Pitfalls of Shoulder Surfing Studies

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Goals of the adversary:

- Observe an authentication session.
- Authenticate as the user.
User authentication with PressureGrid
Input Methods and Input Errors

User authentication with PressureGrid
Input Methods and Input Errors

Adversary inputs a guess:

![Diagram showing a guess of 7 and a result of failed.]

Reasons of failure:

- Guessed the wrong number.
- Inputed the wrong number.
Input Methods and Input Errors

... can lead to an under-estimation of risk.

We shall ...

... verify adversaries report what they intend to report.

... measure the success without input errors.
An Approach against Input Errors

One authentication session of four digit pin:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>2</td>
<td>3</td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>7</td>
</tr>
</tbody>
</table>

Guess of adversary:
Isolating the Source of Security

Increasing security of PressureGrid through:

- Flickering lights
- Minimizing the finger movement
- The distance between hands
- Two dimension input
Isolating the Source of Security

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Kim et al. studied them jointly.

Which elements have a high impact for the security? Which marginally?

We shall . . .

. . . isolate the core contributors in an empirical study.
Simulation of the Adversary: Strategies

PressurePIN:

- 2 of 14 adversaries broke PressurePIN.
Simulation of the Adversary: Strategies

First observation:

- 2 of 14 adversaries broke PressurePIN.
Simulation of the Adversary: Strategies

Second observation:

- 2 of 14 adversaries broke PressurePIN.
Simulation of the Adversary: Strategies

▶ Participants may not find or use strategies.
▶ Real adversaries find, learn and use strategies.
▶ Can lead to an under-estimation of risk.

We shall . . .

. . . take observation strategies into account in an empirical study.
Outlook: An Approach to handle Strategies

- Design elements
  - analyze
- User interaction
  - study

Elementary observations

- study

Feasible observations

- estimate

Simulate authentication sessions and attacks

- Probability of success

Guessing entropy
Summary

We talked about:

- Input methods and input errors of the adversary
- Isolating the source of security
- Strategies in studies

More in our paper about:

- Side-Channels due to user behavior
- The adversary
- ...
Conclusion

- Study design and report is important.
- Studying security is different from usability.

In security we are also interested beyond the mean.
Conclusion

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- Studying security is different from usability.

In security we are also interested beyond the mean.

Future work: Finding new ways of security analysis
Questions and Discussion

Thank you for your attention!

What are your experience with security and usability studies?
Questions and Discussion

What are your experience with security and usability studies?