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Age and Trust in the Internet: The Centrality of Experience and Attitudes Toward Technology in Britain

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Abstract

The authors describe changes in user's trust on the Internet in Britain between 2003 and 2009, and show how the relationship between age and trust can be explained by a combination of experience with the Internet and general attitudes toward technology. The comparison uses 2003 results reported by Dutton and Shepherd (2006) versus similarly sampled 2009 data. The authors examine two sets of dependent variables—perceptions of trust and risk on the Internet and use of the Internet for e-commerce, an anticipated impact of trust. The authors find that indicators of trust are related to experience with the technology, although this relationship is less important in 2009 than it was in 2003. The authors also find that trust is influenced by general attitudes toward technology. When both experience on the Internet and technology attitudes are controlled, the relation between indicators of trust and age disappears. This finding is particularly interesting since age is usually an important predictor of many aspects of the Internet; it suggests that the role of age can be mitigated by addressing the degree to which older individuals tend to have less experience with the Internet and more scepticism about the role of technology in society. Interventions could address both of these determinants of distrust.

Keywords

trust, risk, Internet, technology attitudes, replication

On the Internet, trust poses a paradox.[1] The paradox is easiest to see from the perspective of exchange theory, as developed by Blau (1968), Homans (1974), and Thibaut and Kelley (1959). Exchange theory suggests that people are most likely to use a new product when it reduces their costs and maximizes their rewards. The Internet is primarily a communication technology and much of its attraction stems from the fact that it reduces the cost of communication. E-mail is one dramatic example; it is no accident that e-mail has been the most common use of the Internet. The Internet also reduces the costs of activities that depend on communication, such as the cost of searching for information.

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The paradox is that the Internet makes some things more costly; in particular, trust. Many commercial transactions benefit from trust. From an exchange theory perspective, trust reduces the cost of a transaction by reducing the need for expensive supporting activities that reassure participants that the transaction will be carried out honestly, such as detailed contracts, third-party certification, advance payments, insurance, and other supporting actions. On the Internet, the product being bought can only be seen in pictures, which may or may not be accurate representations of the actual product. It cannot be touched or examined, and many of the nontextual, face-to-face cues that people may use to judge the honesty of the seller, such as voice tone, facial expressions, and so on, are also absent. The absence of these indicators might make trust harder to achieve.[2] To the extent that additional supporting activities need to be included to provide the trust for a transaction to go forward, they may raise the cost of the transaction.

As a result, trust might be more problematic on the Internet than in traditional retail settings. Despite the ease of communication, difficulty of obtaining trust may limit the scope or growth of commerce on the Internet. This leads to two broad questions: First, to what extent do people extend trust to the Internet? Second, has the character of trust changed over time as use of the Internet has expanded?

To answer these questions, we are fortunate that we have comparable data sets collected in 2003 and 2009. Dutton and Shepherd (2006) reported the results from a 2003 random sample of adults living in Britain, the Oxford Internet Survey (OxIS). In this article, we replicate the Dutton and Shepherd analyses using the most recent OxIS survey, 2009. We show changes over the past 6 years and we extend their results using insights from more recent research. The article is divided into three sections. We begin by briefly summarizing the literature on trust and the Internet, with special attention to prior work on Britain and to Dutton and Shepherd (2006). Then we present our replication and extensions, followed by a discussion of the results.

Trust and the Internet

The major conclusion reached from Dutton and Shepherd's (2006, pp. 442–445) analysis of 2003 data is that the Internet is an experience technology. By this, they mean that "[t]hose exposed to the Internet gain more trust in the technology ... Even past users have more confidence in the Internet than do non-users who have no experience" (p. 442). Gaining experience means that users find the Internet easier to use, they are more comfortable with it, they are more trusting, and they are able to make more sophisticated and more effective use of different components of the Internet. This is consistent with a reduction in costs and enhancement of rewards; in other words, the effects of an experience technology are as predicted by exchange theory. This perspective suggests that we ask whether the Internet continues to be an experience technology. Now that we have more data, we can conduct a further test. The Internet is a complex environment with a great deal of depth. Over years of use, people can gain additional competence, which may lead to additional trust. Do the more experienced tend to be even more comfortable and trusting than the less experienced?

There is an alternative possibility. Between 2003 and 2009, many early users gained an additional 6 years of experience with the Internet. The longer people use the Internet, the more likely they are exposed to bad experiences like abusive e-mails, viruses, foreign fraud, or misrepresented products. To the extent that negative experiences remind people of the costs and risks of the Internet, they may lead to a decline in trust. This suggests that more experienced users could be less trusting than those with lesser experience. Dutton and Shepherd found that bad experiences reduced confidence and increased perception of risks (pp. 444–445), although only the increased risk was statistically significant. Others also found this: Hoffman, Novak, and Peralta (1999) found that perception of lack of control leads many consumers to avoid online purchases.[3]

In general, models of trust divide influence into four general categories: the external environment, the characteristics of the online vendor, demographic characteristics of the individual, and the attitudes, perceptions, and experiences of the individual (Connolly & Bannister, 2007; Reigelsberger, Sasse, & McCarthy, 2007). The external environment includes such things as the characteristics of the legal framework and strength of supporting institutions such as banking or credit. These external environmental characteristics do not vary within a nation, so a national sample survey cannot measure their effects.[4] The characteristics of individual websites vary greatly but are specific to each website; again, a national sample is not relevant. OxIS can effectively address the remaining two categories: demographic influences on trust as well as individual dispositions, attitudes, and experiences on the web. The Dutton and Shepherd article included a number of demographic variables and, of course, experience played a major role.

In addition to replicating those models with new data, this article examines the role of attitudes on perceptions of trust and risk. Attitudes are more-or-less stable characteristics of individuals instead of characteristics of the social or institutional environment. Attitudes are somewhat different from the internalized norms used by Reigelsberger et al. (2007). The key difference is that attitudes are individually and privately held. For any individual person they have no *necessary* link to any larger social norms, though such a link may exist. This is a theoretical difference since the actual measurement is invariably the same: by Likert scales asking respondents to agree or disagree with certain statements.

