others on a large display.

Nonissue. Nonissue refers to an appeal based on a belief that the issue under discussion is irrelevant or does not occur, including no harm (e.g., "It's not being used for any malicious purposes"), no privacy (e.g., "Privacy, that's such an old concept; that doesn't exist anymore"), and implied consent (e.g., "It would become a knowledge that this area is being filmed, and … I can choose to avoid this place if I don't want to be on somebody's screen").

The "no harm" consideration sometimes emerged when participants were considering the lack of access that remote viewers had to the individual being viewed:

> *Let's say that the screen's in an apartment in a residential neighborhood in Tokyo. Is that all right or not all right?* Again, I'd have to ask why do they want to see it? In a way it's not quite as creepy as the guy on University Ave., because they can't come here. … That doesn't bother me quite as much actually. … Because it's far away,

> they couldn't come here anyway; then it's not quite as bad. Because somebody at an apartment implies that they want to watch here without being there physically, which implies that maybe there's something. You know.

It is in this way that, for some participants, people watching the large screen could increase in number without increasing the risks as long as those people watching were in far-off locations such that they could not physically access the public area and harm individuals there. It is also worth highlighting that the "no privacy" justification was used in three ways, each increasing in scope. The first focused on the lack of a privacy violation in the instance at hand ("You're not really invading on their privacy if you're just kind of like filming them walking"). The second argued that privacy does not exist in public spaces ("Just because this is a public place, you don't require privacy in a public place"). And the third argued that privacy no longer exists ("Privacy, that's such an old concept; that doesn't exist anymore"). Note, finally, that we placed the Implied Consent subcategory here under Nonissue rather than Informed Consent. Our reason is that participants used this justification as a means to establish that they could have chosen otherwise, and thus the potential concerns raised at this point in the interview were to them actually not of concern.

Quantitative Results of Justification Use

We quantitatively analyzed the Watched and the large display Watcher participants' justification use, averaged across the seven context-of-use questions (4a–4g). Given the numerous categories used and the comparatively small number of participants in each category, it was not possible to perform inferential statistics on this segment of results. Nonetheless, by visual inspection of the quantitative results, certain trends can be seen.

Across condition and gender, at the overarching level of the categories, participants provided a consistent pattern of justification use to support their "all right" evaluations. Specifically, as shown in Figure 5, participants on average primarily drew on three forms of justifications: personal interest (31%), functionality (31%), and social expectations (24%). Two of these same categories played an important role in supporting participants' "not all right" evaluations: functionality (34%) and social expectations (30%). More specifically, functionality understood in terms of a technological isomorphism (e.g., that the large screen functioned analogously to an existing technology) more often supported affirmative evaluations for the use of the display (17%) than not (5%); yet, functionality understood in terms of an augmentation (e.g., that the large screen extended the capabilities or features of one's biology, the physical world, or existing technologies) less often supported affirmative evalua-

Figure 5. **Study II: Percentage of Justification Use (Averaged Across the 7 Context-of-Use Questions) for The Watcher Large Display and The Watched Interview Responses by Evaluation, Stakeholder Role [W'er = Watcher; W'ed = Watched] and Gender.**

	All Right				Not All Right			
	W'er		W'ed		W'er		W'ed	
Justification	***M***	***F***	***M***	***F***	***M***	***F***	***M***	***F***
1. Personal interest	26	34	35	27	–	3	11	4
1.1 Unelaborated	4	0	1	2	–	3	4	0
1.2 Indifference	5	11	10	11	–	0	0	0
1.3 Connection through info.	3	11	18	4	–	0	0	2
1.4 Personal enjoyment	9	8	4	2	–	0	7	2
1.5 Aesthetics of view	3	15	4	11	–	0	0	2
2. External sanctions	0	3	8	0	–	11	0	0
2.1 Unelaborated	0	0	0	0	–	11	0	0
2.2 Punishment avoidance	0	0	0	0	–	0	0	0
2.3 Social condemnation	0	2	8	0	–	0	0	0
2.4 Rules and laws	0	2	0	0	–	0	0	0
3. Functionality	23	21	34	47	–	53	22	27
3.1 Biology	1	2	3	13	–	0	4	0
3.2 Tech. isomorphism	12	18	21	16	–	17	0	4
3.3 Tech. augmentation	12	3	12	27	–	39	19	24
4. Social expectations	29	23	32	11	–	28	30	31
4.1 Unelaborated	0	2	0	4	–	17	7	11
4.2 Socio-tech. isomorphism	3	0	4	4	–	0	0	0
4.3 Biological capabilities	0	10	0	2	–	0	0	0
4.4 Place	25	21	23	5	–	6	4	7
4.5 Current tech. practice	0	0	5	0	–	0	0	0
4.6 Work practice	8	2	0	2	–	11	19	16
5. Welfare	8	2	14	5	–	22	26	28
5.1 Unelaborated	1	0	1	2	–	3	4	0
5.2 Physical	2	0	4	2	–	0	4	7
5.3 Material	3	0	5	0	–	11	7	13
5.4 Psychological	1	2	1	2	–	8	11	20
5.5 Educational	1	0	3	0	–	0	0	0
6. Privacy	8	15	3	0	–	8	37	16
6.1 Unelaborated	4	2	0	0	–	6	4	16
6.2 Private Content	0	0	0	0	–	0	0	0
6.3 Legitimate use	3	0	0	0	–	3	19	0
6.4 Maintain anonymity	5	13	3	0	–	0	7	0
6.5 Control	0	0	0	0	–	0	7	0
7. Property	0	2	0	0	–	0	0	0
8. Informed consent	0	0	0	0	–	61	22	31
8.1 Informed	0	0	0	0	–	44	4	22
8.2 Consent	0	0	0	0	–	17	4	4
8.3 Informed consent	0	0	0	0	–	0	15	4
9. Fairness	1	7	1	0	–	2	7	0

