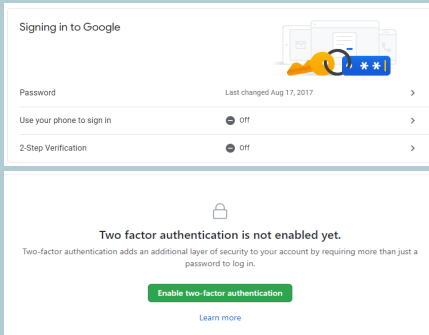


# "If I could do this, I feel anyone could:" The Design and Evaluation of a Two-Factor Authentication Manager

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## Problem

- Inconsistent setup interface, workflow, and terminology
- Lack of 2FA mass-enroll support. *"Upgraded to a new phone, which is like taking a 12 hour refresher course in configuring 2FA"*



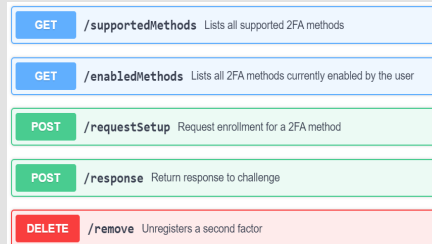
- Wide variety of 2FA methods

Method	Identifier	Challenge
Backup codes	Backup code	Backup code
Phone Call	Phone number	Code through call
Push notify	Registration ID	Auth Req approval
SMS	Phone number	Code through text
TOTP	Shared secret	Code through secret & timestamp
U2F	Public key	Signed challenge
WebAuthn	Public key	Signed Challenge

## 2FA manager design

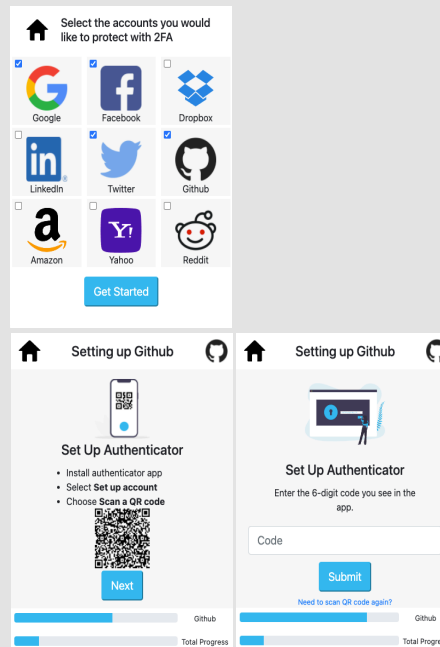
- Abstract design of setup/removal
- Partially automates setup/removal
- Unified, fast, and easy-to-use
- Support mass 2FA setup/removal

## Setup/Removal Abstract Interface



## 2FA manager prototypes

- Browser extension
- KeePass manager extension



## Methodology

- Evaluate usability of 2FA manager
- 60-person between-subjects
- 2FA setup and removal task on Google, Facebook, and Dropbox

Group	Method Used	Prior Usage
A	Manual	Non-TOTP user
B	2FA manager	Non-TOTP user
C	2FA manager	TOTP user

- Research questions center around success rate, completion time and perceived usability
- Quantitative and qualitative results

## Results

2FA manager results in fewer mistakes and reduced time for setup and removal

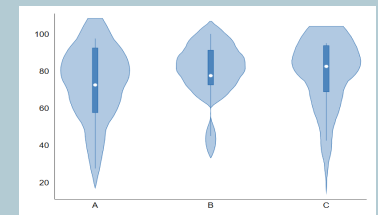
Group	Success	Failure
A	15 (75%)	5 (25%)
B	20 (100%)	0 (0%)
C	18 (90%)	2 (10%)

Manual setup/removal problems:

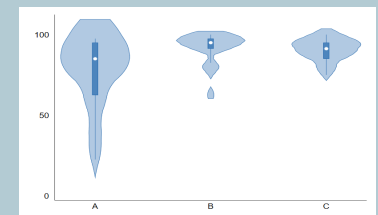
- Users quit prematurely believing they have completed the process
- Account lockout when removal fails

Group	Setup time (s)	Removal time (s)
A	472	162
B	315	62.4
C	262	59.67

- Setup time: significant diff ( $t(33) = 2.66, p = 0.006$ ) between A and B
- Removal time: significant diff ( $t(32) = 3.50, p=0.0007$ ) between A and B



Setup SUS score



Removal SUS score

**P23:** "This process makes the disabling of 2FA so easy that I'd want to use it on more websites."

**P10:** "This was *\*incredibly\** easy. Install the extension, select multiple websites, and go. Setting up multiple websites is great, as I can just plug in credentials from my password manager"