A key attitude is propensity to trust. Researchers who think of trust as a personality characteristic often use an individual's general disposition or propensity to trust to predict trust behavior (e.g., Chopra & Wallace, 2003). Like other general dispositions, this is often seen as learned during early childhood and carried forward as a stable orientation in a broad range of situations (Rotter, 1967). Alternatively, it can be viewed as a propensity developed as a result of adult experiences (Connolly & Bannister, 2007). Sociologists and organizational psychologists have usually omitted this variable, preferring to focus on structural and situational factors (Burt & Knez, 1995). But there is considerable evidence that people vary widely in their general willingness to trust (Gefen, 2000; Lee & Turban, 2001). Propensity to trust has been part of two major models of consumer trust, Cheung and Lee (2000, 2005) and Connolly and Bannister (2007).

Curiously, a second set of general dispositions has been omitted in studies of Internet commerce. These are users' attitudes toward technology. They represent broad receptiveness to technology. Perhaps, they have been uninteresting because the literature focuses fairly closely on issues that websites can influence, and a general attitude toward technology is not something that can be changed by a vendor. As general dispositions, they represent the default point of view for people who are using the Internet. Their default point of view may be modified by their personal experiences or other factors, nonetheless, when people are asked about technology, these attitudes are the responses that they give "off the top of their heads" (Zaller, 1992). As the default perspective, they influence the willingness of respondents to learn new aspects of a technology and the motivation to overcome problems. To this extent, they influence the sensitivity to risk and confidence about using technology.[5]

Based on this analysis, the regressions reported here contain three classes of variables. Several demographic variables—like gender, age, and education—serve as controls. A group of variables measure different kinds of experience, like proximity to the Internet, broadband access, and bad experiences. Finally, two attitude variables measure propensity to trust and attitudes toward technology.

Data

The OxIS is a biennial sample survey of adult Internet use in England, Wales, and Scotland. The first survey was conducted in 2003 and subsequent surveys followed in 2005, 2007, and 2009. Each

survey has followed an identical sampling methodology. The respondents are selected for face-to-face interviews based on a three-stage random sample of the British population. Although questions have been added as new issues emerged, many questions have remained the same to facilitate comparisons between years.

An important strength of OxIS is that it is not a convenience sample. This distinguishes it from many otherwise excellent studies of trust (e.g. Briggs, Burford, Angeli, & Lynch, 2002, Cheung & Lee, 2000, 2005; Connolly & Bannister, 2007). This has both methodological and theoretical implications. Methodologically, as a representative sample, OxIS allows us to project to the adult (14 and over) population of Britain. This is not possible for a convenience sample. Theoretically, a random sample of adults allows us to explore a number of interesting variables. The convenience samples are usually composed of college students who have limited variation in age, social status, and income compared to the general population of Internet users. We can explore the effects of these demographic variables where convenience samples cannot.

We use the 2009 survey, which contacted 2,662 people and completed interviews with 2,013, for a response rate of 75.6%. The high response rate was aided by the fact that respondents knew that the research was being conducted for the University of Oxford and by the promise that £1 would be donated to Oxfam for every complete interview. Our analyses are based either on the full sample of 2,013 or on the subset of current Internet users, 1,401 respondents, 69.6% of the full sample.[6]

Results

The level of trust continues to vary widely in 2009. Relatively few people are either blindly trusting or deeply suspicious. When asked how much trust they have in "people you can communicate with online," 20% of the sample said they "Don't Know" while the other respondents were distributed across the five response categories. Most respondents were in the middle categories with a tendency toward being trusting, but less than 2% claimed "total trust."

Factors Shaping Trust

The concept of the Internet as an experience technology led us to explore proximity to the Internet in relation to trust. As people use the Internet over time, they may develop more assurance in their skills and more confidence that they can deal effectively with the risks. One measure of their sense of assurance is the proportion who answered "Don't Know" to the question "How reliable or accurate would you rate information on the Internet?" The broad pattern for 2009 is identical to 2003: people closest to the Internet—broadband users—are least likely to say they "Don't know" while people farthest from the Internet—nonusers—are most likely, see Figure 1. But there is also a major change: compared to 2003, broadband users, who make up 67% of the 2009 sample, are much less likely to answer "Don't know." Narrowband users are somewhat less trusting, but very few remain. In 2009, about 2% of users still connect via narrowband, 34 out of 1,401 users. At the other extreme, the proportion of nonusers (about 25% of the 2009 sample) who "Don't know" whether the information on the Internet is reliable or accurate has more than doubled to almost 70%. Users today are farther away from nonusers in their attitudes than they were in 2003. What accounts for this change? Our guess is that the characteristics of the nonuser population have changed since 2003. As the nonuser population shrank the remaining nonusers have become more homogeneous in terms of trust (and probably other ways as well). The people who remain nonusers are the least trusting of all.[7]

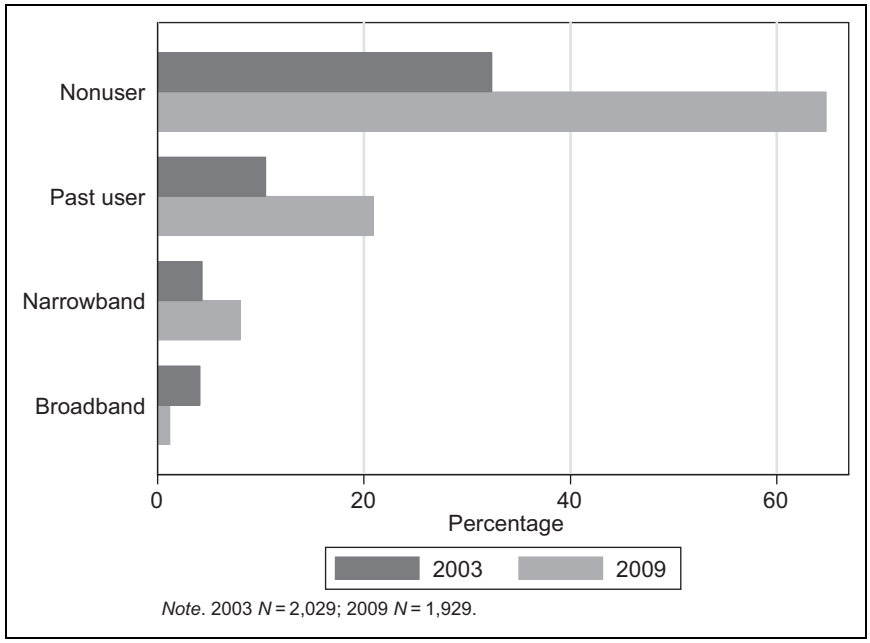

Figure 1. Percentage who answered "Don't Know". Question: how reliable would you rate information on the Internet?

