

# A Study of Authentication in Daily Life

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# Authentication

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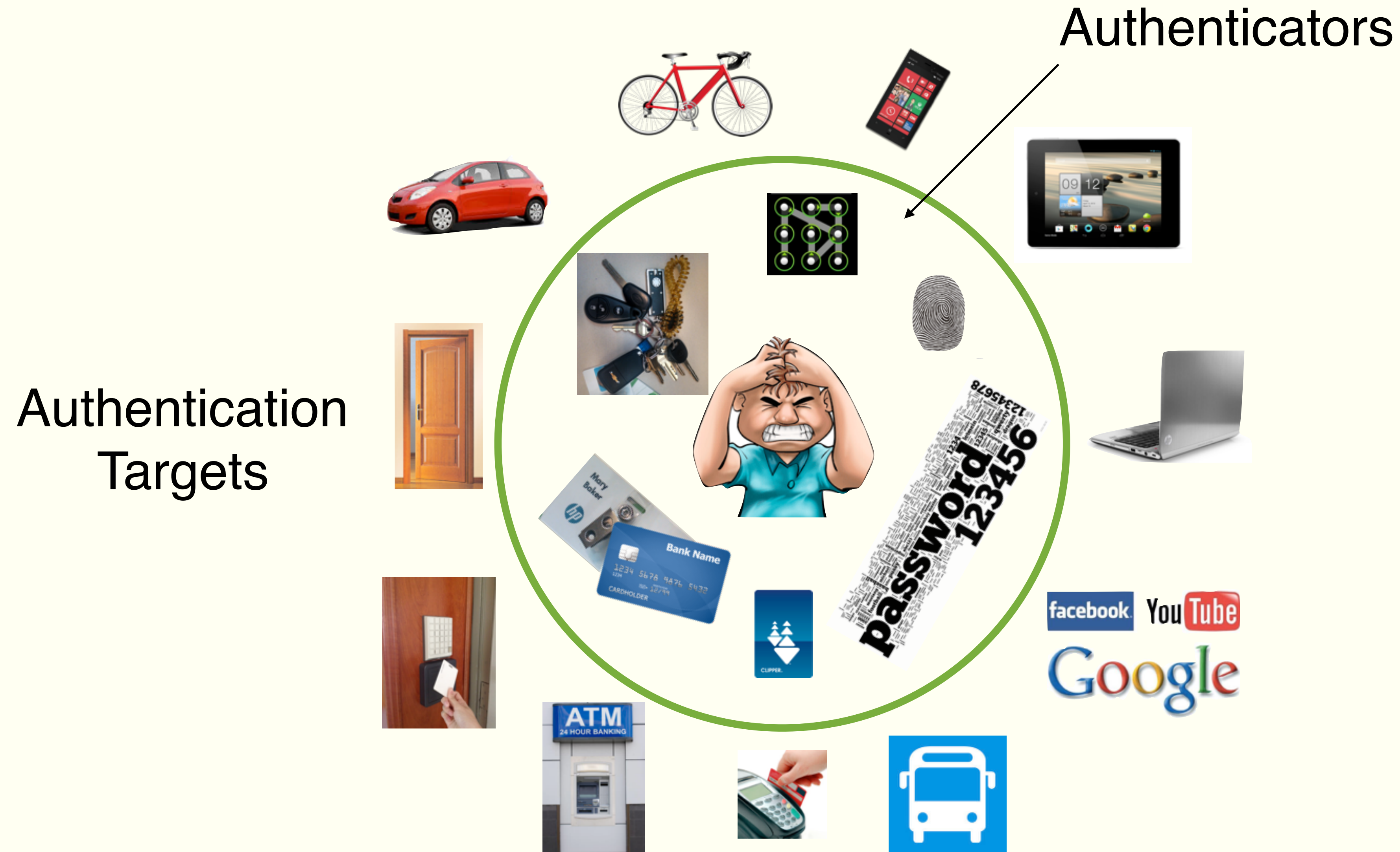


# Authentication





# Authentication



# Authentication behavior studies

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- Password habits [[Adams and Sasse 1999](#)]
- Web password habits [[Florencio and Herley 2007](#)]
- Access control in real world [[Sinclair and Smith 2010](#)]
- Password diary study [[Hayashi and Hong 2011](#)]
- Phone lock habits [[Egelman et al. 2014](#), [Harbach et al. 2014](#)]
- Authentication diary study, NIST report [[Steves et al. 2014](#)]
- Understanding biometric authentication on smartphones [[Luca et al. 2015](#)]
- Understanding people's security practices [[Ion et al. 2015](#)]

# Study goal

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Gain a better understanding of people's daily authentication behavior and opinion through interviews and tracking their authentication events to inform future projects that aim at reducing users' authentication burden.

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- **What** do people authenticate to, **how**, **when**, and **where**?
- Which authentications are **error-prone**?
- What do they **think** about authentication, and what do they **like** and **dislike**?

# Study contributions

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- Design of a wearable digital diary study
- Findings from the participant's authentication logs and the semi-structured interviews with them
- Study data: Participants' authentication logs and summarized interviews

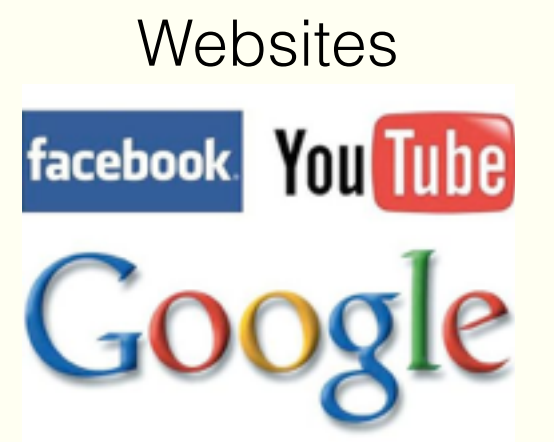


# Authentication event\*

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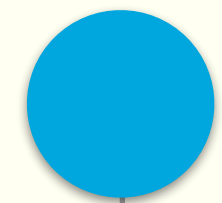
\*For our purpose

*An authentication event is an act where an individual must demonstrate, **actively**, that he is the right person to gain access to a resource or service through something he is (or does), something he knows, or something he has.*

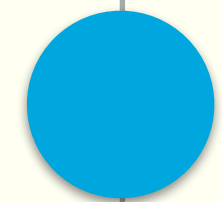


# Study methodology

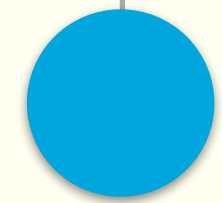
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Pre-logging interview



Logging: Participants log authentications for 7 days



Post-logging interview



# Logging authentication events

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## **Authentication event details:**

1. Time
2. Authentication target
3. Authenticator
4. Success/failure
5. Number of attempts, if successful
6. Location

# Logging: Watch app

- Only 2 taps to log an event in common case
- Slot-machine interface
- Most participants preferred logging on the watch



“Anything more than 2-3 taps is effort for me.”