Figure 5. (Continued)

	All Right				Not All Right			
	W'er		W'ed		W'er		W'ed	
Justification	***M***	***F***	***M***	***F***	***M***	***F***	***M***	***F***
10. Nonissue	7	8	0	7	–	0	0	0
10.1 No harm	5	8	0	2	–	0	0	0
10.2 No privacy	1	0	0	0	–	0	0	0
10.3 Implied consent	1	0	0	5	–	0	0	0

Note. The number of the participants by evaluation, stakeholder role, and gender (each column) who provided justifications for each of the questions is as follows. All Right Evaluations: W'er, M, 102; W'er F, 61; W'ed, M, 77; W'ed, F, 55. Not All Right Evaluations: W'er F, 36; W'ed, M, 27; W'ed, F, 45. Because virtually no men in The Watcher Large Display condition provided negative "not all right" evaluations, no justification data for this group is reported. Percentages of subcategories may not equal those of overarching categories due to (a) rounding and (b) collapsing multiple justifications.

tions for the use of the display (14%) than not (27%). In turn, social expectations understood in terms of place (e.g., what one expects being in a public place) more often supported affirmative evaluations for the use of the display (18%) than not (6%); yet, social expectations understood in terms of work practice (e.g., what one expects being in a work environment) less often supported affirmative evaluations for the use of the display (3%) than not (15%).

In addition to functionality and social expectations, three other overarching justifications played, on average, an important role in supporting participants' "not all right" evaluations: welfare (25%), privacy (29%), and informed consent (38%). Under welfare, the most often used subcategories were psychological welfare (13%) and material welfare (10%). Under privacy, the most often used subcategory (not counting "unelaborated") was legitimate use (7%). Under informed consent the most often used subcategory was informed (23%).

Notably, certain justifications averaged across questions played little role in participants' "all right" or "not all right" evaluations: external sanctions (3%, "all right"; 4%, "not all right"), property (1%, "all right"; 0%, "not all right"), fairness (2%, "all right"; 3%, "not all right"), and nonissue (6%, "all right"; 0%, "not all right").

4. DISCUSSION

Some scholars have argued that privacy no longer exists, or, if it does, it is quickly disappearing with the advent of new technologies that increasingly make people's activities public (Gotlieb, 1996). Moreover, it could be said

that as a society people should stop worrying about long-lost ways of being and, instead, adjust to the new world. Yet the results from these two studies support a different conclusion.

All (100%) of the participants in the Watched interview condition conceptualized the canonical privacy item (a handwritten diary) as being private, and a majority (57%) said that a whispered conversation in an outdoor café was also private. Against this backdrop, over half (55%) of the participants we surveyed expressed some concern for having their images in a public place collected and displayed elsewhere. In turn, from 53% to 93% of the participants we interviewed (depending on gender and condition) judged that it is not all right to record a live video image in a public place. These results are consistent with related literature on attitudes about online privacy (Cranor, Reagle, & Ackerman, 1999; Privacy and American Business, 1997, 1998) and privacy concerns and consumer choice (Taylor, 2003). In addition, 16% of the participants we surveyed expressed strong and consistent concerns about having their images in a public place collected and displayed elsewhere. These results are in line with those by Jancke et al. (2001), who found that roughly 20% of people in their study expressed strong privacy concerns about linking a workplace through real-time video. The results are also roughly compatible with those found over the years in Harris Polls where approximately 25% of the population in the United States has been characterized as "privacy fundamentalists" (Taylor, 2003). Taken together, our results extend previous research by providing evidence that people have concerns for their privacy even while walking through a public plaza.