Components of Trust

We did a PCA of the trust variables in order to create indices that were more stable than any individual variables, see Table 1. The PCA yielded two components with eigenvalues greater than 1.0. This led us to two broad theoretical conceptions of trust. The first component consisted of four variables: concern with protecting credit cards, agreement that the Internet is a threat to privacy, contact information is too easy to find, and it is difficult to assess product quality on the Internet. These variables reflect risks of using the Internet, so we named the component "net risk." The remaining three variables loaded most strongly on the second component: trust in people you can communicate with online, reliability of Internet services, and trust in people providing Internet services. This seems to reflect trust in the Internet and the people who use it, so we named this variable "net trust." These two components are conceptually and empirically distinct. It is possible to have considerable trust in the Internet while still recognizing that, realistically speaking, there are significant risks.

All seven variables were measured using 5-point Likert scales. In addition to the usual Pearson correlations, we also used matrices of ordinal measures of association, Goodman-Kruskal γ coefficients and Kendall's τ-b coefficients, as input into the PCA. All three of these similarity matrices produced identical output configurations, so we have considerable confidence that these two components are stable. This two-component configuration exactly matches the results based on the 2003 data. There is stability across time.

To measure attitudes toward technology, we again created indices with the aid of PCA. The PCA for technology attitudes had a single dominant component. Technology attitudes were composed of responses to Likert-scaled items: openness to trying new technology, technology is making things better plus three reverse-coded items; it is easier to do things without technology, lack of trust in technology, and nervousness around technology. The 5-item index has a satisfactory Cronbach's α of .82. Note that none of the technology attitude items mention specific aspects

Table 1. Trust Variables Principal Components Varimax Rotated Loading Matrix

	1	2
Concerned with protecting credit cards when using new technologies	0.733	–0.181
Agree: computers and the Internet are a threat to personal privacy	0.654	–0.127
Agree: difficult to assess product quality when shopping on Internet	0.535	–0.279
Agree: people can find my contact information too easily	0.505	0.227
How much trust do you have in the people providing Internet services?	–0.281	0.802
How reliable or accurate would you rate information on the Internet?	–0.248	0.741
How much trust in people you can communicate with online?	0.359	0.598

Note. $N = 2{,}013$.

Table 2. "Net Trust" Index Results for all Respondents

			2009 Coefficients			
	2003 Model		Model 1		Model 2	
Variable	Coeff.	β	Coeff.	β	Coeff.	β
Gender	0.01	.00	–0.05	–.02	0.08	.03
SES	–0.02	–.03	–0.06	–.03	–0.02	–.01
Age	0.00	.02	–0.01**	–.13**	–0.00	–.04
Education	–0.04*	–.05*	–0.09*	–.06*	–0.16**	–.10**
Broadband	0.71**	.23**	1.01**	0.35**	0.58**	.20**
Narrowband	0.71**	.36**	0.61**	0.06**	0.34	.03
Past user	0.39**	.09**	0.20	0.04	0.04	.01
Trust propensity	—	—	—	—	0.27**	.22**
Tech. attitude	—	—	—	—	0.10**	.32**
Constant	–0.34**	—	0.10	—	–2.27**	—
N	2,026		1,804		1,782	
R^2	n.r.		15.3		26.0	

Note. n.r.: R^2 was not reported for 2003; βs are standardized regression coefficients.
* $p \leq .05$ (two-tailed test); ** $p \leq .01$.

of the Internet such as credit cards, product quality, trust, shopping, or accuracy of information. In contrast to the specificity of the items in the net trust and net risk indices (Table 1), they are very general. The concepts that this variable measures do not necessarily reflect any deep-seated convictions, instead they reflect a general orientation or default point of view toward technology (Zaller, 1992).

Multivariate analysis of trust explores the influence of users' experience on the Internet and demographic variables like income, education, gender, or age. Tables 2 and 3 reproduce the results from 2003 and they add two models with 2009 data. Model 1 is a straightforward replication of 2003; Model 2 extends the 2003 analysis by adding two attitude variables: the propensity to trust variable and attitudes toward technology in general. We begin by discussing Model 1; we discuss Model 2 below. In Model 1, generally, the 2003 and 2009 results agree. The use of the Internet is positively correlated with net trust and negatively related to net risk. The significant, positive coefficients for broadband use and narrowband use show this for net trust in Table 2. For net risk, the signs of broadband and narrowband coefficients reverse to negative, as they should (see Table 3). Controlling for the other variables, education is negatively related to net trust, suggesting that more education leads to more skepticism. This pattern repeats for net risk, where the education variable has a positive sign.

Table 3. "Net Risk" Index Results for all Respondents

	2003 Model		2009 Models			
			Model 1		Model 2	
Variable	Coeff.	β	Coeff.	β	Coeff.	β
Gender	0.11	.04	0.00	.00	–0.12*	–.05*
SES	–0.03	–.04	0.07	.04	–0.03	.03
Age	0.00	.01	0.01**	.13**	0.00	.05
Education	–0.04	–.05	0.08*	.05*	0.13**	.08**
Broadband	–0.53**	–.17**	–0.41**	–.14**	0.07	.02
Narrowband	–0.16**	–.08**	–0.77**	–.08**	–0.31	–.03
Past user	0.15	.04	–0.22	–.04	0.01	.00
Trust propensity	—	—	—	—	0.23**	.18**
Tech. attitude	—	—	—	—	–0.12**	–.40**
Constant	–0.24	—	–0.48	—	1.11**	—
N	2,026		1,804		1,782	
R^2	n.r.		5.0		17.5	

Note. n.r.: 2003 R^2 not reported; βs are standardized regression coefficients.
* $p \leq .05$ (2-tailed test); ** $p \leq .01$.

