

Dissecting Nudges in Password Managers: Simple Defaults are Powerful

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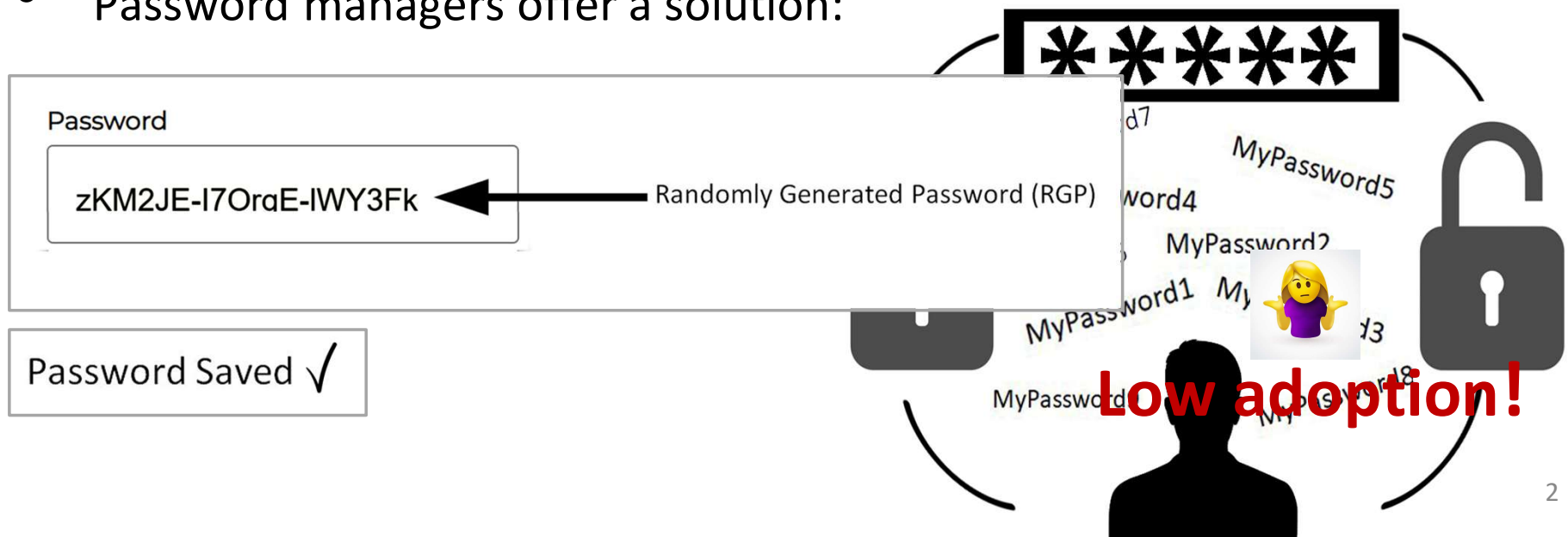
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Julie Thorpe

Ontario Tech University

Motivation

- Passwords are widely used for web authentication.
- Users struggle to manage multiple passwords.
- Password managers offer a solution:



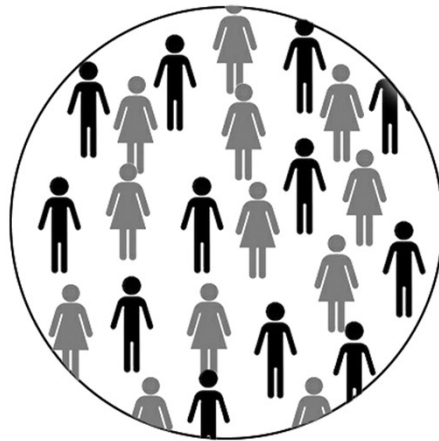
Nudging

A strategy to influence individuals' choices without imposing a predetermined result.



- Popular web browsers (Chrome, Firefox, Safari) nudge users to use RGP.
- Recent study (SOUPS 2022) shows Safari users have higher RGP adoption.

RQ1: Is Safari's Design Effective or Its Users?



Safari's design
or
Safari users?

We assess the Safari design's effectiveness on **Chrome** users.



RQ2: Which of Safari's Nudge Design Elements?