“I didn’t used to wear a watch. [...] Now I want a watch”



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(1)



(2)

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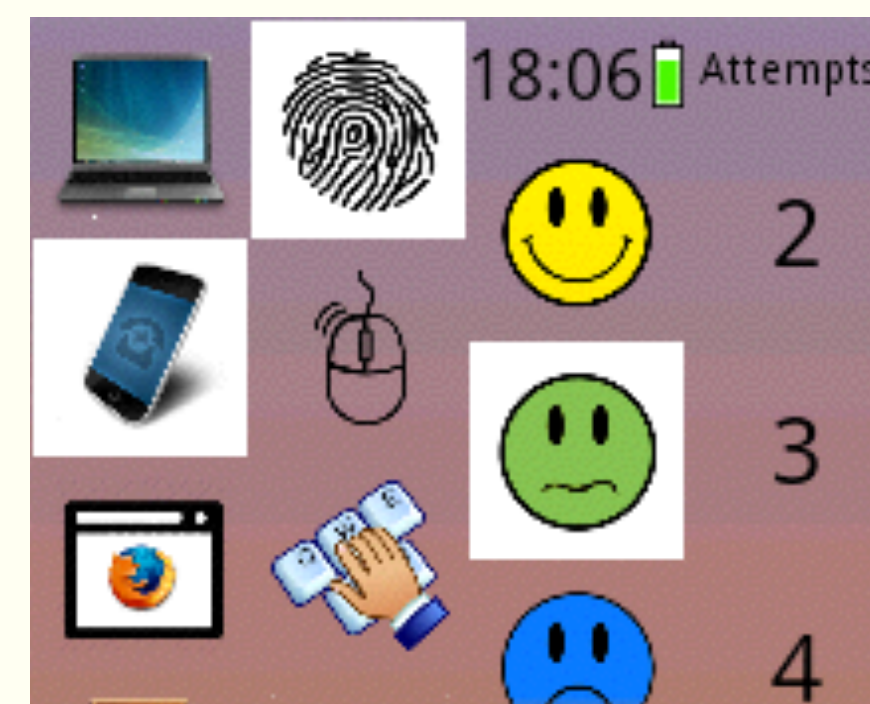
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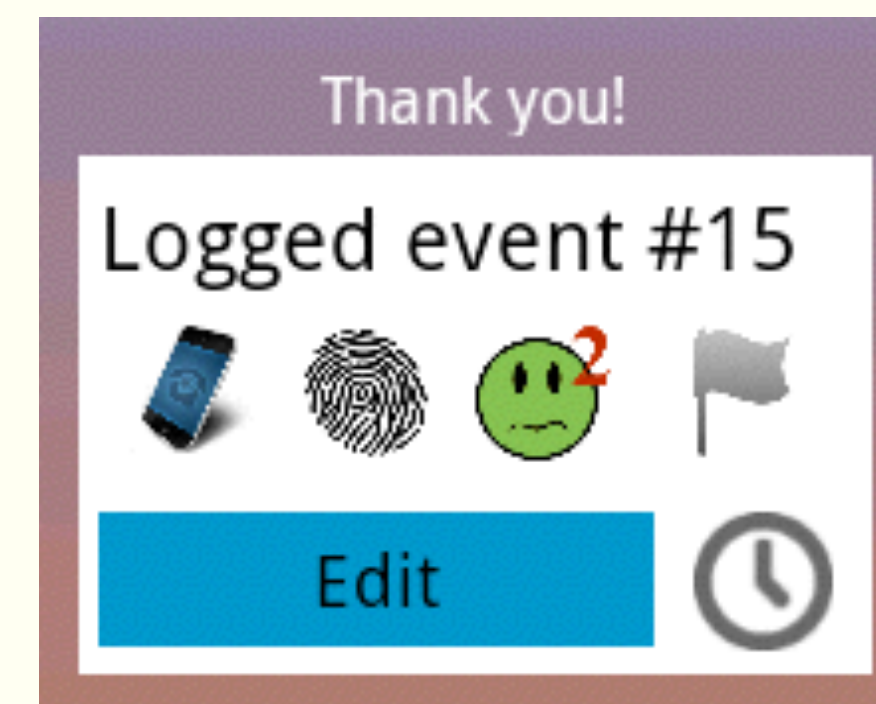
(1)



(2)



