MUNI Interdisciplinary Research Team on Internet and Society

CROCS

User Perceptions of Usability and Security of Authentication Methods for Mobile Banking on Smartphones

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Cyberspace 2019 Presentation (Usable Security & Privacy Track)

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Project Introduction

- ***Innovation and adaptation of authentication technologies for secure digital environment***
- 2/2018-2/2020
- Supported by Technological Agency of Czech Republic
- Cooperation between Centre for Research on Cryptography and Security at the Faculty of Informatics Masaryk University, Interdisciplinary Research Team on Internet and Society at the Faculty of Social Studies MU, and AHEAD iTec, s.r.o./Monet+

Background

- Mandatory 2FA since September 2019
- Widely used SMS code
- Need for a different authentication method that is
  - Easy to use
  - Secure
  - Well-accepted

- Qualtiative User Study → Large-Scale User Study

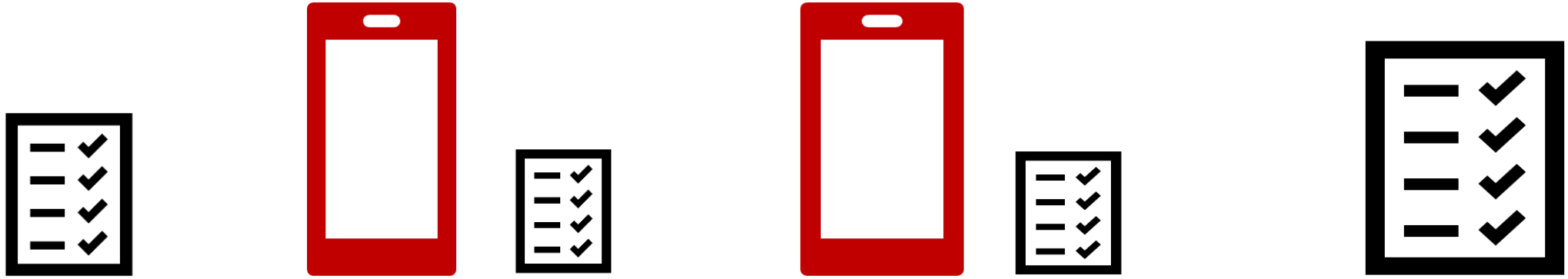
Large-Scale User Study

- Goal: To evaluate usability, perceived security, and preference of various authentication methods
  - Token vs. card-reader
  - PIN, fingerprint
- **N = 250 (aged <55)** + 250 (aged 55+)
- Preliminary results