Gender and socioeconomic status (SES; measured by the standard British social profile) are unrelated to either net trust or net risk. These patterns are consistent for 2003 and 2009.

There are two changes: age is nonsignificant in 2003, but in 2009, it is negatively associated with net trust and positively associated with net risk. This suggests that older people have become less trusting. Being a past user is no longer a significant predictor in the net trust model. It was not significant in 2003 or 2009 in the net risks model. This is consistent with Figure 1, where the bulk of users (broadband users) are becoming more trusting, but the other categories including ex-users are becoming less trusting since 2003.

Model 2 adds the two attitude variables: propensity to trust and attitudes toward technology. The first thing to notice is their overall impact: big. The R^2 is about 11 percentage points higher in the net trust regression (Table 2) and over 12 points higher in the risk regression (Table 3). These broad, general attitudes seem to have a large effect on perceptions of both trust and risk. In both tables, the technology attitude variables are highly significant and in the appropriate direction: positive attitudes are positively associated with trust and negatively associated with risk; the signs reverse for negative attitudes.

The propensity to trust variable is significant and positive in both tables. The theory says that the general attitude of propensity to trust ought to be positively related to net trust; it should not be positively related to net risk. It is not due to collinearity since the positive effect is apparent even in the simple scatter plots of propensity to trust against both dependent variables; that is, the effect is there even in the zero-order relationships. We speculate that propensity to trust may be a measure of intensity of feeling. Not trusting is similar to not caring. People who do not care about trust also do not care so much about risk and they score low on those variables as well. Similarly, not caring about trust would suggest people are not very reliable so these respondents would score low on the net trust variable as well.

Also interesting are some of the changes to the other coefficients. We look first at changes reflected in both models before we consider net trust and net risk separately. Once we control for technology attitudes, age is no longer significant. This is true in both regressions. This is a particularly interesting result since a common finding is that across many measures older people are

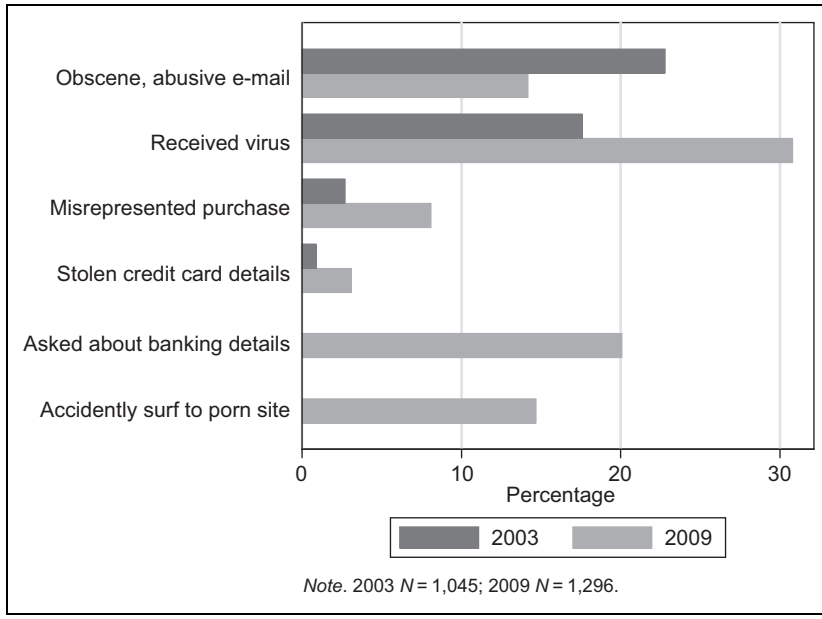

Figure 2. Bad Experiences on the Internet.

consistently less engaged with the Internet. This result suggests that their weaker involvement can be explained by their general attitudes.

There are two other changes. Only the broadband coefficient is significant for net trust but neither the broadband nor the narrowband coefficients are significant in the net risk regression. This suggests a relationship between narrowband users and technology attitudes. In a country like Britain where broadband access is inexpensive and available almost everywhere, staying with a narrowband link to the Internet may be the result of a general reluctance to engage the Internet. Narrowband users may be generally less comfortable with technology and their technology attitudes may be a reason for staying with narrowband. Broadband users are more confident at least where trust is concerned. Looking at the net risk regression (Table 3), we notice that gender becomes significant for the first time. It is negative, suggesting that once we control for technology attitudes, women feel less risk than men. SES seems to have no effect on risk or confidence.

As a whole, the addition of the two attitude variables in the Model 2 regressions has had a major impact. The explained variance jumps sharply and several important coefficients change in interesting ways. Most importantly, age—one of the most critical factors related to use of the Internet—becomes nonsignificant.

Bad Experiences Online

If the Internet is an experience technology, then what is the effect of negative experiences? Will they reduce trust, as suggested by the fact that the ex-users in Figure 1 tend to perceive greater risks? Figure 2 illustrates the first notable observation about negative experiences: they are common. Over 30% of users have received a virus, and many others received spam or have had a purchase misrepresented. In total, about 48% of users reported at least one negative experience. Second, several categories of bad experiences have become much more common since 2003. In some cases, the increases are dramatic: Stolen credit card details have gone up by over a factor of three, from less than 1% to over 3%. Misrepresented purchases have tripled from under 3% to over 8%. Although the

percentages are not large, this is important because stolen credit cards or misrepresented products can create big, expensive problems for a consumer. Two problems that were not queried in 2003 affected important proportions of respondents. About 20% of respondents have been asked to provide their bank details and 15% accidentally ended up on a pornographic website.

