

A Study of the Risk Perception of Information Leakage in a computer-mediated Society (3)*

Koji Kosugi**

Takehiro Fujihara***

Hiromi Ikeuchi****

According to the “Research Association of Internet Business” carried out by Ministry of Posts, the number of internet users was about eleven million in 1997, and will be about forty-one million in 2005. The development and diffusion of information networks may provide not only the opportunity for various choices and voluntary participation, but also a more wealthy and open society in which we may express our individuality (Ministry of Posts, 1998). But, the Ministry of Posts (1995) pointed out both positive and negative sides of this computer-mediated society. For example, the negative side of computer-mediated society will be the information leakage, being wire-tapping, piracy, disturbance of privacy, and so on. Whereas advanced instruments and progressive technology may make our life more effective and comfortable, these technologies may threaten human beings and the environment.

Slovic (1987) developed techniques for assessing the complex and subtle opinions that people had about risk. He found what people mean when they said that something was (or was not) “risky” and determined that dread risk and unknown risk factors underlay those perceptions.

In computer-mediated society, one of the serious risks may be information leakage. The purpose of this study was to investigate the risk perception of information leakage in a computer-mediated society. Fujihara, Ikeuchi, and Wakimoto (1998) found that the relationship between the fear and the probability of information leakage was negatively correlated, and female students felt more fear about information leakage than did male students. But, as the sample in the above study was limited to university students, their findings could not be generalized.

Method

Participants; We sent by mail 514 questionnaires to persons listed in the alumni address book of the department of Social Psychology. One hundred ninety seven valid responses were returned. (100 Males and 97 Females, Mean Age; 41.90).

Measures; Twenty-nine item risk perception scale with fear and probability dimension. (Fujihara et al., 1998) In the fear dimension, subjects were asked to evaluate the degree of fear toward a leakage of information from 1 (do not feel any fear) to 5 (feel fear very much). In the probability dimension, subjects were asked to evaluate the degree of future probability of increasing events of information leakage from 0% to 100% using 10% intervals.

The media use capability scale was measured by asking participants how to watch a video, to program the CD player, or to save a file with the word processor, and so on. Fi-

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**Graduate Student Kwansei Gakuin University

***Professor of Social Psychology Kwansei Gakuin University

****Graduate Student Kwansei Gakuin University

nally, possession of communication tools scale was measured by asking whether or not the respondents had a personal computer, pocket pager, mobile telephone, and so on.

The scale of attitude toward computer-mediated society (Tatsuki, 1993) consisted of pairs of words and subjects were asked to choose either one of the words that fits to the concept of “computer-mediated society” from each pair. This scale can classify the subjects into two categories. One is called connection-oriented, and another is called control oriented.

Results and Discussion

1. Means of risk perception scale and risk probability scale

Table 1 shows the means and standard deviations of the risk perception scale. The highest average score item was “To be searched your bank account files and changed it (Item No. 2, score: 4.86)”. “Being wire tapping (Item No. 3, 4.78)” and “Leakage your credit card number (Item No. 16, 4.63)” ranked second and third, respectively. On the other hand, the lowest average score item was “Leaking the school name you graduated (Item No. 27, 2.36)”. The second and third lowest were “The detailed account of card were delivered while you are absence (Item No. 24, 2.64)”, and “Leaking your or your partner’s office name (Item No. 25, 2.64)”.