Study Design

Scenario TOKEN

Scenario CARD-READER



Questionnaire
- Demographics
- Security Attitudes
- Smartphone Security Behavior

Scenario Evaluation Questionnaire

Scenario Evaluation Questionnaire

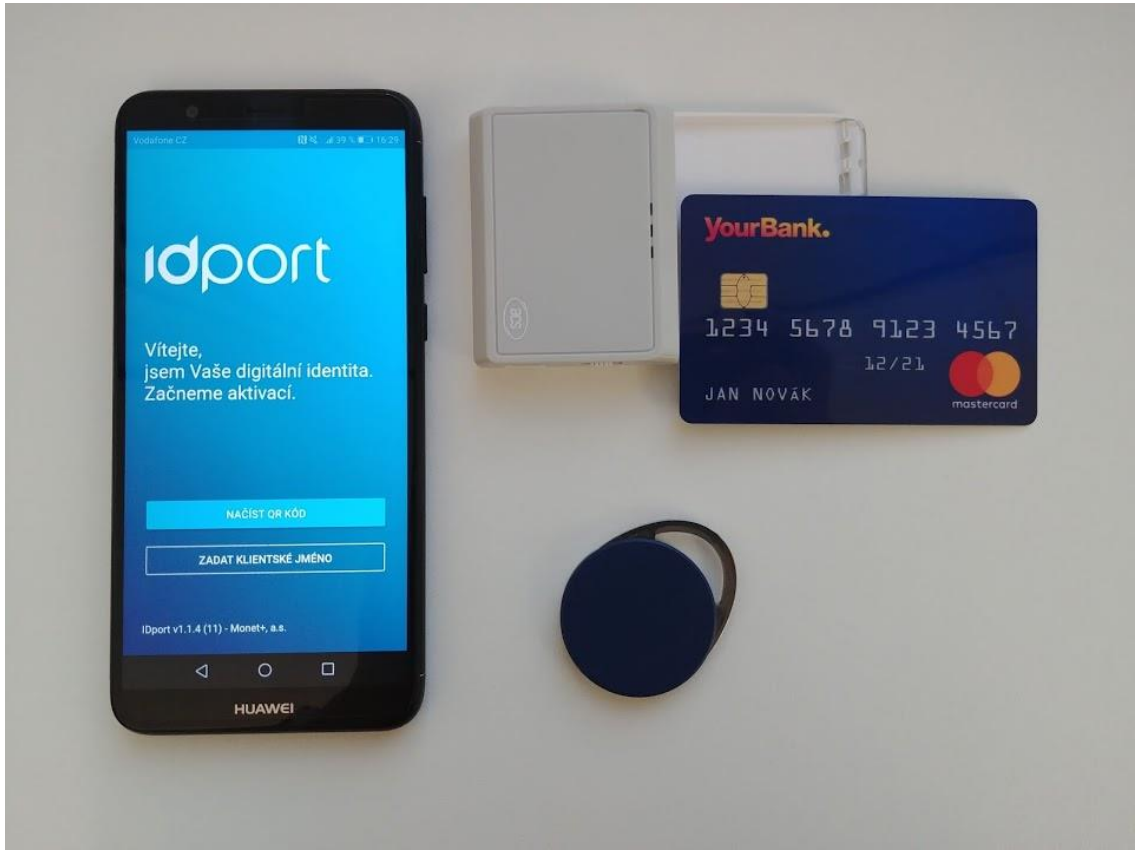
Questionnaire
- Authentication Method Evaluation
- Authentication Method Usage
- Online Banking Usage