The results of the interview study (Study II) provide a deep and broad understanding of the ways in which participants understood privacy. In terms of depth, participants' privacy conceptions were often more than a mere restatement of the word privacy (e.g., "because it's an invasion of my privacy"). Rather, participants brought to bear privacy considerations based on whether there are legitimate uses of the information (e.g., "I just don't feel like people in Tokyo, and I'm sure they're all very nice, need to be privy to what I look like"), ways of maintaining anonymity through technical mechanisms (e.g., "Because [of the way the technology works], we can't pick up details of people's faces"), and people's control over information (e.g., "They don't want other people to know"). The results also show that people's privacy judgments are multifaceted and overlap with broader considerations based on physical harm (e.g., "If there is an accident, you can see them and then you can help them"), psychological well-being (e.g., "At this point, it's getting kinda scary as to why in the world they're doing this"), and informed consent (e.g., "It's okay with me … if it's disclosed"). It was also the case that participants' privacy evaluations depended, in part, on how they viewed the local and cultural practices. Thus participants drew on their differing understanding of social expectations to support both positive evaluations (e.g., "It just

seems fine; there's hundreds of cameras all over the place, you know, watching you constantly") and negative evaluations (e.g., "I don't feel the same way about it [the large display in an apartment on University Ave.] because when you're in an office, you're in a professional environment, you know, there's certain things that you do and you don't do"). Thus future studies of information technologies and privacy in public places would do well to engage people with these deeper and broader considerations.

As shown in the introduction, in the field of human–computer interaction (as represented by its major publication venues during 2000–2004), we did not find a single empirical publication about privacy that reported analyses with respect to gender. Thus one of the goals of this study was to examine potential gender differences in people's judgments about privacy in public. We found across both the surveys (Study I) and the interviews (Study II) a clear pattern in which more women than men expressed concerns about the display of real-time images from a camera in a public place. In addition, a greater percentage of men expressed concerns about privacy when they were in the more vulnerable position of being the Watched compared to the Watcher. This latter finding is not surprising insofar as people typically become more concerned about an issue when it affects them directly. What is surprising is that the percentage of women who expressed concerns did not change across conditions. Our interpretation is that, compared to men, women feel more vulnerable, especially in terms of physical safety and psychological well-being (such as being stalked) and that women bring these concerns into a greater variety of roles in life. One implication of our results is that when designing systems that may implicate privacy, it is important to bring a representation of perspectives (in this case vis-à-vis gender) to the design table, in terms of the user perspective, indirect stakeholders, and the design team itself.

In terms of the effect of location of the large display (in an office adjacent to the public plaza, within the same town, in Tokyo, across the globe) and the number of people watching (one person, thousands, millions), the majority of participants (61%) held consistent views about privacy across the seven context-of-use questions. Of the 39% of the participants who expressed differing views about privacy across the seven context-of-use questions, a cluster analysis revealed two overarching patterns. First, these participants more often said that it was all right to display the image in the building adjacent to the public plaza than elsewhere. Second, these participants more often said that it was all right to display the image in an office with a window view of the public plaza compared to an inside office in the same building. In addition, our results show some indication that for the participants who did not hold a consistent view of privacy across the seven context-of-use questions, displaying the image in a large number of remote locations was more acceptable than displaying the image in a single remote location. This finding runs counter to a good deal of literature that shows that when the magnitude of a problem increases,

so does the judgment against it. Why, then, the different pattern of results regarding magnitude in our current study? One explanation emerged from the interview justification results. Namely, by increasing the number of people watching one's image on a large display, personal security could be enhanced by virtue of the increasing number of people who would be in a position to come to one's aid in time of trouble.