Interestingly, problems with spam have declined. Perhaps this reflects the increasing effectiveness of spam filtering software, now almost universally installed by ISPs. If so, the contrast between declining spam and increasing viruses highlights the relative weakness of antivirus software and the difficulty of achieving protection from viruses. An alternative explanation is that the decline in spam-related problems reflects not effective spam filtering software but how it is maintained. Spam filters often are installed and maintained by paid ISP staff while antivirus software is installed and often updated by individual users, although remote updating by service providers is becoming more common. Individual users are notoriously erratic.

The changes documented in Figures 1 and 2 point to an apparent inconsistency. Figure 2 says that negative experiences are common and mostly increasing. If bad experiences influence trust, then we would expect to see a decline in trust from 2003 to 2009. Instead, we see the opposite: Figure 1 says that users have become more trusting. What is happening here? Resolving this inconsistency gives us an opportunity to showcase the value of two sample surveys that share a common methodology and facilitate comparative research.

There are at least two possible hypotheses. First, negative experiences could simply have no effect. This could occur if people liked the Internet, and the communication, commercial, and information services it provided and simply accepted problems as the price of doing business. This would be like drivers of a car who know that they may have an accident that could injure them. If someone runs into them, the accident may not even be their fault. The convenience of driving outweighs the risks and they can take prudent steps to reduce the possibility of accident and injury (like wearing seatbelts or driving defensively).

The risks of the Internet have been so well publicized that most people may have already taken them into account. People may more or less expect to have some negative experiences. When they actually occur, few are surprised and few actually think that something special has occurred. Under this hypothesis, negative events would not be reason for a user to change their opinion about any aspect of the Internet, including trust.

A second hypothesis is that the more time a person spends online, the more likely they are to encounter negative events. Thus, the people who experienced bad things tend to be those who are the most experienced users. If the Internet is an experience technology, then experienced users are best able to cope with the problems they encounter. We would expect bad experiences to have their least effect on the most experienced users.

When we look at the direct effect of bad experiences on trust, as in Figure 3, we see that they do not have a strong impact. Although the variables displayed in Figure 3 are not statistically independent (chi-square $= 10.4$, $p \leq .05$), notice the columns where the percentages differ. Users who have encountered bad experiences are less likely to be in the "total trust" category and more likely to be in an intermediate category, a category we might call "guarded trust." The percentage differences are not great, only about six percentage points maximum. In three of the five categories, bad experiences do not seem to change anything at all. The substantive effect of bad experiences seems small. This supports the first argument that most people expect some bad experiences on the Internet but they have already discounted them, so the actual negative experience has little impact.

The second hypothesis—that more experienced users are more likely to have had bad experiences—receives no support from these data. Years of Internet experience and number of bad experiences are in fact statistically independent (table not shown; chi-square $= 22.3$ on 24 degrees of freedom, $p > .55$). There are possibilities that we cannot address with our data. For example, users with more years of experience may have learned to deal with problems like spam and viruses. Those

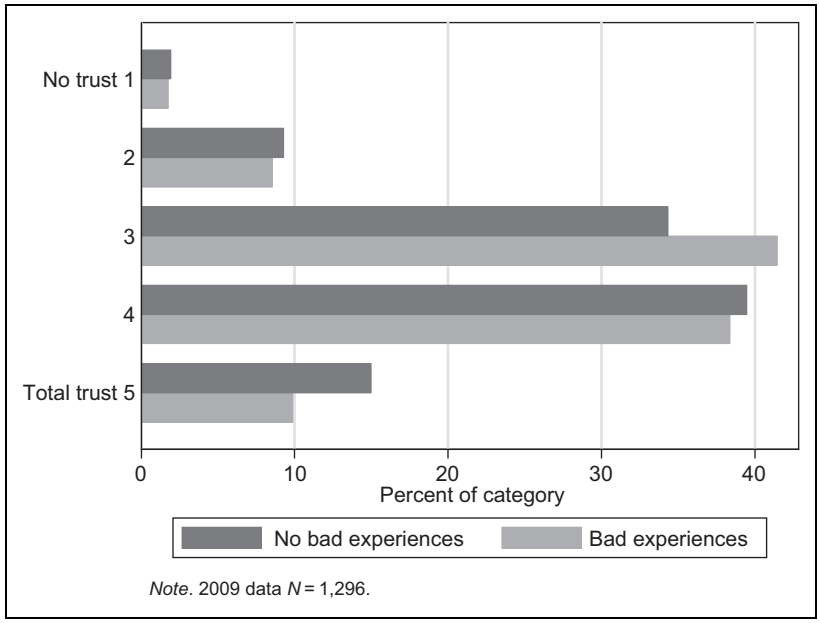

Figure 3. Do bad experiences reduce trust?

experiences may not be salient to them and they may tend to underreport them. Of course, if this were true then bad experiences would have little impact on trust, which is what we are arguing anyway. Thus, within the limits of these data, we can confirm the first hypothesis, that in 2009 bad experiences have been mostly discounted and they do not have much impact on trust. An earlier relationship between bad experiences and trust, found in our 2003 survey, has disappeared.

Multivariate Analysis of Bad Experiences and Trust

What is the effect of bad experiences on trust in the larger context of a multivariate model? We can use our previously created dependent variables of net trust and net confidence to explore this question. In a bivariate plot of number of bad experiences against net trust (not shown), the fitted line is horizontal, indicating no relationship. This is consistent with the analyses of trust and bad experiences in Figures 2 and 3. However, once we control for other variables in a multiple regression (Table 4), bad experiences have a statistically significant negative impact on confidence in both 2003 and 2009. This indicates bad experiences tend to reduce net confidence. The βs for bad experience are the smallest of the significant coefficients, indicating that the bad experiences have the weakest effect on net trust. Like the prior tables, Tables 4 and 5 reproduce the 2003 results plus a column with a straightforward replication, labeled Model 1, and a column with additional attitude variables, labeled Model 2. We begin with discussion of Model 1 compared to 2003; Model 2 is discussed separately.