Table 1. The means (M) and standard deviations (SD) of risk perception scale

Item No.	Items	M	SD
2	To be searched your bank account files and changed it	4.86	0.41
3	Being wire tapping	4.78	0.53
16	Leakage your credit card number	4.63	0.65
4	To be read your diary or letter	4.53	0.77
13	Leaking the worries which you don't want to be known	4.42	0.77
11	Leakage your bank account	4.38	0.87
14	Leakage your name when you use the computer available with anonymity	4.27	0.74
26	To be registered your information in information library	4.23	0.92
15	To be read your pocket note	4.20	0.82
10	To be deprived of time and space you can spend with your intimate persons	4.18	0.87
21	To be deprived of time and space you can spend alone	4.16	0.90
18	To be read the e-mail which you received	4.07	0.92
29	To be known of whom you spoke ill	4.05	0.93
8	To be known the message in telephone message recorder	3.93	1.02
28	Leaking your family's circumstances	3.88	0.97
23	Leaking the information about your family	3.78	1.03
20	Leakage your hobby which you don't want to be known	3.62	0.96
1	Some company search your phone number, and call you	3.51	1.10
5	Leaking your phone number	3.42	1.01
17	Leaking your address	3.28	1.04
19	Making public your alumnus list	3.12	1.07
12	Leaking your birthday	3.03	1.16
6	To be known your phone number to whom you call	2.99	1.11
9	To be known your e-mail address to whom you sent	2.93	1.13
22	Leaking your nick name in home	2.78	1.13
7	Leaking your height or weight	2.77	1.18
25	Leaking your or your partner's office name	2.64	1.20
24	The detailed account of card were delivered while you are absence	2.64	1.07
27	Leaking the school name you graduated	2.36	1.06

As shown in Table 2, higher average score in the risk probability scale were “Some company search your phone number, and call you (Item No. 1, 83.20%)”, “Leaking your phone number (Item No. 5, 82.92%)” and “Making public your alumnus list (Item No. 19, 79.70%)”. And the lower ones were “To be searched your bank account files and changed it (Item No. 2, 23.43%)”, “Leaking the worries which you don’t want to be known (Item No. 13, 30.10%)” and “To be read your diary or letter (Item No. 4, 33.30%)”.

Table 2. The means (M) and standard deviations (SD) of risk probability scale

Item No.	Items	M	SD
1	Some company search your phone number, and call you	83.20	19.42
5	Leaking your phone number	82.92	21.25
19	Making public your alumnus list	79.70	23.71
17	Leaking your address	78.48	23.81
24	The detailed account of card were delivered while you are absence	78.43	29.14
27	Leaking the school name you graduated	77.01	23.51
25	Leaking your or your partner’s office name	75.63	23.02
12	Leaking your birthday	69.39	27.10
6	To be known your phone number to whom you call	64.42	29.11
9	To be known your e-mail address to whom you sent	61.83	30.87
23	Leaking the information about your family	52.64	24.85
29	To be known of whom you spoke ill	51.98	25.92
7	Leaking your height or weight	50.61	27.75
26	To be registered your information in information library	50.15	30.61
28	Leaking your family’s circumstances	46.29	23.95
22	Leaking your nick name in home	46.14	27.17
18	To be read the e-mail which you received	46.04	29.25
14	Leakage your name when you use the computer available with anonymity	45.69	28.23
3	Being wire tapping	42.84	32.06
11	Leakage your bank account	41.37	30.03
16	Leakage your credit card number	41.33	30.45
8	To be known the message in telephone message recorder	38.63	29.20
21	To be deprived of time and space you can spend alone	38.47	26.25
20	Leakage your hobby which you don’t want to be known	37.81	23.58
10	To be deprived of time and space you can spend with your intimate persons	36.63	25.11
15	To be read your pocket note	36.60	27.83
4	To be read your diary or letter	33.30	25.83
13	Leaking the worries which you don’t want to be known	30.10	21.88
2	To be searched your bank account files and changed it	23.43	24.73

A Scatter Diagram between the risk perception scale and risk probability scale is displayed in Fig. 1. The correlation between the average scores of the risk perception scale and risk probability scale was negative ($r = -0.75, p < .05$).