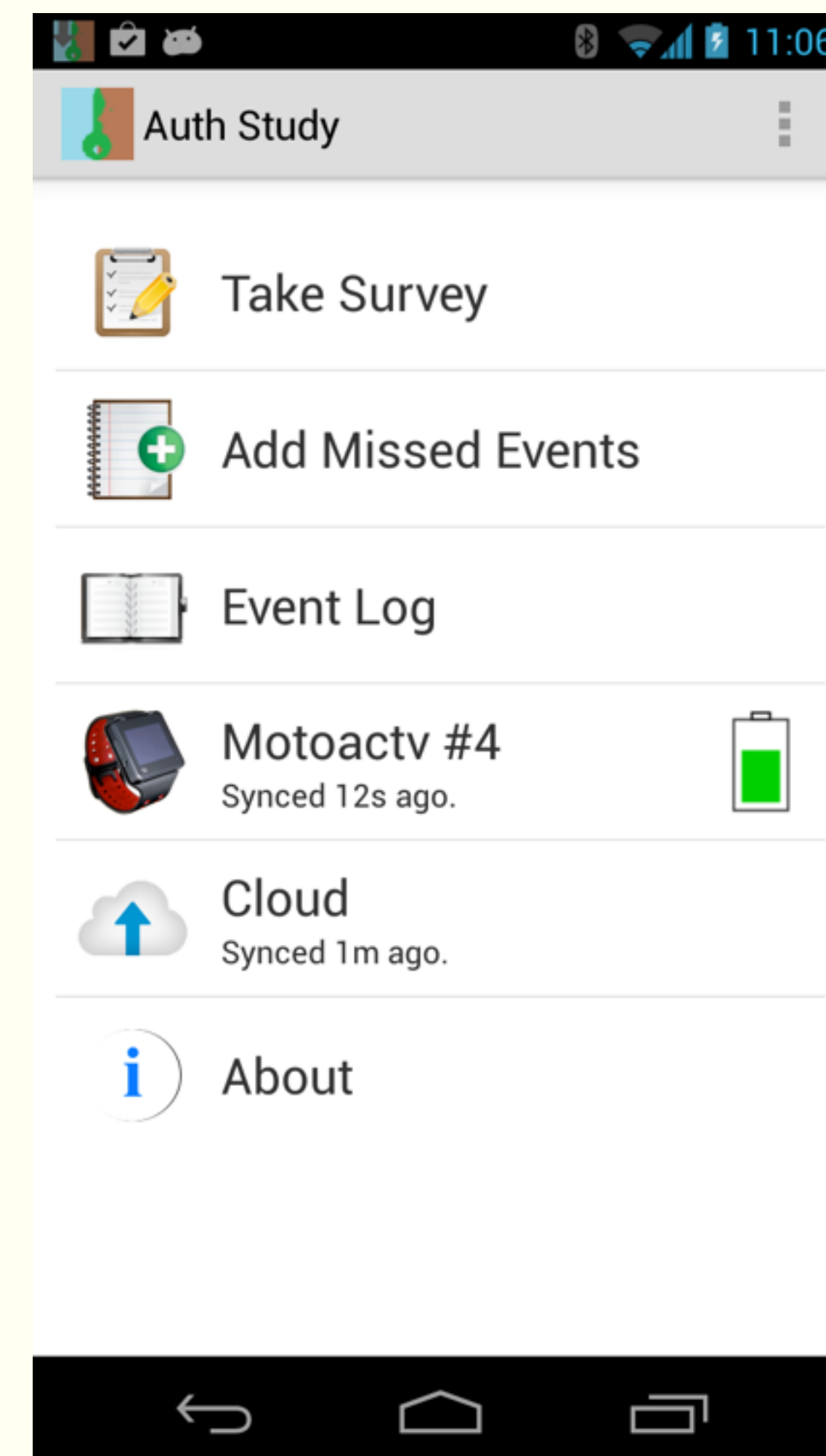
(3)



(4)

# Logging: Phone app

- Syncs data with the watch
- Uploads data to our server
- Logs participants' location
- Shows daily event log so participants can edit events and add missed events
- Administers daily survey



# Limitations

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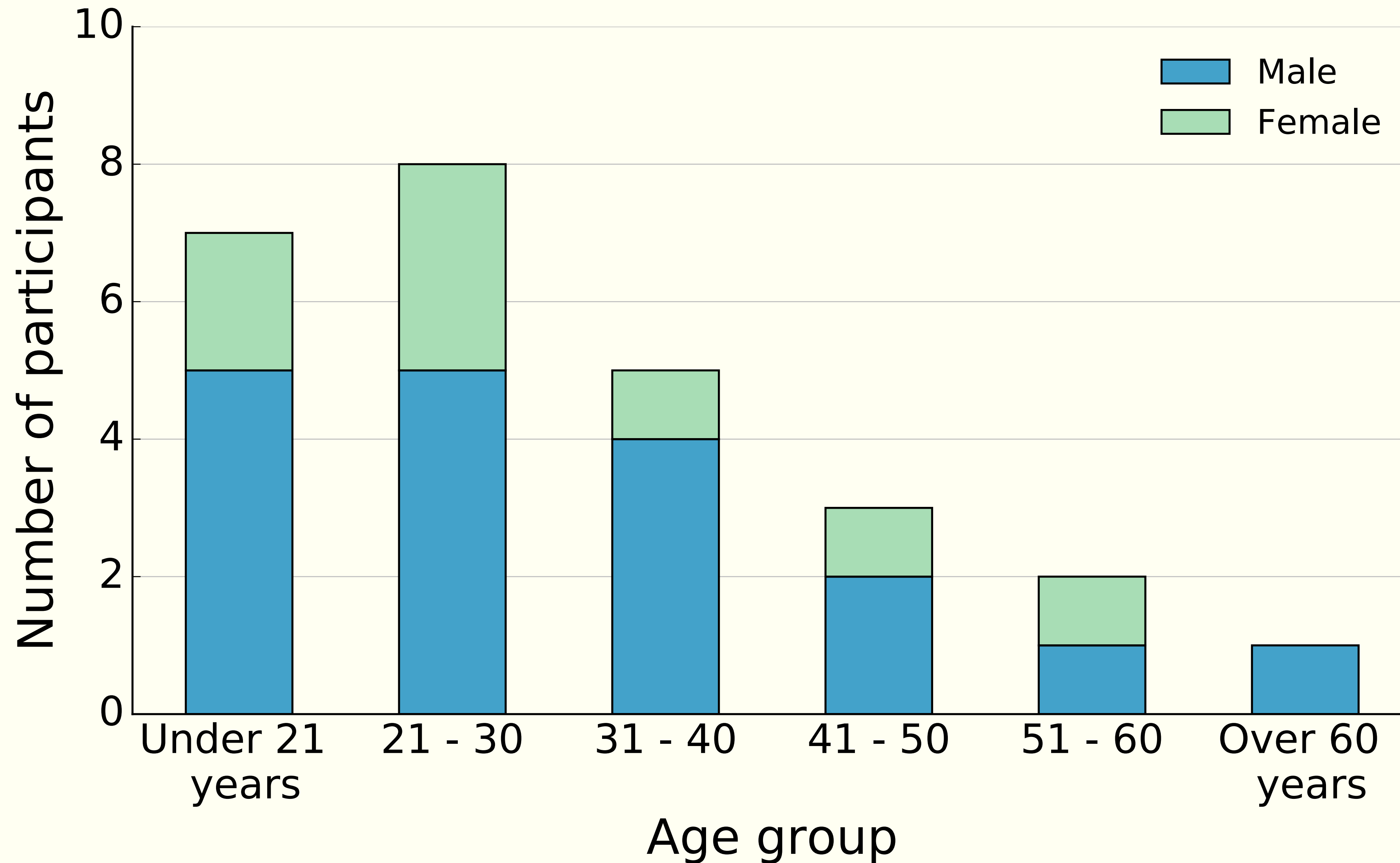
- **Under-reporting:** Minimized effort to log an event, but cannot rule out under-reporting.
- **Small sample size:** A “convenience” sample of 26 participants.
- **Self-logged vs. auto-logged:** Phone events are auto-logged and rest are self-logged.
- **A snapshot of a week:** May not be representative of the participant’s typical week.
- **Possible change in participants’ behavior:** Participation in the study could affect participant behavior.