Bad experiences are always significant. They are negative for the trust regression and positive for the risk regression, both indicating they reduce trust and increase risk perceptions. This is consistent in 2003 and 2009. Among the demographic variables, both age and education are now positively associated with risks, but only age is related to trust. The effect of education on risks indicates that better educated tend to be more sceptical but not more confident. Age is significant and positive in the risks regression (Table 5), indicating that older people tend to be more concerned with risks. This

Table 4. "Net Trust" Index Results for Internet Users

			2009 Coefficients			
	2003 Model		Model 1		Model 2	
Variable	Coeff.	β	Coeff.	β	Coeff.	β
Gender (female)	–0.06	–.02	–0.05	–.02	0.07	.03
SES	0.01	.01	0.09	.04	0.02	.01
Age	0.00	.04	–0.04	–.06	0.02	.03
Education	–0.06**	–.09**	–0.20**	–.13**	–0.24**	–.15**
Broadband	0.03	.01	0.19	.04	0.09	.02
Proximity	–0.20*	–.21*	0.05**	.24**	0.03	.15
Proximity×SES	0.07**	.27**	–0.45*	–.17*	–0.40	–.15
Bad experiences	–0.07**	–.08**	–0.06*	–.06*	–0.06*	–.06*
Trust propensity	—	—	—	—	0.31**	.26**
Tech. attitude	—	—	—	—	0.11**	.27**
Constant	0.28	—	0.34	—	–2.17**	—
N	1,045		1,214		1,201	
R^2	n.r.		2.9		14.7	

Note. n.r.: R^2 was not reported for 2003; βs are standardized regression coefficients.
* $p \leq .05$ (two-tailed test); ** $p \leq .01$.

Table 5. "Net Risk" Index Results for Internet Users

			2009 Models			
	2003 Model		Model 1		Model 2	
Variable	Coeff.	β	Coeff.	β	Coeff.	β
Gender (female)	0.07	.02	0.03	.01	–0.14	–.05
SES	–0.02	–.02	–0.14	–.06	–0.15*	–.06*
Age	0.00	.02	0.08**	.09**	0.00	–.00
Education	–0.05*	–.07*	0.12*	.06*	0.13*	.07*
Broadband	–0.34**	–.13**	–0.14	–.03	0.03	–.01
Proximity	–0.15**	–.13*	–0.13	–.01	0.01	.05
Bad experiences	0.16**	.18**	0.16**	.14**	0.14**	.12**
Trust propensity	—	—	—	—	0.28**	.20**
Tech. attitude	—	—	—	—	–0.18**	–.40**
Constant	–0.09	—	–0.44	—	2.21**	—
N	1,045		1,214		1,201	
R^2	n.r.		2.9		21.0	

Note. n.r.: 2003 R^2 not reported; βs are standardized regression coefficients.
* $p \leq .05$ (two-tailed test); ** $p \leq .01$.

result is consistent with the regressions in Tables 2 and 3 but not with 2003, and it is perhaps an indication of the effect of life experience.

Experience on the Internet is much broader than bad experiences. To measure the broader range of experiences of Internet users, we developed a summary scale of their "proximity" to the Internet based on a combination of years of experience, range of uses, and expertise. Higher proximity (meaning more experience, a greater range of uses, and additional expertise) tends to increase confidence in 2009, see Table 4. This clears up a puzzle in the 2003 data where there was a negative

association between proximity and net confidence. In addition to the direct relation between proximity and confidence, there is also a significant interaction effect with SES. For respondents in higher SES groups, high proximity tends to diminish net confidence, while respondents with lower SES find their confidence increased. The βs indicate that proximity has the strongest effects on trust, much stronger than demographic variables like age, SES, and gender. As Internet use has expanded in recent years, the effects of experience have tended to predominate: Proximity in 2009 tends to undermine predispositions rooted in social structure and move all users closer to a learned level of confidence.

In the net risks regression, proximity is no longer significant in 2009 perhaps reflecting the expectation that we described above that certain risks accompany use of the Internet. Broadband use is also no longer significant. The broadband result is not surprising since almost virtually all users now have broadband; little variation remains to be explained by that variable. Among the experience variables, the results from the net trust regressions mirror the 2003 results; but half of the predictors of net risks have changed, see Table 5.

Turning to the Model 2 regression, all attitude variables are highly significant. Again, they increase the R^2 sharply and their signs are consistent. Like before, propensity to trust is significant and positive in both tables.

In the net trust table, the addition of attitude variables has removed the effects of proximity, suggesting that attitudes may be more important than certain experiences. Bad experiences remain significant and negative, so in that sense experiences continue to influence Internet trust.

In the net risk table, bad experiences remain important. Education and age become nonsignificant, while SES (measured by standard British social categories) is negative, indicating that higher SES groups are less concerned with risks.

In the regressions reported in Tables 4 and 5, we see the same two strong patterns apparent in the earlier regressions. First, general attitudes have a strong influence on willingness to trust and perceptions of risk. They represent broad orientations toward technology. It is through these lenses that people interpret their experience. Second, the closer people are to the Internet the more they trust it and the less concerned they are with risks. Trust matters because of its potential impact on commercial activity. Lack of trust can limit people's willingness to buy goods over the Internet, which would limit the growth of Internet commerce. Both attitudes and experience matter.

Trust and E-Commerce

We can directly address the impact of trust on Internet commerce. The 2009 OxIS asked respondents a series of nine questions about their online commercial activity. The questions include such items as how often respondents bought a product online, compared products and prices, or booked travel reservations. There was a table addressing commercial activity in the previous article, but the dependent variable was a single variable instead of an index. The multiple questions on the 2009 survey offer additional flexibility and stability because we can create an index. However, because of the change in the dependent variable the results are not strictly comparable to the earlier article and we do not reproduce the 2003 results.