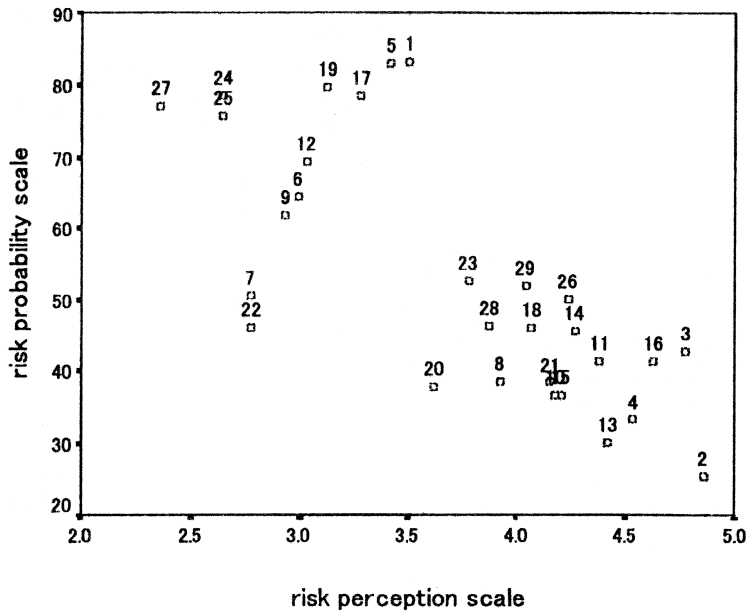


Fig. 1. Scatter Diagram between risk perception scale and risk probability scale

2. Factor structure of Risk Perception

Factor analysis of the risk perception scale of fear dimension yielded three factors. Then factor matrix was rotated by Promax method (See Table 3.).

The first factor was interpreted as “the risk perception of the leakage of public information about an individual,” such as the leakage of his/her office name, school name which he/she graduated, and his/her address. The second factor was interpreted as “the risk perception of the leakage of private information of an individual,” such as his/her own worries, and the contents of his/her notebook and diary. The third factor was named as “the risk perception of the leakage of the information related with money,” such as the fear of wire tapping the telephone, the leakage of the bank account number and the credit card number. Sex differences were found for each factor score (Factor 1, $t(181) = 3.90, p < .05$ Factor 2, $t(181) = 3.73, p < .05$ Factor 3, $t(169) = 5.32, p < .05$), which meant that females showed significantly higher factor score than males. But no difference was found for each factor score in different age groups. (Factor 1, $F(3,182) = 1.51, n.s.$ Factor 2, $F(3,182) = 1.95, n.s.$ Factor 3, $F(3,182) = 1.37, n.s.$)

Factor analysis of the risk probability scale, which consisted of the same items as the risk perception scale, yielded three factors. Factor matrix was rotated by Promax method (See Table 4.).

Table 3. Pattern Matrix of risk perception scale

Item No.	Items	Leakage of public information about an individual	Leakage of private information of an individual	Leakage of information related with money
27	Leaking the school name you graduated	0.879	0.002	-0.212
25	Leaking your or your partner's office name	0.852	0.130	-0.221
19	Making public your alumnus list	0.776	-0.178	0.208
5	Leaking your phone number	0.698	-0.280	0.322
17	Leaking your address	0.691	-0.130	0.204
22	Leaking your nick name in home	0.673	0.072	-0.019
6	To be known your phone number to whom you call	0.600	-0.023	-0.069
12	Leaking your birthday	0.598	0.160	0.009
7	Leaking your height and weight	0.588	0.128	0.071
24	The detailed account of card were delivered while you are absence	0.588	0.176	-0.345
1	Some company search your phone number, and call you	0.516	-0.201	0.345
9	To be known your e-mail address to whom you sent	0.501	0.177	-0.080
23	Leaking the information about your family	0.473	0.329	0.074
13	Leaking the worries which you don't want to be known	-0.068	0.699	0.093
15	To be read your pocket note	0.100	0.621	0.028
4	To be read your diary or letter	-0.142	0.605	0.239
10	To be deprived of time and space you can spend with your intimate persons	-0.192	0.595	0.269
28	Leaking your family's circumstances	0.316	0.509	-0.058
21	To be deprived of time and space you can spend alone	-0.029	0.383	0.255
8	To be known the message in telephone message recorder	0.211	0.365	0.123
29	To be known of whom you spoke ill	0.088	0.321	-0.096
18	To be read the e-mail which you received	0.253	0.316	0.255
3	Being wire tapping	-0.062	0.002	0.696
2	To be searched your bank account files and changed it	-0.292	0.151	0.593
16	Leakage your credit card number	0.039	0.041	0.514
11	Leakage your bank account	0.031	0.233	0.472
14	Leakage your name when you use the computer available with anonymity	0.047	0.082	0.442
26	To be registered your information in information library	0.160	0.280	0.372
20	Leakage your hobby which you don't want to be known	0.224	0.159	0.366