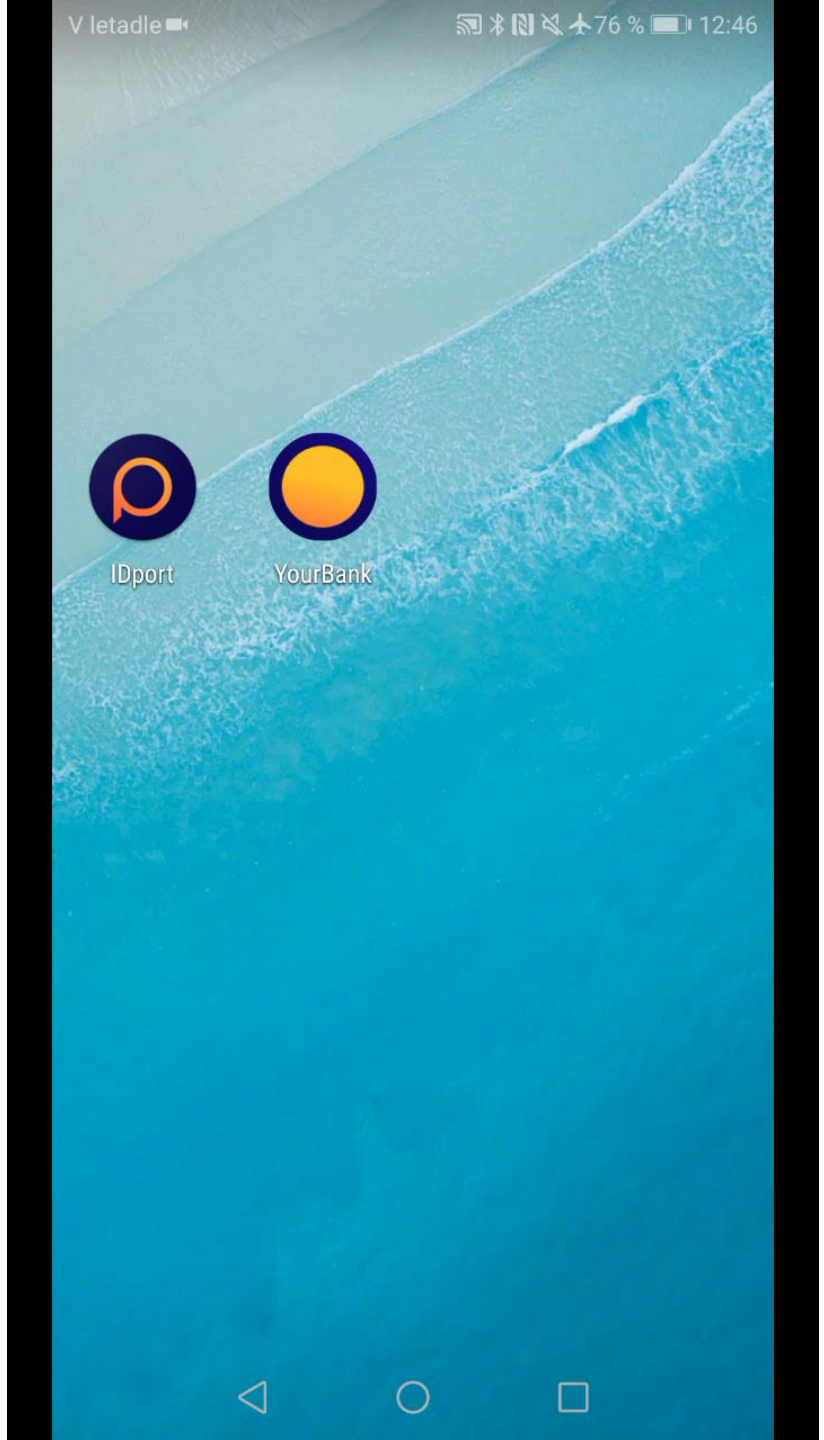
Scenarios

- NFC token
- Card-reader and card PIN
- + PIN code and fingerprint

- 2 applications
  - IDport authentication application
  - YourBank MBanking application

- 2 tasks
  - Activate IDport
  - Pay for a vacation (money transfer)