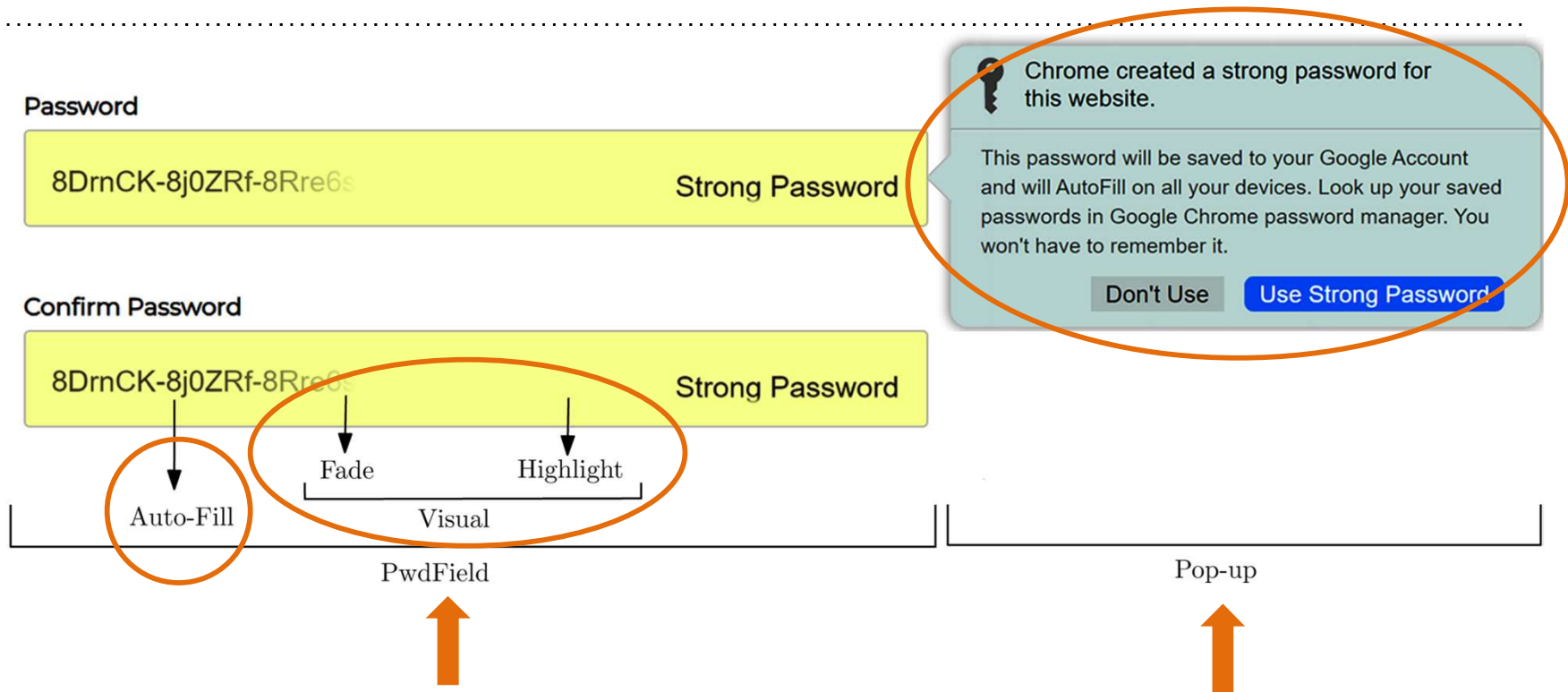


Figure 1: Simulating Safari's Nudge Design on Chrome (with minor modifications to the pop-up text)



RQ3: Can a Social Nudge Improve Safari's Nudge?