Table 4. Pattern Matrix of risk probability scale

Item No.	Items	Probability prediction of the leakage of public information	Probability prediction of the leakage of private information	Probability prediction of the leakage of information related with money
25	Leaking your or your partner's office name	0.918	-0.089	-0.112
27	Leaking the school name you graduated	0.848	-0.095	-0.007
19	Making public your alumnus list	0.727	0.043	-0.070
17	Leaking your address	0.707	0.038	0.025
5	Leaking your phone number	0.676	-0.063	0.066
12	Leaking your birthday	0.644	0.203	-0.032
1	Some company search your phone number, and call you	0.586	0.067	-0.063
24	The detailed account of card were delivered while you are absence	0.493	0.035	-0.166
23	Leaking the information about your family	0.413	0.209	0.259
22	Leaking your nick name in home	0.392	-0.119	0.361
7	Leaking your height and weight	0.390	0.034	0.159
29	To be known of whom you spoke ill	0.346	0.047	0.299
2	To be searched your bank account files and changed it	-0.253	0.874	0.003
16	Leakage your credit card number	0.149	0.825	-0.216
11	Leakage your bank account	0.073	0.794	-0.082
14	Leakage your name when you use the computer available with anonymity	0.080	0.705	0.037
18	To be read the e-mail which you received	0.016	0.701	0.137
8	To be known the message in telephone message recorder	-0.106	0.696	0.150
3	Being wire tapping	-0.008	0.645	0.059
9	To be known your e-mail address to whom you sent	0.117	0.581	-0.046
26	To be registered your information in information library	0.091	0.440	0.061
6	To be known your phone number to whom you call	0.259	0.382	-0.030
15	To be read your pocket note	0.137	0.356	0.284
10	To be deprived of time and space you can spend with your intimate persons	-0.215	-0.051	0.916
21	To be deprived of time and space you can spend alone	-0.158	-0.024	0.818
13	Leaking the worries which you don't want to be known	-0.041	0.089	0.780
20	Leakage your hobby which you don't want to be known	0.129	0.062	0.549
28	Leaking your family's circumstances	0.303	-0.034	0.513
4	To be read your diary or letter	0.096	0.274	0.331

The first factor was interpreted as “the probability prediction of the leakage of public information”, the second factor was labeled as “the probability prediction of the leakage of private information” and the third factor was labeled as “the probability prediction of the leakage of information related with money”. Factor scores indicated no significant sex and age differences.

3. Relationship between the risk Perception and other variables

In order to examine the relationship between risk perception and other variables, multiple regression analysis was conducted with each of the three risk perception scores as dependent variable, sex, using ability, possession score and attitude score as independent variables.

Table 5. Result of Multiple Regression Analysis

	Leakage of public information	Leakage of private information	Leakage of information related with money
Using ability	0.154*	-0.034	-0.014
Possession score	-0.002	-0.013	-0.009
Attitude score	-0.128*	-0.018	-0.11
Sex	0.393**	0.279***	0.355***
Age	0.191	-0.005	-0.077
R square	0.131***	0.089**	0.157***

* $p < .10$ ** $p < .05$ *** $p < .01$

According to Table 5, only sex variable significantly predicted all of three factor scores. And, the first factor score, namely the leakage of public information, was marginally significantly predicted by “using ability” and “attitude score”.

Conclusion

Factor analysis of risk perception scale yielded three factors and the mean factor scores indicated that people perceived the information leakage related with money to be more risky.

And, negative correlation between fear perception and risk probability might suggest that risk perception would increase in proportion to the less probability of the incident to occur. These results suggested that people might feel fear toward unknown or unpredictable events.

Sex difference was found for all three factor scores with higher risk perception in females than in males. These results were consistent with Fujihara et al. (1998) results of student sample. Thus, female may have higher risk perception of the information leakage in a computer-mediated society.

Where does this difference come from? Our speculation is that in comparison with males, females always have a high possibility to become victims or targets of unknown or potent attackers in a computer-mediated society.

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ABSTRACT

The purpose of this study was to investigate the risk perception of information leakage in a computer-mediated society. The survey questionnaires used consisted of a risk perception scale and a risk probability scale, a media use capability scale, possession of communication tools scale, and a scale of attitude toward computer-mediated society. The risk perception scale yielded three factors interpreted as “a leakage of public information”, “a leakage of private information” and “a leakage of information related with money”. Sex differences were found for all three factor scores with higher risk perception in females than in males.