A PCA on the nine questions showed that five items formed a single coherent factor. The standardized Cronbach's α, at .81, indicates satisfactory internal consistency. We combined them into a single measure of commercial activity which became our dependent variable, see Table 6. Following our practice in earlier tables, we ran two models: Model 1 without attitude variables and Model 2 with attitude variables.

Several results are worth special mention. First, one might think that trust and risk are the opposite of each other. If this were true then people with high levels of trust would not feel much risk, and people who feel that the Internet is risky would have low levels of trust. But Table 6 tells

a different story. Although the signs on the net trust and net risk coefficients are opposite, the variable measuring perceptions of net trust has no significant effect on commercial activity. However, perceptions of net risk are significant. The pattern of signs and significance is identical to the results using the 2003 data. This clearly indicates, if it was not already clear, that trust and risk are different concepts. They are not just opposites. The same respondent can feel both a high degree of trust and a high degree of risk, or a low degree of both. There is no strong empirical association.[8]

Second, perceived net risks are significantly and negatively associated with online shopping. This tends to confirm the widely held suspicion that distrust of the Internet undermines e-commerce.

Third, bad experiences have a positive coefficient. They do not reduce commercial activity; instead they are associated with increased activity. This may seem counterintuitive, and we checked our variables carefully to be sure that we had not inadvertently reversed a scale. We did not make a mistake. This result seems clearer in the context of the other results reported here, especially our discussion of bad experiences in Figure 3. While many people experience the negative aspects of the Internet, most seem to have discounted them. They accept bad experiences as part of the price they pay for the conveniences of the Internet and those experiences do not alter their decision to use the Internet. The result in Table 6 is consistent with this analysis. In the case of Internet commerce, we suspect that the positive "effect" of bad experiences may reflect the fact that people who are more active commercially are also more likely to have experienced some negative incidents. The causal direction, in other words, runs from more commercial activity to negative experiences. We are unable to confirm the question of causal direction using these data, but the evidence does not support the expectation that bad experiences dampen the commercial use of the Internet.

Fourth, proximity is strongly positive. The β shows that it is the most important coefficient in the model. This reinforces the theme that the Internet is an experience medium. As people become more experienced they tend to become more involved in e-commerce. They also develop more trust in the Internet (Table 4) but they do not perceive greater risks (Table 5).

Finally, looking at Model 2, the technology attitude variable is significant and positive. What is interesting here is the contrast to the net trust and net risk models (Tables 4 and 5). The βs show that attitude variables dominate those models; but in the e-commerce regression their impact is considerably weaker. They do not dominate this regression; instead, experience dominates e-commerce.

Propensity to trust is not significant. This also differs from the net trust and net risk models. It differs as well from many other studies (e.g., Cheung & Lee, 2005; Connolly & Bannister, 2007). In considering this result, we underline a key difference between this study and virtually all others. OxIS is a true random sample rather than a convenience sample, such as of college students. A nonmethodological difference is that we include general technology attitude variables. It may well be that the context of a questionnaire on e-commerce primes respondents so that questions about trust (even if they do not explicitly mention the Internet) are treated as if they had asked about the Internet. If this is so, then general questions about trust and general questions about technology or the Internet would tend to elicit similar responses and incorporating them into a single regression could produce a result like Model 2. This issue deserves further investigation.

Discussion: The Internet and Trust

Although our data are drawn from Britain, there is no reason to believe that British Internet use is in any way exceptional. Britain has about the same proportion of nonusers as North America (around 30%); a smaller proportion than Scandinavian countries, a larger proportion than southern Europe. The results reported here should be broadly similar to any advanced industrial country. This is, of course, a hypothesis that should be tested, perhaps using data from countries participating in the World Internet Project (http://www.worldinternetproject.net).

Table 6. 2009 Commercial Activity Index

	Model 1		Model 2	
Variable	Coefficients	β	Coefficients	β
Gender (female)	0.03	.01	0.18	.02
SES	0.32**	.09**	0.34**	.10**
Age	0.05	.02	0.09	.03
Education	0.22	.04	0.23	.04
Income	0.33**	.11**	0.32**	.11**
Broadband	0.87*	.06*	0.81	.05
Proximity	0.24**	.33**	0.22**	.30**
Bad experiences	0.65**	.20**	0.63**	.19**
Net trust	0.08	.03	0.07	.02
Net risk	–0.40**	–.13**	–0.27**	–.09**
Trust propensity	—	—	–0.13	–.03
Tech. attitudes	—	—	0.15**	.12**
Constant	–1.20	—	–3.46**	—
N	958		947	
R^2	32.7		33.7	

Note. βs are standardized regression coefficients.
* $p \leq .05$ (two-tailed test); ** $p \leq .01$.

These results show that users have continued and even expanded their trust in the Internet since 2003. Over that time, however, the character of trust has changed. An important implication of the last table suggests a major shift between 2003 and 2009. The analysis of the 2003 data saw risks and bad experiences as "countervailing trends ... shaping the future of e-commerce." The article explained: "As people get closer to the Internet, they ... learn ... cybertrust. ... However, with experience can come bad experiences ... which can undermine trust" (p. 446). The 2009 data no longer support this interpretation. The first part remains true: As people gain experience with the Internet they become more trusting. The second part is also true: experience increases the likelihood of bad experiences. However, the conclusion no longer follows. Additional experience with the Internet and publicity about negative aspects of the Internet has created a new environment. Bad experiences are expected and they are discounted. They do not have a negative effect on e-commerce. This helps to explain the fact that trust, e-commerce, and bad experiences have all increased since 2003.

Technology attitudes dominate our trust and risk regressions (Tables 2–5). They cause R^2 increases of as much as 18 percentage points. The βs consistently show they are the most important variables. Experience variables are statistically significant, but they are less important.

Internet experience dominates our commercial activity regressions (Table 6). The technology attitude variables are both positive and significant but they are less important than the experience variables. Looking at the βs, the two strongest effects are the variables measuring proximity and bad experiences. When it comes to e-commerce the Internet in 2009 is still an experience technology.