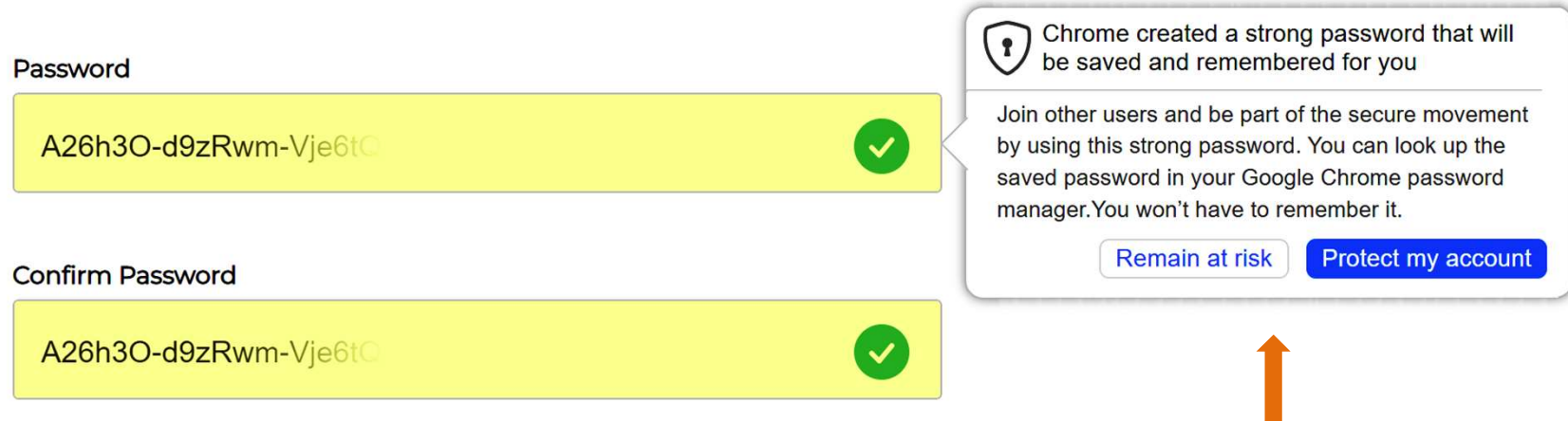
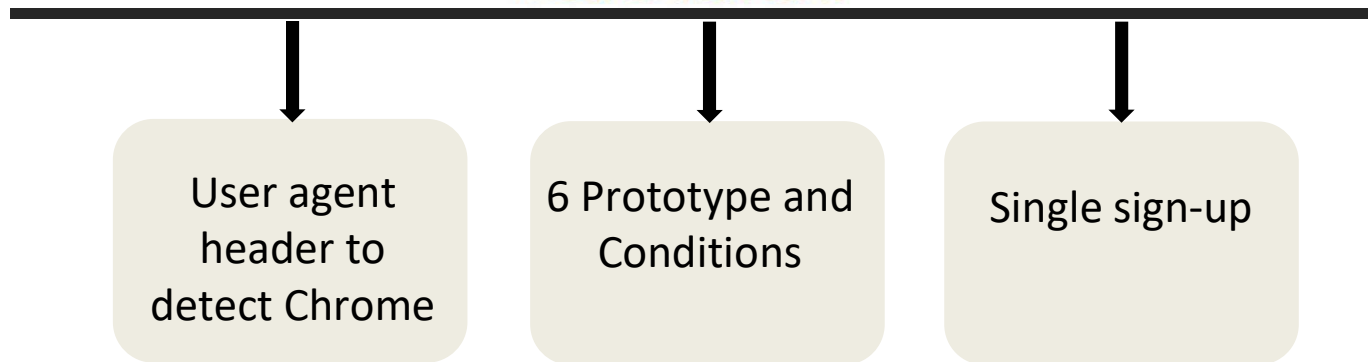


Figure 2: Safari-Social prototype on Chrome

User Study (n=853)

amazon
mechanical turk



Control Condition

Chrome prototype:

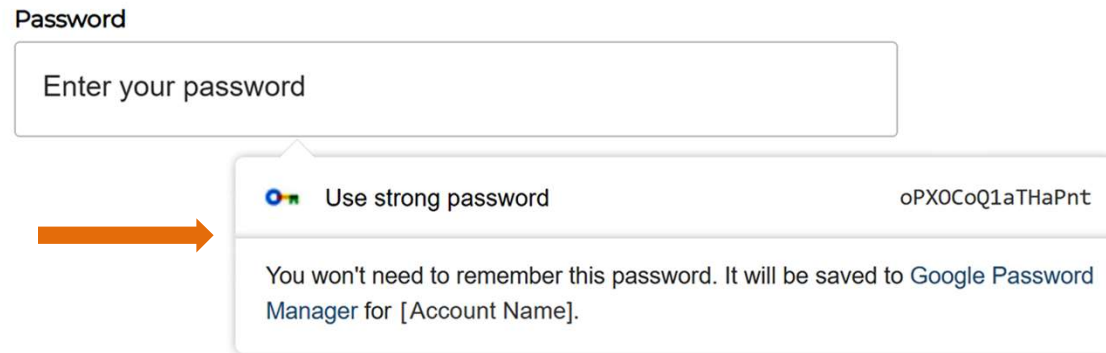
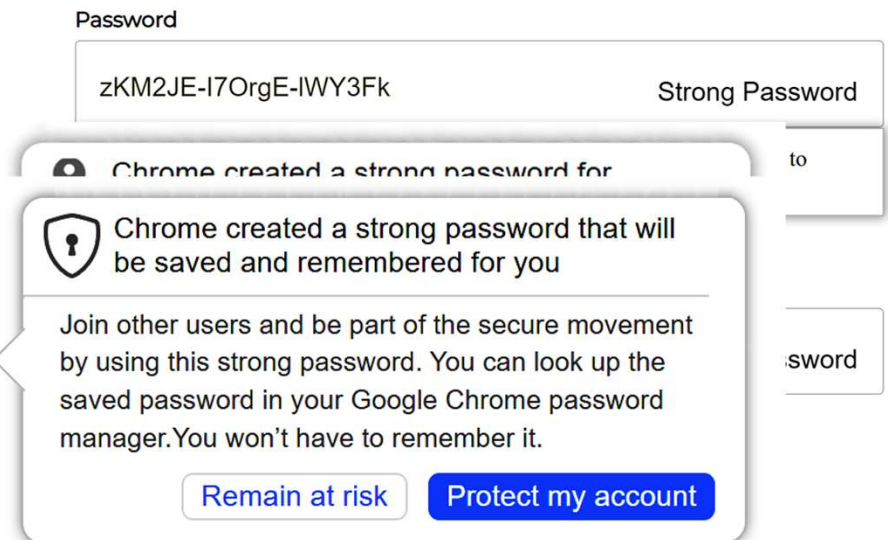


