

# Replication Study: A Cross-Country Field Observation Study of Real World PIN Usage at ATMs and in Various Electronic Payment Scenarios

## Towards Understanding Why People Do, or Do Not, Shield PIN Entry

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# What is this talk about?

## **Replication Study: A Cross-Country Field Observation Study of Real World PIN Usage at ATMs and in Various Electronic Payment Scenarios**

# What is this talk about?

## Towards Understanding ATM Security – A Field Study of Real World ATM Use

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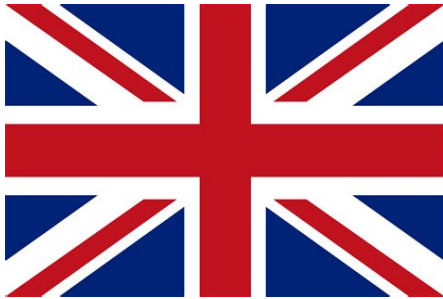
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**SOUPS 2010**

## Replication Study: A Cross-Country Field Observation Study of Real World PIN Usage at ATMs and in Various Electronic Payment Scenarios



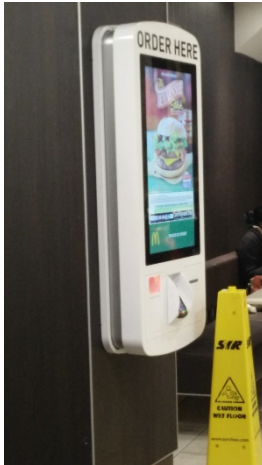
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**Towards Understanding Why People Do, or Do Not, Shield PIN Entry**

# Field Observations

# Methodology – Observation Locations

- A variety of ATM / payment scenarios
  - 2 ATM scenarios
  - 3 payment scenarios
    - 1 supermarket location with the cashier being present
    - 1 restaurant/coffee bar locations paying with the waitress
    - 1 payment at terminals
- Each location was visited at least twice during different time periods
- Locations enabling non-intrusive observations
- Observation sessions were not prolonged



# Methodology – Study Design

## ■ Study Factors

- Country
- Scenario: Withdrawing vs. Paying
- Whether accompanied by other people (or not)

## ■ Dependent Variable: Shielded (or not)

# Methodology – Study Design

- Study Factors
  - Country
  - Scenario: Withdrawing vs. Paying
  - Whether accompanied by other people (or not)
  
- Dependent Variable: Shielded (or not)
  
- Notes taken in written form by one researcher
- Only those observations counted in which the observer was 100% sure
  
- 930 field observations
- 310 in each country
- 90 at ATM, 220 in payment (supermarket 100, others 120) scenarios

# Findings for PIN shielding

- Payment: 34% Germany, 14% U.K., 0% Sweden
- ATMs
  - Our results: 39% Germany, 29% U.K., 29% Sweden
  - DeLuca et al.: 23% → no significant difference
- Regression Model and Post-hoc ANOVA comparison
  - Country
    - In Germany significantly more people shield compared to U.K. and Sweden
    - For payment: In the U.K. significant more people shield compared to Sweden
  - Scenario
    - Germany: No significant difference between withdrawal and payment
    - U.K. & Sweden: Significant fewer people shield in payment scenarios
- Being accompanied or not
  - Our results: No significant differences

# Follow-Up Interviews

# Methodology

- Public interviews
- Not those that were observed / different places / same cities
- Interviews either in English or German
- Notes were taken in written form
  
- Procedure
  - Asking for availability and consent
  - Asked to be frank and honest
  - Card usage to pay when paying / withdrawing
  - Questions about when and how they / others shield
  - Questions about why they think there is a difference between ATM/payment
  
- 27 interviews (10 in the U.K., 10 in Sweden and 7 in Germany)
- Coding by two of the authors



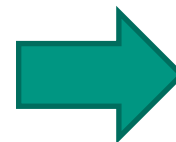
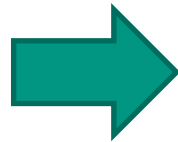
# Possible Explanations from Interviews: Payment versus ATM

- Presence of hard cash during withdrawals / different goals
- ATM environments considered more risky
  - “...at an ATM anyone could stand behind you. But people in a supermarket are there to buy something”
  - “You’re not supposed to get robbed in stores”
  - “Not something you usually think about in a store”
- Lack of understanding of the actual attack scenarios: People versus cameras
- Habituation
  - Payment happens so often (Sweden, the U.K.) → as fast as possible
  - Actually according to the Statistical Office of the European Union payment with PIN happens 5 times more often in the U.K. compared to Germany and seven times more often in Sweden compared to Germany
- Lack of reminders to shield with payment scenarios