“A couple of times I left my PC unlocked when I stepped away for just a minute because I didn't want to have to log it”

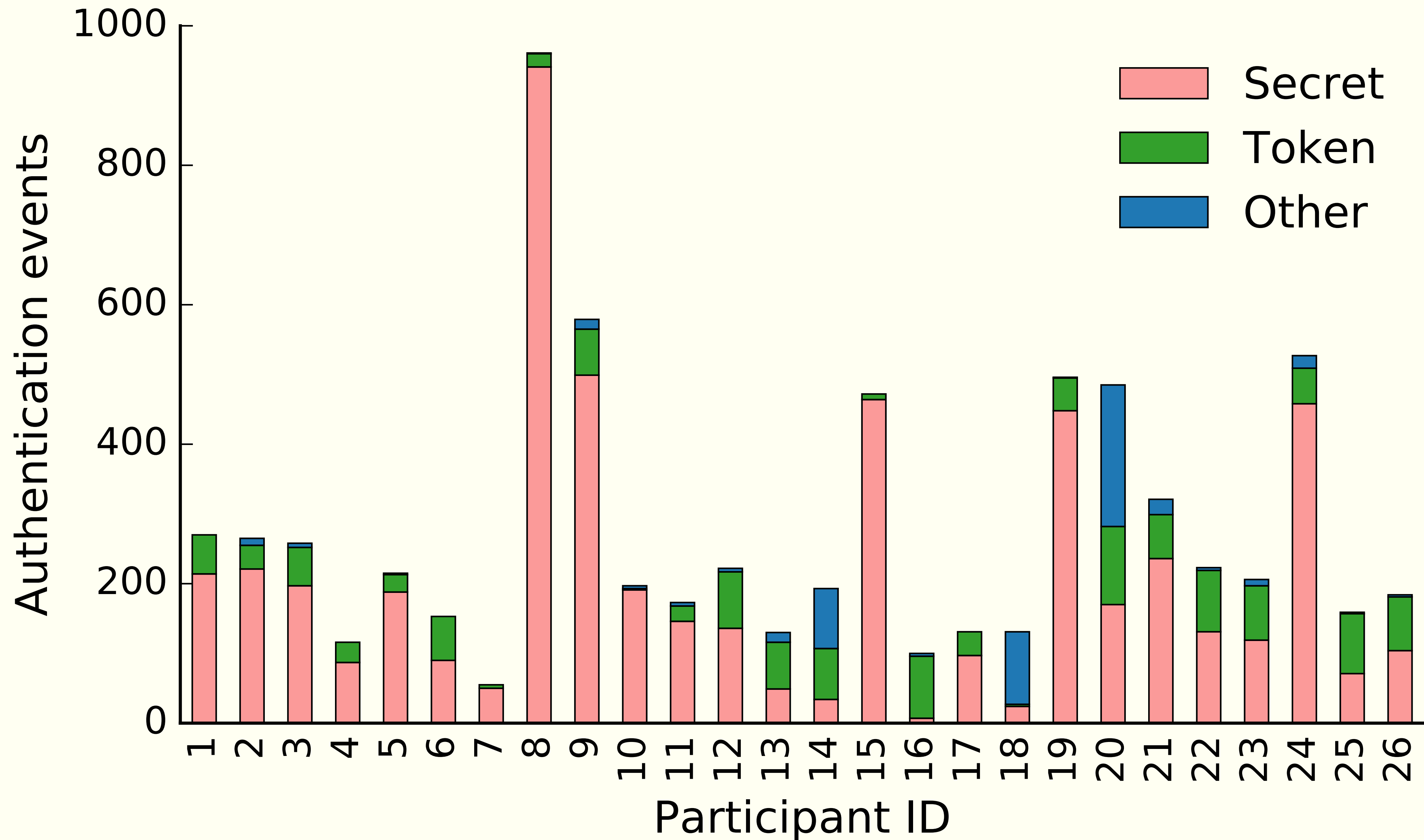
“I found myself typing my passwords slower so I'd get them right the first time.”



# Participants



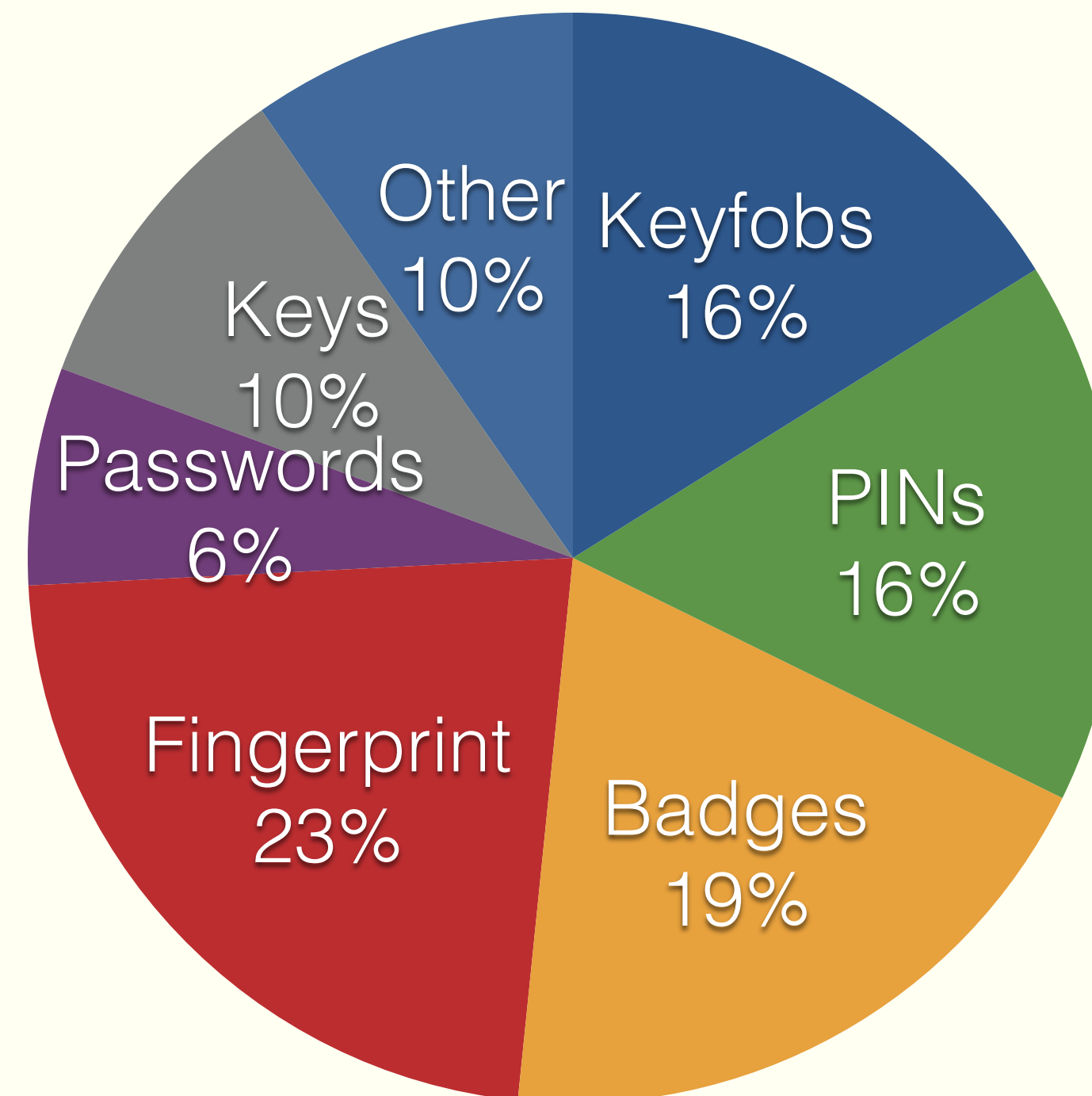
# Distribution of events by authenticators