There are at least two substantial concerns that can be raised about the studies reported here. One concern entails our approach to the qualitative interview data. Specifically, it could be argued that through a systematic treatment of the qualitative data, we have lost a rich, textured account of people's experiences and judgments about privacy and that a narrative-like approach to the data would have yielded a more cohesive account of each person's unique circumstance and perspective. We agree that such narrative analyses are valuable, particularly when the research goals emphasize the detailed perspectives of a limited number of individuals (see, e.g., in our own work, Friedman, Freier, Kahn, Lin, & Sodeman, 2005; also Dourish, Grinter, Delgado de la Flor, & Joseph, 2004). At the same time, such narrative methods are less well-suited to identifying more general patterns across larger data sets, as was the case here with the patterns that we sought with respect to the multidimensional elements of people's privacy judgments. Thus, we drew on well-established methods for analyzing social–cognitive data (Damon, 1977; Kahn, 1999; Kohlberg, 1984; Turiel, 1983). Like the narrative analyses, these social–cognitive methods entail a careful reading of every interview in its entirety (over 1,100 single-spaced transcript pages from 120 individuals). Then, as we have described in the Methods section, coding categories were generated from half of the data, staying close to how people spoke about their views. Those categories were then applied to the entire data set. Thus, although giving up some on a rich narrative account, we believe that our systematic coding of the qualitative interview data at the level of people's reasons positioned us to speak to the research questions at hand.

A second concern entails that of potential bias in the survey and interview questions. Granted, the questions directed participants' attention to some issues—in this case, that of privacy in public—and not to other issues, such as security. Thus it could be argued that our survey and interview questions led participants to identify privacy concerns. There is some merit to this argument, and in this sense our results may represent an upper bound on participants' concerns and that other benefits from the installation, such as increased security, may be underrepresented in the data. That said, we want to emphasize the many ways that we were able to limit bias in the research methods: First, there was no mention of privacy in the recruitment of participants. Second, there was no mention of privacy in the initial questions in both the survey and the interview. Third, when privacy was introduced, participants were free to say that their privacy was not violated. Indeed, many did. Recall that 50% to 83% of the

participants we interviewed (depending on gender and condition) said that their privacy was not violated (see Figure 4). Fourth, the semistructured-interview methodology allowed participants to expand on topics of import to them and to bring more than one type of issue to bear in responding to a single question. As illustrated in the discussion of the qualitative data, participants often did so, and all of their reasons were coded and analyzed. Thus, the range of justifications reported in Figure 5 emerged, including not only references to privacy but to nine other overarching categories: personal interest, external sanctions, functionality, social expectations, welfare, property, informed consent, fairness, and nonissue. Finally, it is important to recognize that the key gender findings of this study stand in the sense that men and women were asked the same questions but responded differently.

We turn finally to some larger biological and cultural reflections on privacy in public. From a biological perspective, it seems reasonable to assume that the human experience of privacy has grown out of biological capacities as a species to sense and to be sensed (Arendt, 1958/1998; Barkow, Cosmides, & Tooby, 1992; Wilson, 1975, 1998). Imagine, for example, a social group some tens of thousands of years ago: A person's presence in public was known by people who could directly sense (such as in see or hear) the other. Vice versa, the sensed person could, in virtually all situations, equally well sense the sensor. In the current study, we saw evidence of such biological reasoning. For example, when participants distinguished among the seven context-of-use questions, they primarily did so on the basis of what they could see (the university building) versus what was out of sight (locations in the local city, in Tokyo, and across the globe). Moreover, participants brought considerations of biology into their reasoning about personal interests (e.g., "We're people, and we have eyes, and we're gonna end up watching other people; we're interested in other people"), social expectations (e.g., "Since you're in a public place, you know that somebody's going to watch you. … Somebody will be watching you"), and how the technology mimics or augments human senses (e.g., "[The large display is] the same as someone looking across the fountain"). Future research could further explore how people's conceptions of privacy in a technological context are at times tethered to human biology.

From a cultural perspective, most new technologies take time to become integrated into—and change—existing patterns of social life (Friedman, 1997b; Grudin, 2001; Pelto, 1973; Sharp, 1980/1952). Thus it remains to be seen to what extent people will allow and adapt to emerging conventional practices that involve Web cameras and surveillance technologies that usurp privacy in public places. On the one hand people may well accept greater erosion of privacy, as much due to the benefits accorded by increased personal security as to the juggernaut of technological progress that is difficult to stop**.** On the other hand, the research literature suggests that children and adults need some privacy to develop a healthy sense of identity, to form at-

tachments based on mutual trust, and to maintain the larger social fabric (Fried, 1968; Newell, 1998; Palen & Dourish, 2003; Reiman, 1976; Schoeman, 1984). The literature also shows that privacy in some form exists cross-culturally (Briggs, 1970; Moore, 1984; Westin, 1967).

As technologies continue to augment the senses and decrease the limitations of physical space and time, there may become fewer and fewer mechanisms by which to maintain privacy in the public realm. Moreover, if it is true—and we believe it is—that some modicum of privacy in public is part of our biological heritage and necessary for healthy psychological and societal functioning, then the private in public needs to be accounted for and supported in system design.

NOTES

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