# Limitations & Conclusion

# Conclusions

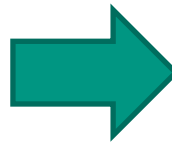
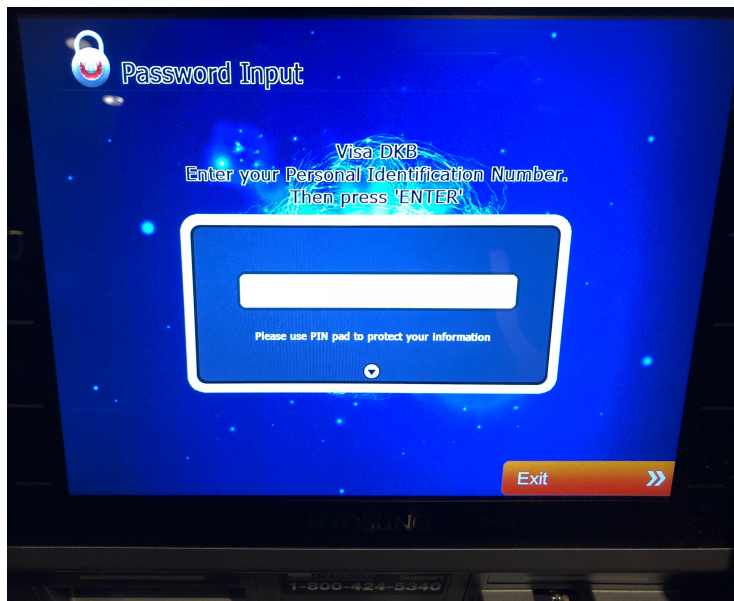
- Proper shields need to be provided





# Conclusions

- Proper shields need to be provided
- Just-in-time reminders



# Conclusions

- Proper shields need to be provided
- Just-in-time reminders
- Raising awareness in particular for the payment scenarios



# Limitations

## ■ Field observation

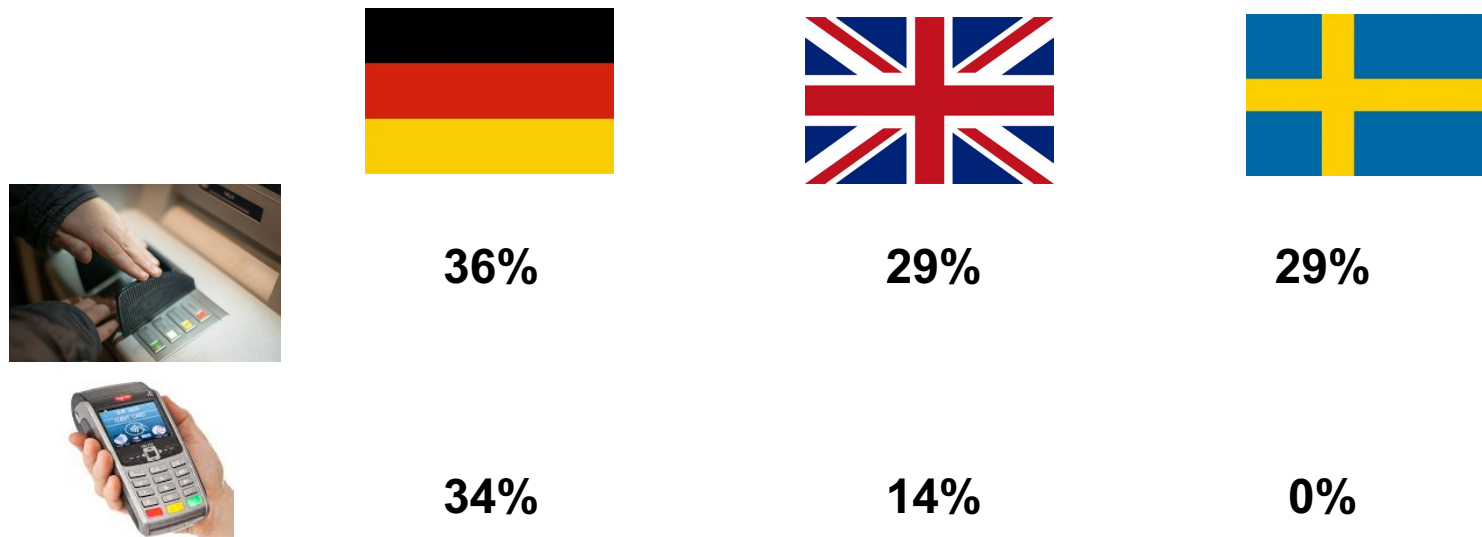
- Observer objectivity
- More scenarios as we could observe

## ■ Interviews

- Explanations provided by our interviewees were not directly provided by the observed subjects
- People may have falsely represented their usual PIN related actions during interviews

# Thanks! Questions?

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Habituation, lack of reminders, presence of hard cash, different goals, lack of understanding of the actual attack scenarios

# Ethical Considerations

- We got clearance from the ethics commission/IRB and legal teams
- Acquiring consent
  - Would have influenced the measurement
  - Murphy and Dingwall (2007): if people are in the public space they give implicit consent to be seen
- Deception
  - Not really an issue: *covert non-participant*
- Privacy
  - PIN entry is sensitive action
  - All locations were chosen so the observer could not see the entered PIN
- Anonymity
  - We did not collect any personal data on the observed subjects