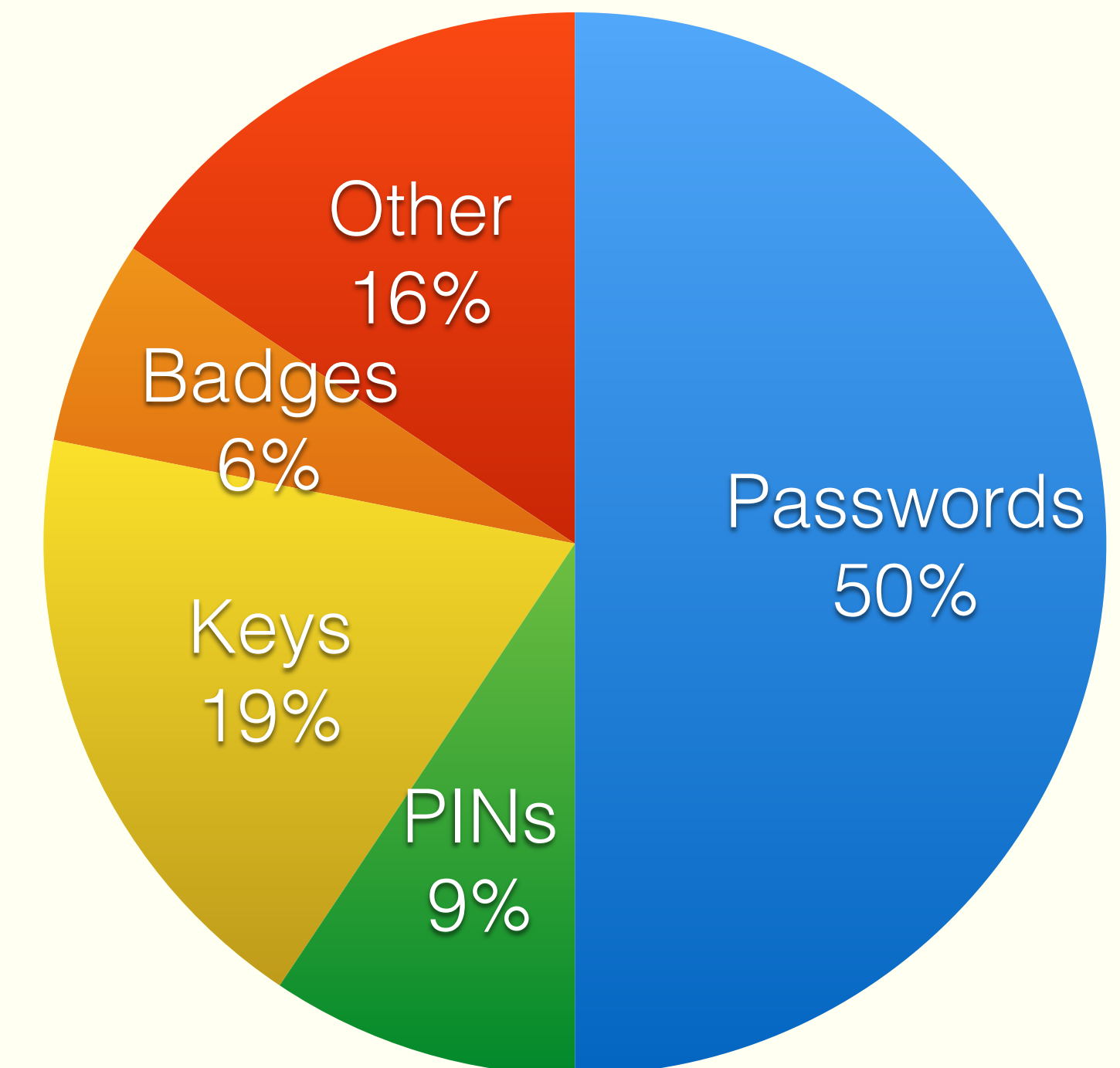
# Opinions about authentication

How frustrating is authentication?	N
(1) I don't notice them	1
(2)	9
(3)	10
(4)	5
(5) Extremely frustrating	1