V letadle
76 %
12:46
IDport
YourBank

Sample

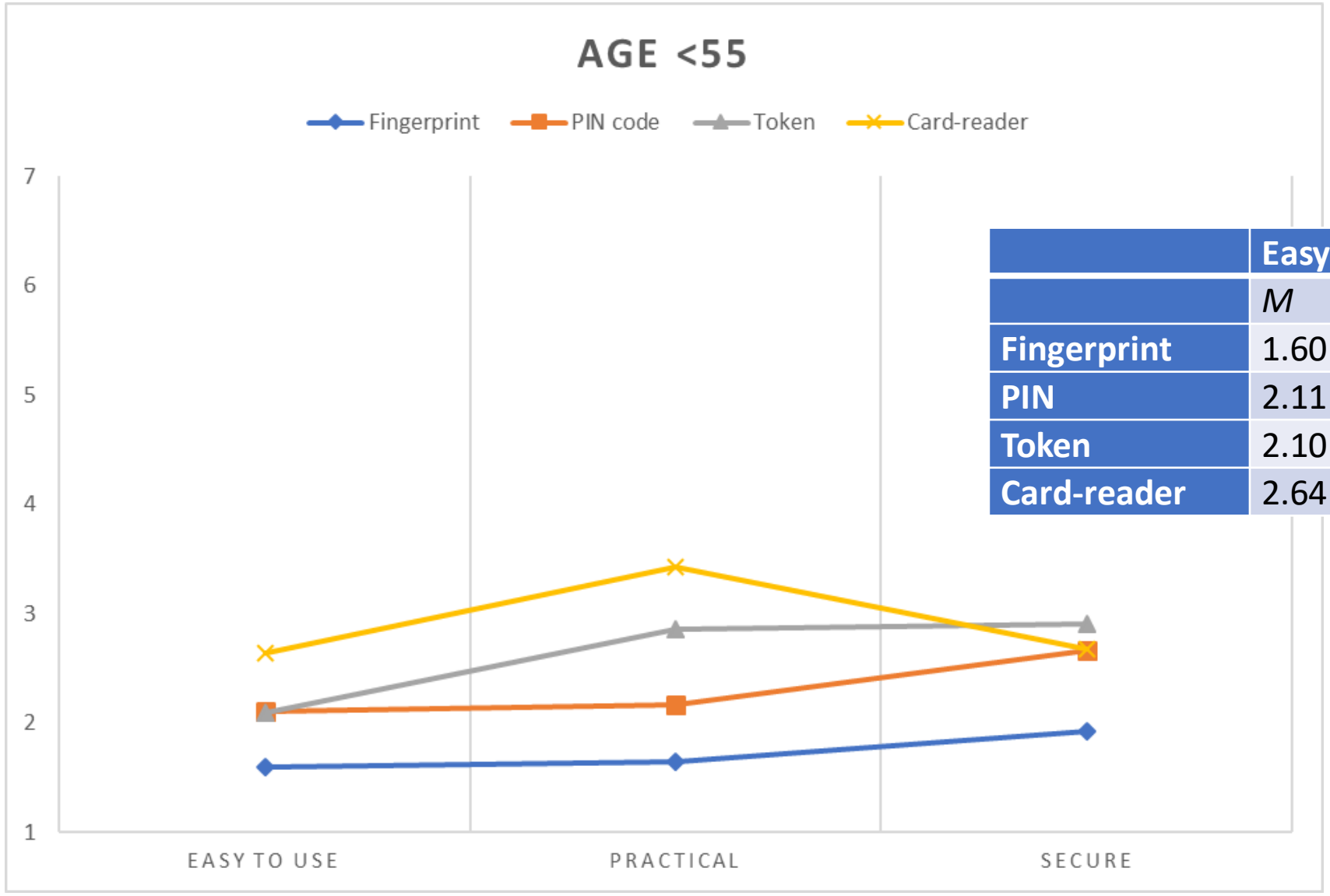
Age group <55

- N = 250 (238)
- Data collected by a professional survey agency
- Representative sample

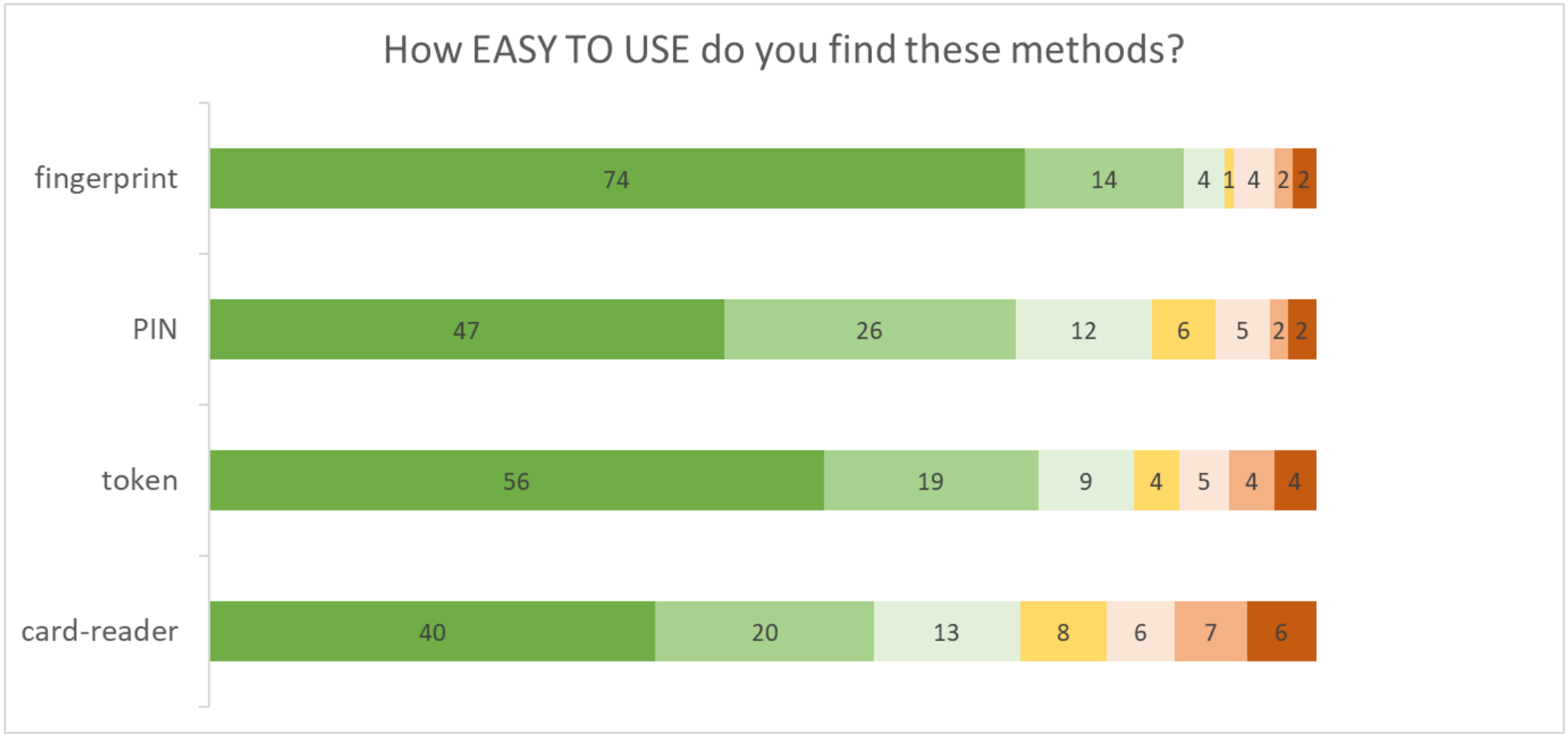
- Age *M* = 38.76, *SD* = 9.16
- Males 45%, females 55%
- Education
  - Primary 4.2%
  - Secondary 62.6%
  - Tertiary 33.2%
- Work status
  - Full-time 69.3%
  - Part-time 9.2%
  - Maternity leave 11.8%