In terms of exchange theory, the importance of additional experience is that it gives Internet users skills and tools that help them solve problems easier and more quickly. Bad experiences become less important. With experience users refine their abilities so that problems become less daunting and take less energy to solve. Additional experience also makes it easier for users to do what they like and enjoy. In these ways experience lowers the cost of working on the Internet and enhances the value.

One striking finding was the behavior of the age variable. Effects of age are widespread in many areas of Internet research. Here the effect of age disappears when we control for technology

attitudes.[9] Age is a proxy variable, but it is often unclear what the proxy measures. After all, many things vary across age cohorts: level of education, income, occupation, labor force participation, and marital status, to mention only a few. Our results offer a clue about the underlying mechanism for which age is a proxy. They suggest that the reason older people tend to be less trusting is due to their less favorable attitude toward technology in general. More generally, they suggest that people with negative attitudes toward technology tend to be less trusting regardless of their age. This underlines the importance of technology attitudes in use of the Internet. We speculate that what is happening is that positive attitudes help users overcome the sometimes daunting initial learning task when users learn about links, buttons, clicking on links and buttons, and all the associated jargon like "uploading," "downloading," "hyperlinks," "browser," and the like. Following up on these findings could be an important area for future research.

Looking at the other demographic variables the most notable finding is that they generally have little effect. Gender is significant only once (in the net risks Table 5). In part, this may reflect the virtually identical split in Internet use: 49% men to 51% women. Once attitudes and experience are taken into account, gender counts for little. Like gender, SES is significant for the net risks regression, where wealthier people are less concerned with risks. More educated people are less trusting but they do not perceive greater risks. In the end, there are relatively few statistically significant results, and even for the significant results the βs show that the experience variables are usually more important than all the statistically significant demographic variables combined.

In contrast, among nonusers in 2009 the level of distrust has soared, perhaps one reason why they remain nonusers. They have less confidence in information and people online, and perhaps because they have no experience, they are more susceptible to scare stories in the media. Distant from the technology, they do not understand it very well and they perceive greater risks than may actually exist. This may be one of the downsides of an experience technology: nonusers seem caught in a Catch-22 contradiction. Nonusers will only understand the benefits of the Internet by using it, but since they perceive serious problems they are unlikely to start. If they do not start they will never experience its benefits.

For Internet users this replication ends on a positive note. Users see enormous benefits of the Internet in 2009: 17% say they found a job through the Internet, 43% improved their health, and 74% saved money. Although there are no questions comparable to these in 2003, on other questions where we have comparable data, perceptions of the Internet seem to have become more positive. For example, the proportion of users who agree that the Internet saves them time has increased by 14 percentage points from 2003 to 2009 and the proportion who agree that prices are lower on the Internet has gone from 36 to 77%. As we documented in Figure 2, bad experiences are generally increasing. There are serious problems like credit card fraud and identity theft that seem to be increasing, and we do not discount those. There certainly could be a point where these problems would begin to inhibit use of the Internet. The big message of the 2009 data is that there is no evidence we are anywhere near that point. Since 2003 there has been a rise in trust among Internet users. The problems seem to have had no measurable impact on users' trust, and no negative impact on online shopping. The Internet is very alive and well.

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Notes

1. References to the Internet are meant broadly to include all kinds of mediated communication technologies, including the World Wide Web, e-mail, text messages, and the like. "The Internet" is a shorthand reference.
2. However, there are circumstances that could enable more trust in mediated communication (Guerra, Zizzo, Dutton, & Peltu, 2003). In fact, trust in mediated versus face-to-face communication has often countered common sense notions of media reducing cues and therefore lowering trust.
3. Many researchers use a variable they label "experience," but it is usually *perceived experience* (e.g., Connolly & Bannister, 2007), measured by general positive or negative experience questions. Instead of using an agree–disagree Likert scale, we measure experience in OxIS by asking respondents to check off *actual* experiences. Bad experiences are summed into an index.
4. Researchers who do measure this treat it as question of *perceived* legal and banking support, and measure it using a Likert scale. This does not change the fact that the actual environment is a constant within a single legal/banking system. Any differences between respondents will be due to differences in their experiences with the system, or differences in their understanding of the system. In this sense, other variables, such as bad experiences are more direct—and hence more reliable—ways to capture this variable.
5. In addition to attitudes toward technology, we also examined general attitudes toward the Internet. A principle component (PCA) showed that there were separate positive and negative Internet attitude variables. They were composed of broad items about the Internet in general and did not include specifics like use of credit cards, accuracy of information, or trust in online individuals that are part of our net trust and net risk variables (see Table 1). Despite the difference in items, an objection to the use of these variables is that they are too much like the net trust and net risk variables. For this reason, we do not present any models that include attitudes toward the Internet. When we add these variables to our models they are statistically significant with the expected signs, and they add 1–3% to the R^2 values. Models including these variables have the same quantitative results as the models displayed in Tables 2–6.
6. For a more detailed description of the sample and methodology, see Dutton, Helsper, and Gerber (2009).
7. We looked at two alternative measures. Using "years of Internet experience" as the measure of proximity to the Internet yields a similar result. We chose to present the figure using "percent who answered 'don't know'" because this variable is available for nonusers and years of Internet experience is not. We also tried using people who responded that the Internet was "totally unreliable." This result is qualitatively identical to the result in Figure 1, but since most nonusers responded "don't know" there is a high proportion of missing data. Since this would be a major change in the measurement this result is not strictly comparable to 2003.
8. A possible objection to this analysis is that the results in Table 6 are an artefact of creating net confidence and net risk from the first two principal components. We checked this possibility by creating alternative measures of net trust and net risk using the simple sum of the variables that load most heavily on each component. These alternative measures have a statistically significant negative relation; however, the relationship is weak: Pearson's $r = -.22$. When we reran Model 1 and Model 2 in Table 6 using the redefined variables the new regression results were identical in the sense that none of the signs changed and the same variables were either significant or nonsignificant. Therefore, the results in Table 6 appear to be robust.
9. In two tables age is also not significant when we only control for bad experiences (Tables 4 and 6).

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