Most liked  
authenticators



Most disliked  
authenticators

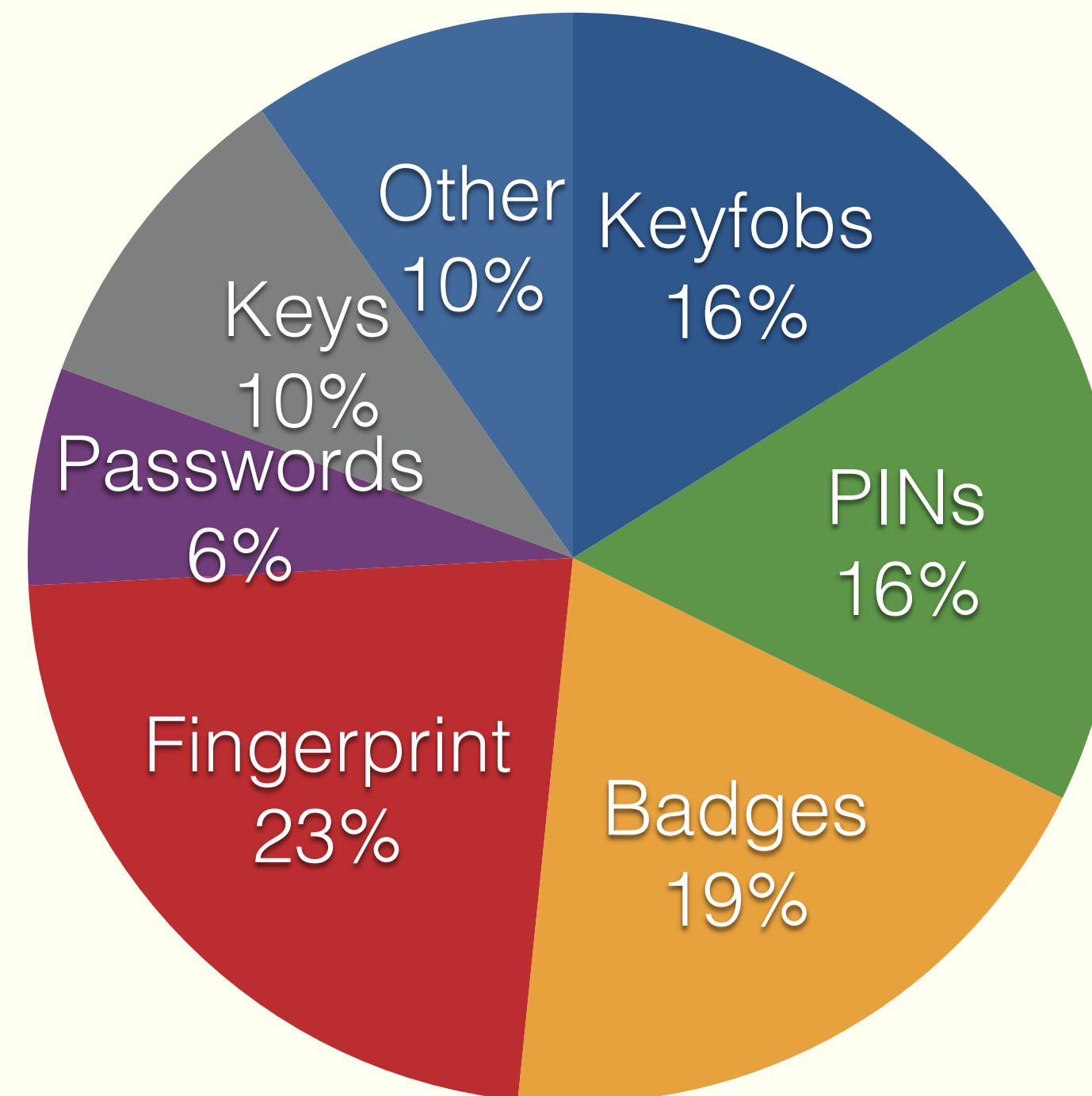


"It's important – necessary, so you just do it"

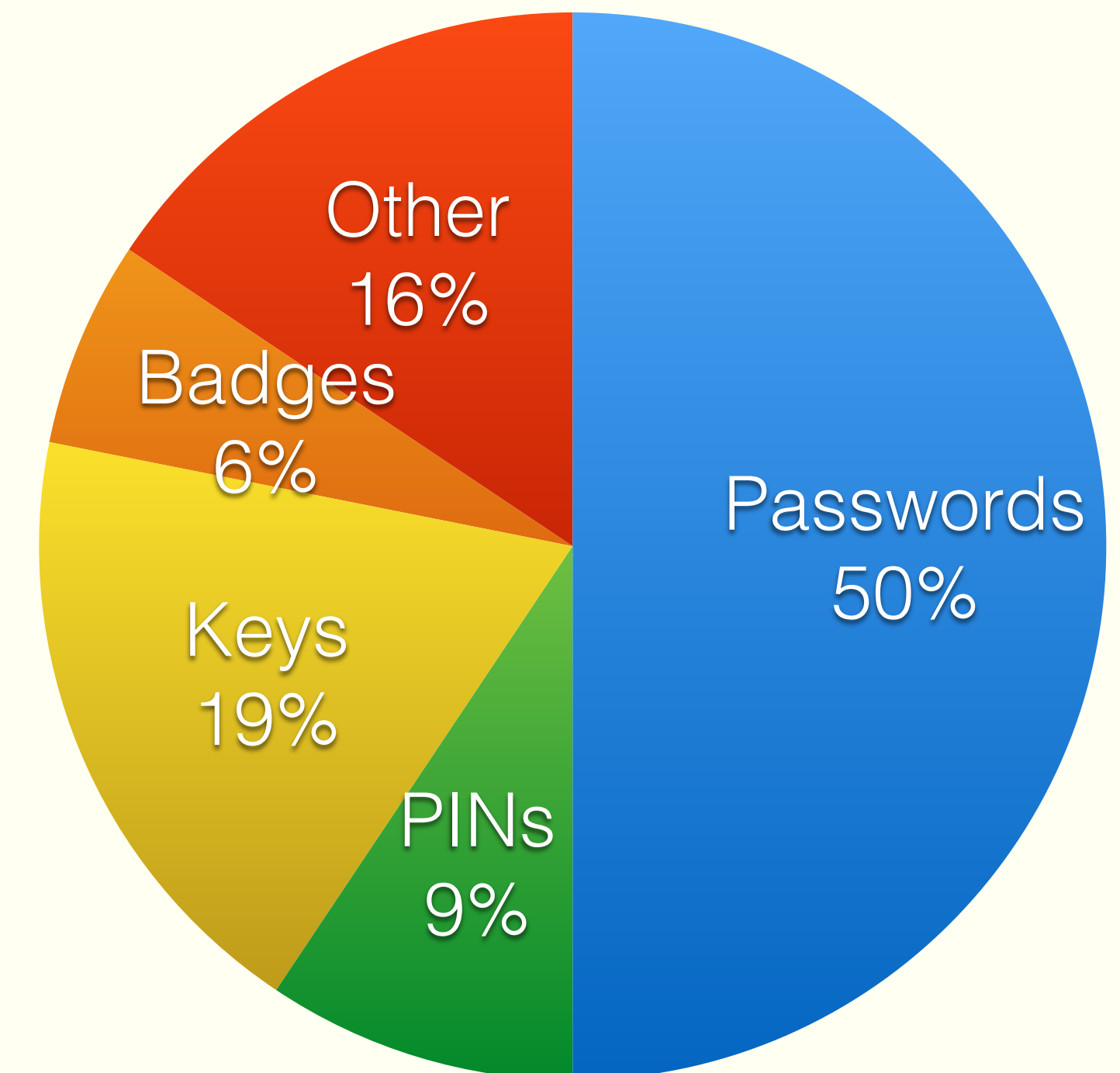
# Opinions about authentication

How frustrating is authentication?	N	N*
(1) I don't notice them	1	1
(2)	9	6
(3)	10	8
(4)	5	7
(5) Extremely frustrating	1	4