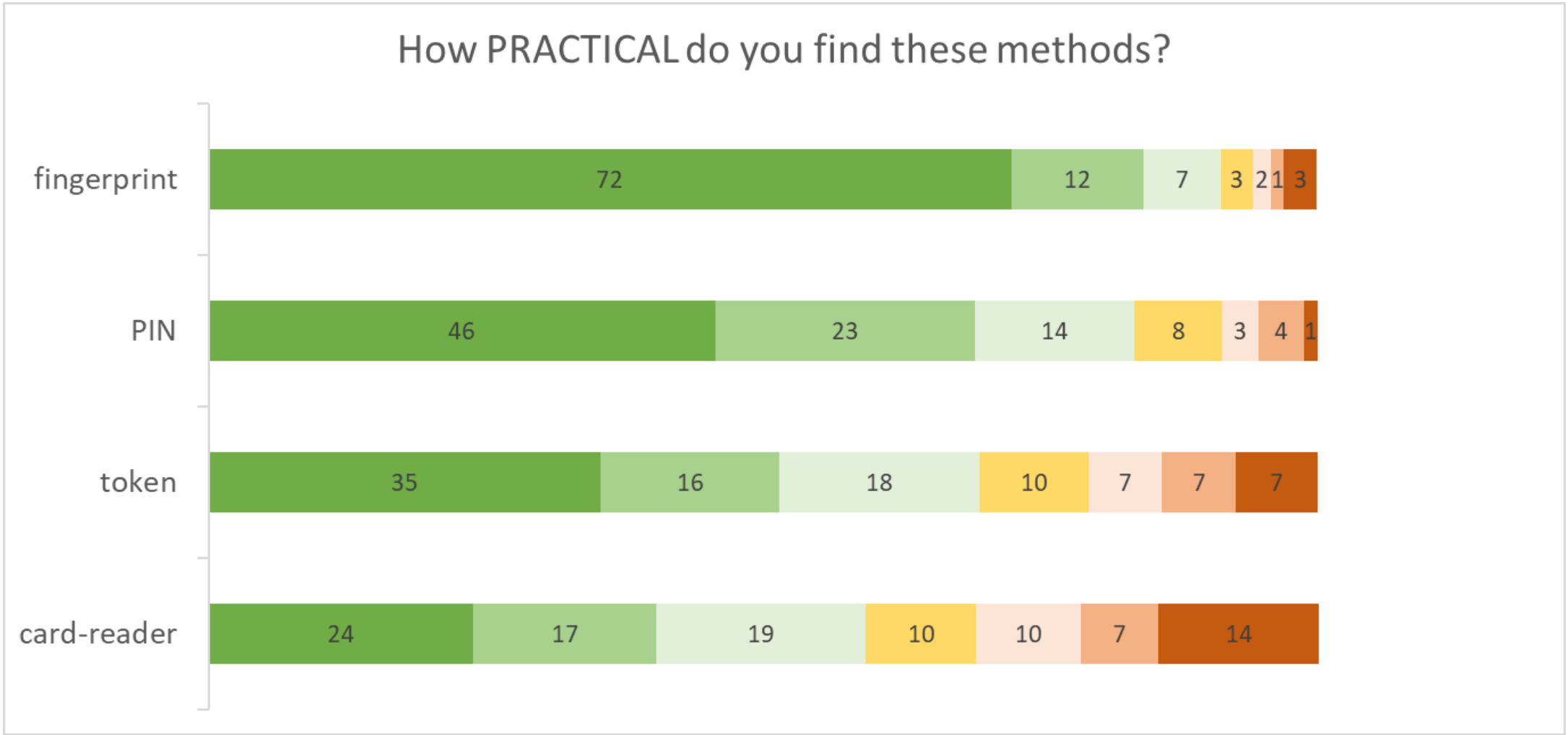
Results

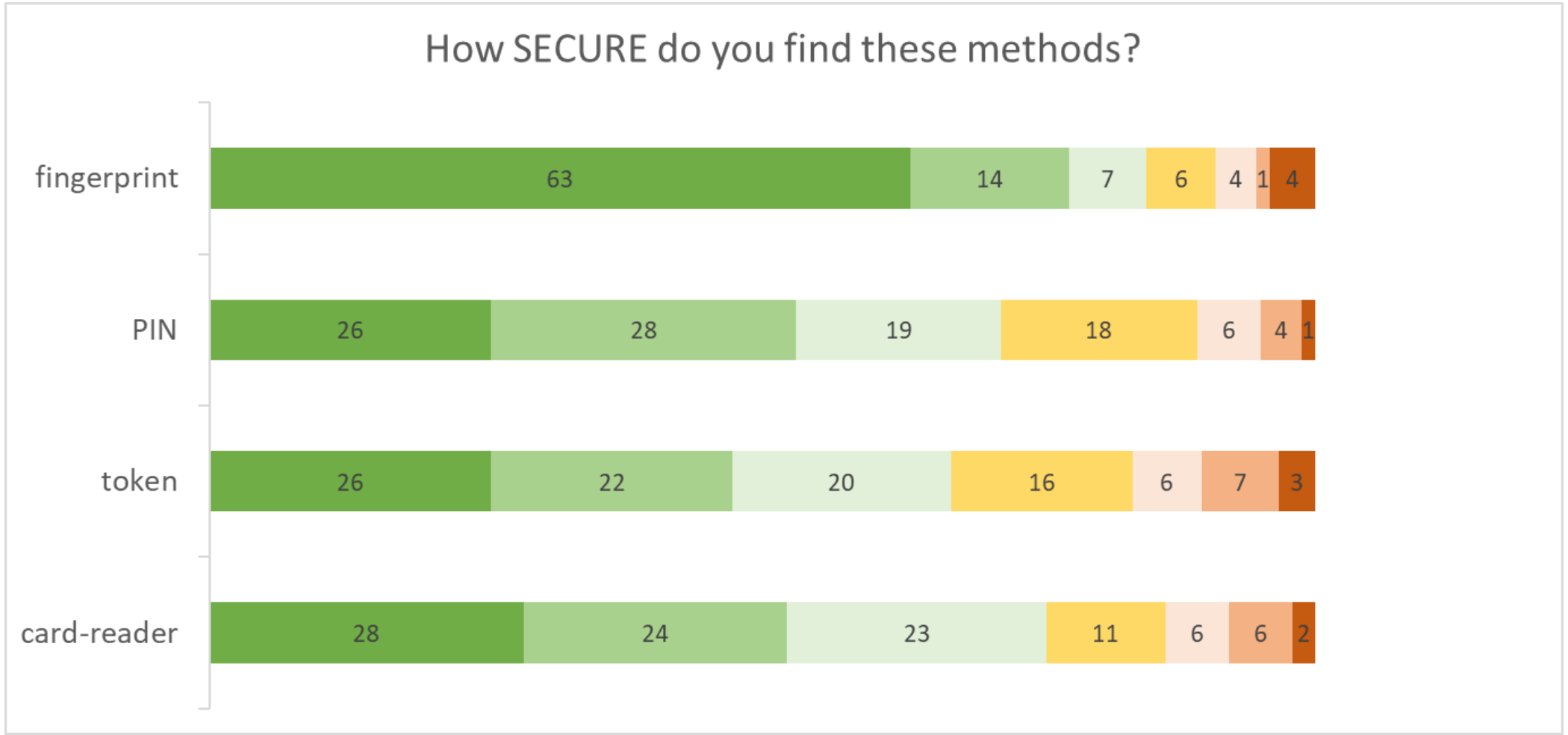
- **Perceptions of „tested“ authentication methods**: PIN, fingerprint, token, card-reader
  - Easy to use, practical, secure
  - Predictors of usability and security
- **Preferences for specific authentication methods** and their combinations



