Perception and acceptance of fingerprint biometric technology
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ABSTRACT
The acceptance of biometric security services appears to be affected by several factors, one of which may be the context in which it is used. In this study, 24 participants were asked to role-play the use of a fingerprint biometric identification system when making purchases at an online bookstore. The results show differences in opinions about the biometric system when the perceived benefits for the users were manipulated. Participants were more comfortable using biometrics, and considered them more beneficial, when they were used to secure personal information for personal purchases, in contrast to securing personal information for corporate purchases. The results suggest that application contexts with obvious, apparent benefits to the user tend to lead to greater perceptions of usability and higher acceptance rates than contexts where there are only system or corporate benefits...

1. INTRODUCTION
The usability and acceptance of biometric security services may be affected by the context of use, with two important contextual factors being the perceived benefit to the user and the perceived privacy risks. Application contexts with obvious, apparent benefits and lows risks may lead to greater perceptions of usability and higher acceptance opinions of biometrics than contexts where there are little obvious benefits and high risks.

Though the general attitudes toward biometrics for authentication have been previously explored [1, 2, 3] research on the attitudes towards biometric devices in particular contexts is just starting. The goal of this research project was to gather data on users' perception of fingerprint biometrics within different contexts, focusing on the user's perspectives when deciding on the tradeoffs between perceived benefits and risks.

2. METHODOLOGY
There were 24 participants recruited from the general population;

14 females and 10 males, all with at least 7 years of computer experience. Ages ranged from 18 to 60 years. An interactive interface for an online bookstore was developed using HTML. The screens were used to simulate account creation and to make an online book purchase. To simulate the use of credit cards, two cards were given to the participants to use; one representing their personal credit card and one representing a corporate card.

A laptop PC was equipped with a Microsoft Fingerprint Reader (Model DG2-00002). The participants were informed that their fingerprint data was not being captured, but that they should role-play as if it was. The fingerprint reader lit up when it was used. The participants were told that this simulated data capture, and they could then press the 'submit' button on their screen to complete their transaction.

At the beginning of the testing sessions, preliminary questions were asked to determine the participants' familiarity with biometrics and their comfort level in performing the experiment. The participants were then asked to complete the following 3 tasks involving the purchase of an expensive book at an online bookstore.

Task 1: Order a book for a project at your office. You will use the corporate account to purchase the book.
Task 2: Order a book for a project at your office. You will need to use your personal credit card to purchase the book, and the company will reimburse you for it.
Task 3: Order a book for your private collection. You will need to use your personal credit card to purchase the book.

For each task, participants completed rating scales about their use of the fingerprint system in terms of perceived benefits, their level of comfort, and whether they would have preferred to use a username and password. Once all the tasks had been completed, an interactive, semi-structured interview was conducted

3. RESULTS AND DISCUSSION
The participants found it beneficial to use the fingerprint system for personal use (88% chose "very beneficial" or "extremely "beneficial" on a 5-point scale), and they also found it beneficial when purchasing for their employer, as long as they could use the employer's credit card information (67%). When mixing their personal credit information for business purposes, however, only 21% found the biometric systems beneficial.

When asked about their level of comfort in using the fingerprint biometric, 46% of the participants were "very comfortable" or "extremely comfortable" when using a personal credit card for a personal purchase. Their level of comfort was lower, however, when asked to use a personal or corporate card, along with their fingerprint, for company purchases (25% in both cases).

Finally, when asked if they would have preferred to use a traditional username and password, only 33% replied that they would when using personal information for personal purposes. This preference increased, however, when participants were asked to user personal information for corporate purposes (46%) and company information for corporate purposes (58%).

These findings indicate that the perceived benefits, levels of comfort, and acceptance of biometrics did fluctuate depending on the context**.** It is clear that people take into account the type of information they are sharing when they decide if a biometric system would be useful and acceptable to them.

Participants were also asked why they might prefer to use a biometric system when making an online purchase. The most frequent response was that the system would be easier to use than a traditional username and password (60% of responses). Only 35% of the participants said they would prefer to use a biometric system because of an increase in security.

The post-session interviews also revealed some interesting themes concerning attitudes towards biometrics.

Confusion About Security. The participants relayed a sense of confusion when it came to assessing the security strength of biometrics. Their inability to understand the security aspect of biometrics made them skeptical of the technology. Often times they hesitated when answering the survey questions and stated in exasperation "*I don't know.*" When asked specifically, "Do you think there are better ways to have stronger security than using biometrics?", their responses indicated that they didn't understand the technology's security strength and they began to feel confused and uncomfortable. *"How do I know my fingerprint is secure? I don't know, do I?" "They can steal my fingerprint just as easy as a password. It is easy to use though – I am confused."* "I don't know if it's more secure. I guess it's more secure."

Social Acceptance. The subjects stated that they would be more accepting of biometrics if it was the social norm. *"It is bound to happen, there is no way to stop it. You don't want to be left behind just because you are nervous." "If it was a trend, I would do it." "I don't want people to think I'm paranoid."* "I would be more comfortable if it was the norm."

Privacy Concerns. Although we did not ask any direct questions about privacy, there were 22 references to privacy from 13 participants. While some participants voiced their privacy concerns explicitly and stated that they felt that biometrics are invasive, others hinted to the same perception, but they added that privacy concerns were not important. "*I mean, they have the ability to get all this information about you now, and now they get your physical characteristic, too. That is more personal.*" "*I think it's intrusive.*" "*The whole privacy thing is overblown.*"

Second Thoughts. At first, many participants felt comfortable with using the fingerprint reader. As they answered questions, however, they began to reflect on what they were doing and to have second thoughts. 10 participants (16 references) expressed the feeling that, in retrospect, they might change their minds. "*The more I think about it, maybe I'm just not totally comfortable with it.*" "*After discussing this, I think I might answer differently on the questions.*"

These qualitative findings suggest that while people have a clear perception of the benefits of biometric systems, their perceptions of the risks are not yet clear. They are willing to try biometrics because they see it becoming the social norm, and they believe that biometrics will be used by most businesses in the future. They feel the convenience is great and it promises greater security. However, they do express lingering concerns about the technology and do not seem ready to discuss or decide its merits.

In conclusion, the context of use does affect an individual's perceptions of benefits and levels of comfort with biometrics. Application contexts with obvious, apparent benefits will lead to greater perceptions of usability and higher acceptance opinions of biometrics than contexts where there are little obvious benefits. However, there is a hesitation due to insufficient knowledge of the technology or its ramifications. There is also a hint of privacy concerns, although they were not clearly defined in participants' minds.

4. REFERENCES

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