Most liked  
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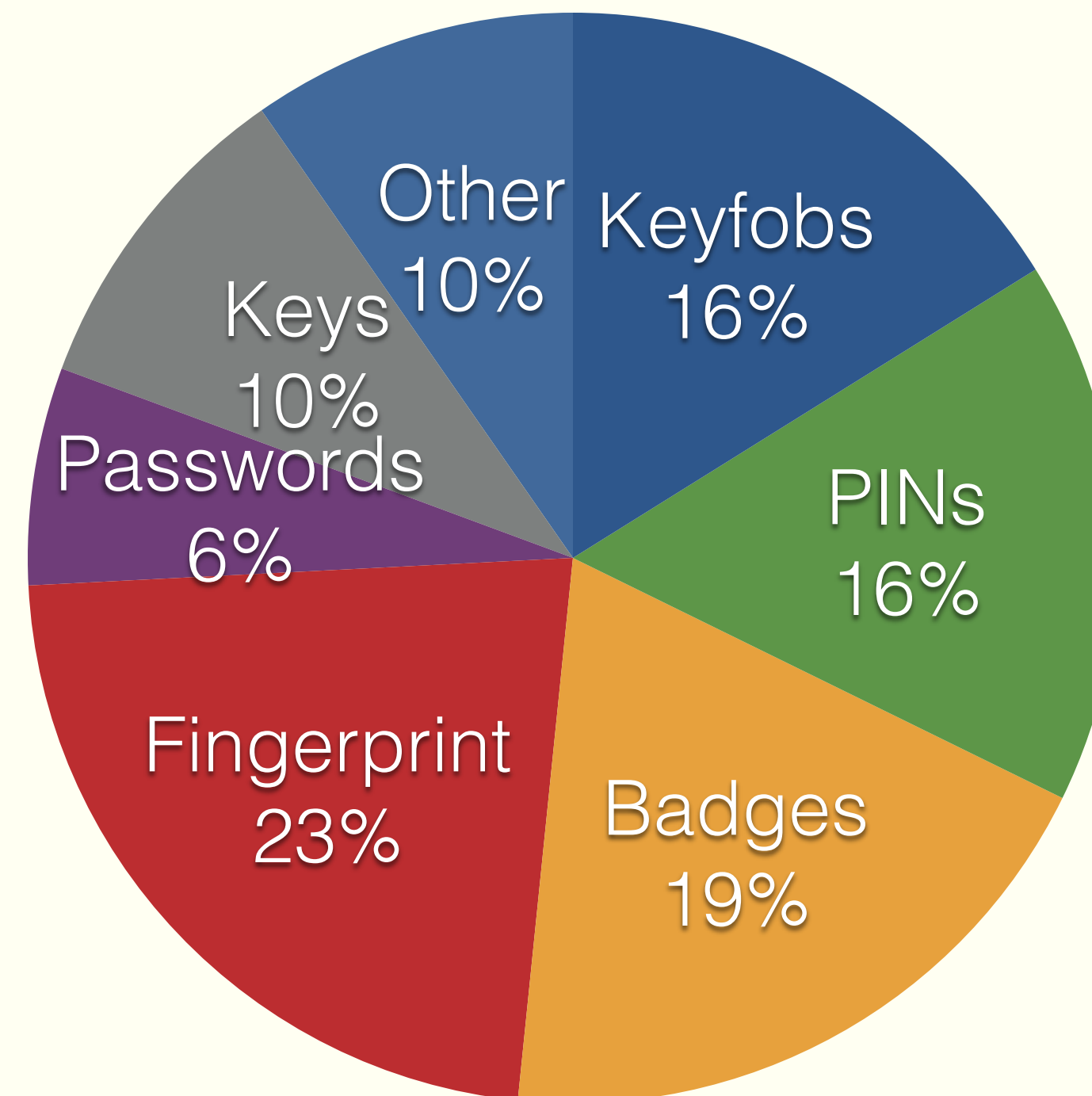
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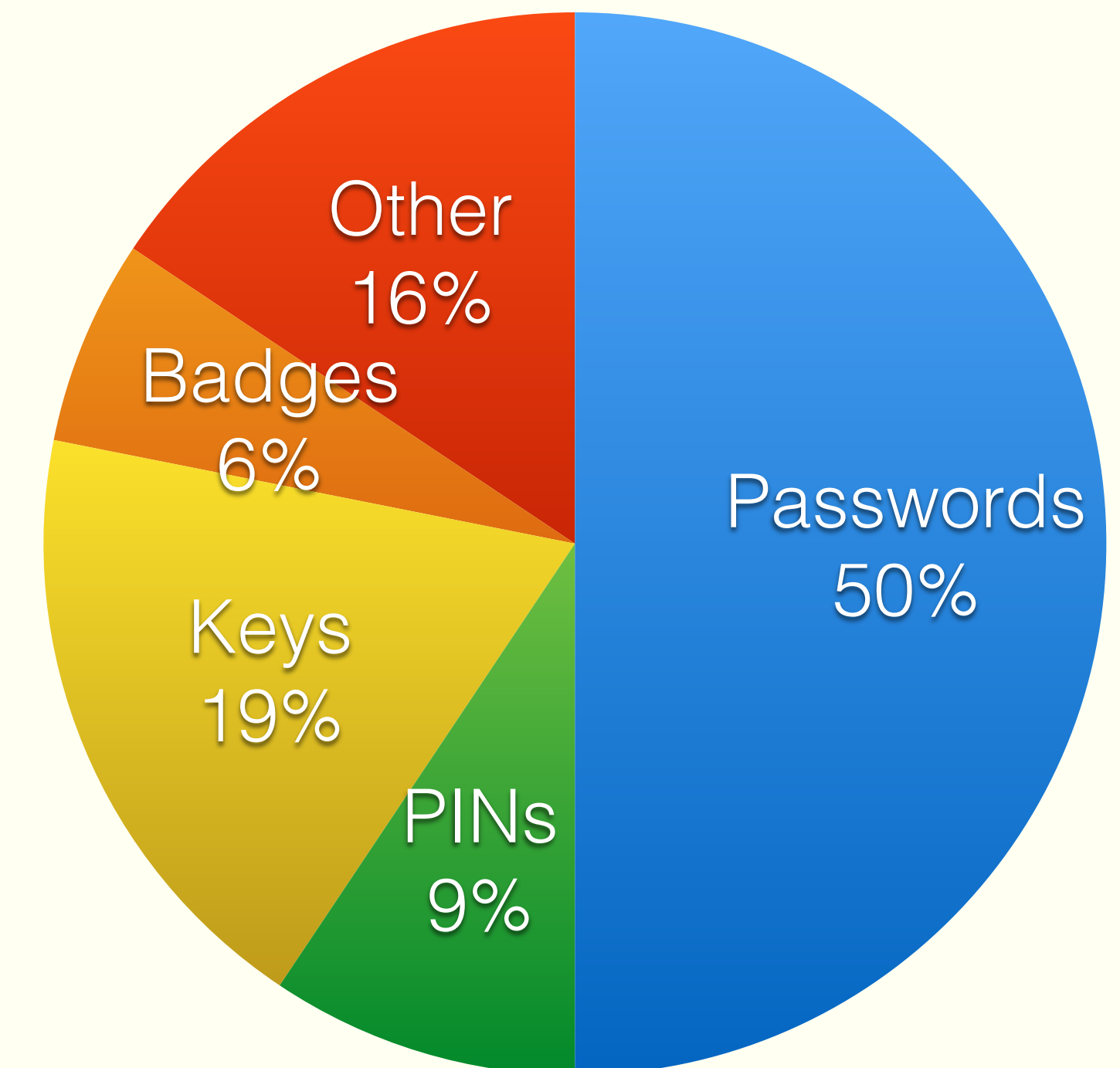
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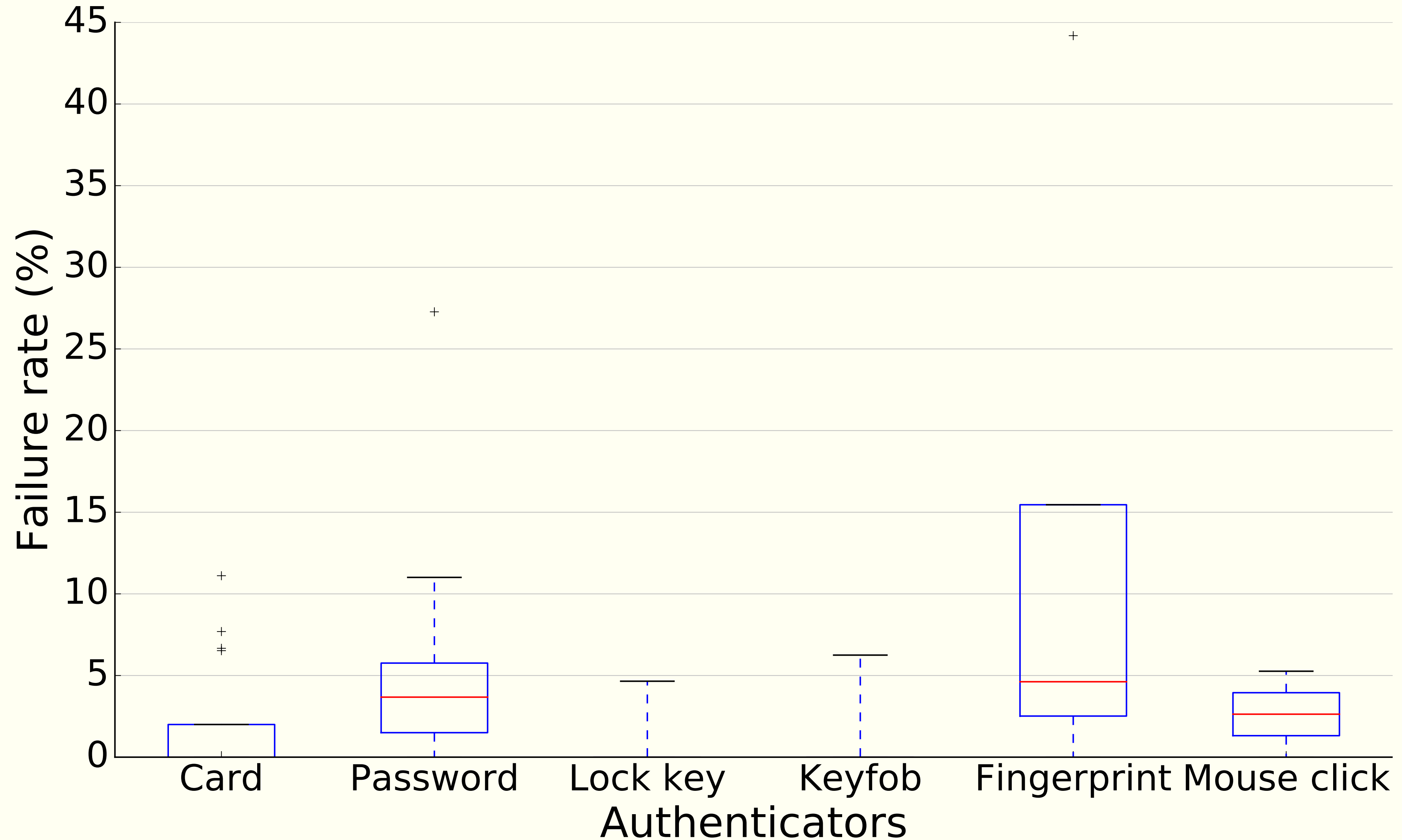
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"It's important – necessary, so you just do it"

"[Most effort are physical keys] first you have to find it in your purse, then pick out the right key from the ring. [...] So keys were a lot of effort, and the phone unlock wasn't."

# Authenticator failure rates



# Acknowledgements

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- Sunny Consolvo
- April Mitchell
- Iris Beneli
- Alvin AuYoung
- Ben Eric Andow
- Animesh Srivastava
- Cormac Herley
- SOUPS reviewers
- Kassem Fawaz
- Jim Mann
- Aarathi Prasad
- Denise Anthony

“The creativity in me makes them [passwords] more complicated – part of my frustration is that.”

“I'm also not happy with door key unlocking.”

“I always have to search in my purse for my keys or my badge. It's a giant black hole.”

“[Locked keys in the car] But a guy in the parking lot was able to break into my car for me. I was never happier in my life to meet a competent criminal.”

“[Authentication] It's kind of evil. It's a constant reminder that there are bad people.”

“How do I log this event? I entered my password and my laptop crashed.”

“Also, I feel embarrassed wearing it [badge ID] — kind of like I'm a kid in kindergarten with a name tag. And I hate my photo that's on it.”