	Easy to use		Practical		Secure	
	M	*SD*	*M*	*SD*	*M*	*SD*
Fingerprint	1.60	1.33	1.65	1.36	1.93	1.59
PIN	2.11	1.46	2.17	1.47	2.67	1.46
Token	2.10	1.67	2.86	1.93	2.90	1.68
Card-reader	2.64	1.90	3.43	2.09	2.67	1.57


How EASY TO USE do you find these methods?
fingerprint
74
14
4
1
4
2
2
PIN
47
26
12
6
5
2
2
token
56
19
9
4
5
4
4
card-reader
40
20
13
8
6
7
6


How PRACTICAL do you find these methods?
fingerprint
72
12
7
3
2
1
3
PIN
46
23
14
8
3
4
1
token
35
16
18
10
7
7
7
card-reader
24
17
19
10
10
7
14


How SECURE do you find these methods?
fingerprint
63
14
7
6
4
1
4
PIN
26
28
19
18
6
4
1
token
26
22
20
16
6
7
3
card-reader
28
24
23
11
6
6
2

Usability & Security DV

- Easy to use + practical → **Perceived usability**
  - Cronbach‘s α .862 (fingerprint), .729 (PIN), .792 (token), .820 (card-reader)
- Secure → **Perceived security**

- **Predictors**
  - Demographics: age, gender, education
  - Smarpthone security behavior scale Cronbach‘s α = .751
  - General security orientation .687, Perceived vulnerability .731, Perceived seriousness .883, Smartphone Self-Efficacy .833

Regression Analyses

- 4 (fingerprint, PIN, token, card-reader) x 2 (usability, security) DV

- 1: demographics
- 2: smartphone security behavior and attitude scales

  →no consistent relationships emerged for usability or security

  →Card-reader
    - Age: the older the more usable/secure
    - Smartphone Secure behavior: the more secure they behave, the more usable/secure

Regression Analyses (continued)

Token & card-reader X usability & security

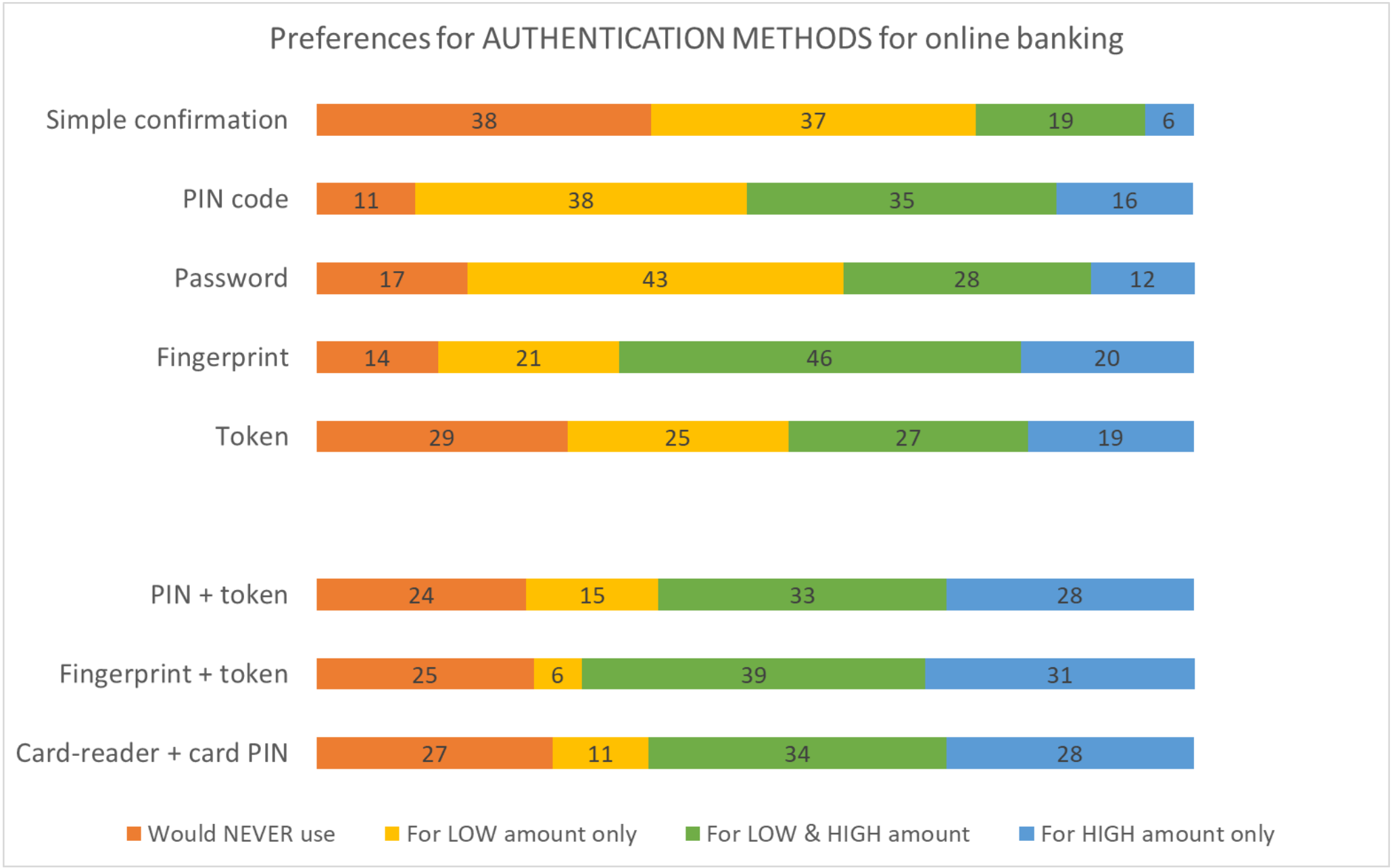
- 1: demographics
- 2: smartphone security behavior and attitude scales
- 3: scenario evaluation – easy to complete, time, instructions

- + 4: objective data from screen recordings

		Age	Gender	Educat	Smrtphn Secure Behavior	General Security Orientation	Perceived Vulnerability	Perceived Seriousness	Smrtphn Self-Efficacy	TASK: Simple	TASK: Time	TASK: Instructions
Usability	Fingerprint								+			
	PIN											
	Token				+						+	-
	Card-reader	+		+	+						+	-
Security	Fingerprint											
	PIN											
	Token											
	Card-reader	+			+							

- USABLE
- SECURE

- Which methods would participants actually use for online banking?


Preferences for AUTHENTICATION METHODS for online banking
Simple confirmation
38
37
19
6
PIN code
11
38
35
16
Password
17
43
28
12
Fingerprint
14
21
46
20
Token
29
25
27
19
PIN + token
24
15
33
28
Fingerprint + token
25
6
39
31
Card-reader + card PIN
27
11
34
28
Would NEVER use
For LOW amount only
For LOW & HIGH amount
For HIGH amount only

Implications

- Perceptions of usability, practicality, and security of the four authentication methods generally positive
- *Fingerprint wins the game*: security perceptions vs. reality
- Card-reader vs. Token: token slightly easier to use and more practical
- Preferences for 2FA combinations
  - Not a clearly preferred or unpopular combination
  - Offer a choice?
- Predictors of usability and security need further exploration
  - validation on the second sample

Limitations and Future Steps

- Preliminary analyses
- Evaluation of methods affected by performed tasks on smartphone

- Finish data collection + data cleaning
- Evaluate predictors in more detail
  - Include objective data from tasks

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Thank you for Your attention.

Questions?