Figure 4: Chrome prototype (based on Chrome's interface since Chrome 105, released Aug. 2022)

Experimental Conditions

Conditions	Safari's UI			Social Pop-up
	Autofill	Visual	Pop-up	
Safari	✓	✓	✓	
PwdField	✓	✓		
PwdField-No-Visual	✓			
Pop-up			✓	
Safari-Social	✓	✓	✓	✓

Table 1: UI design elements for non-Chrome conditions



Study Structure

Task 1: Initial deceptive consent

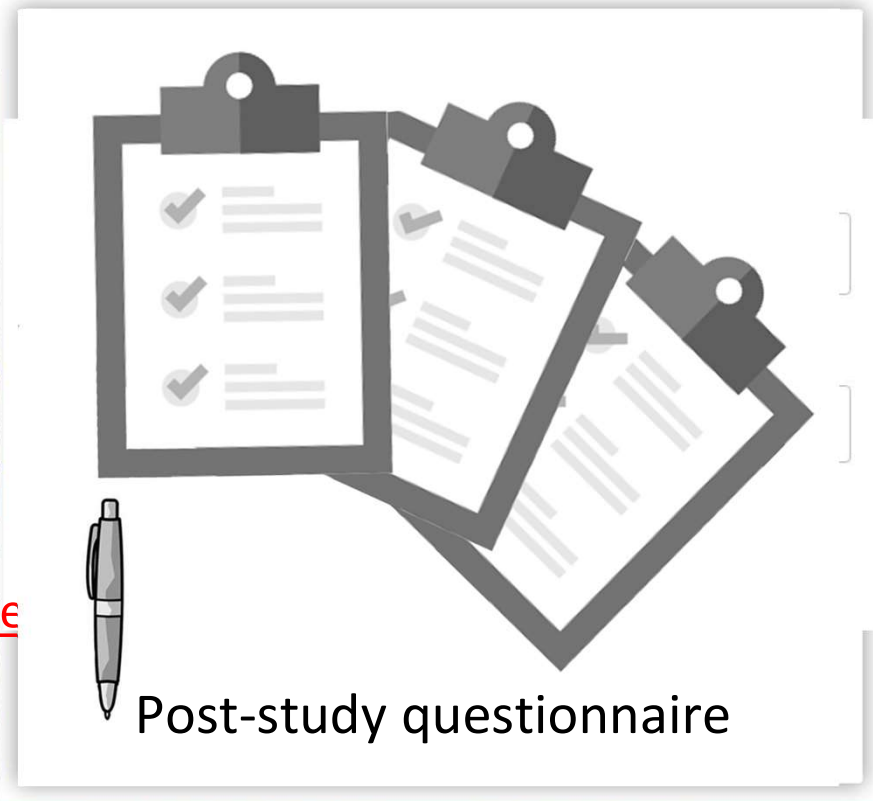
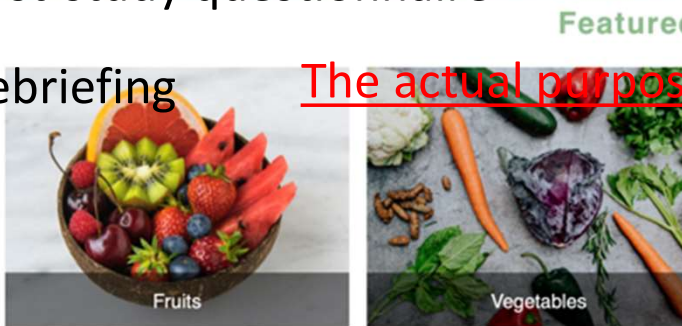
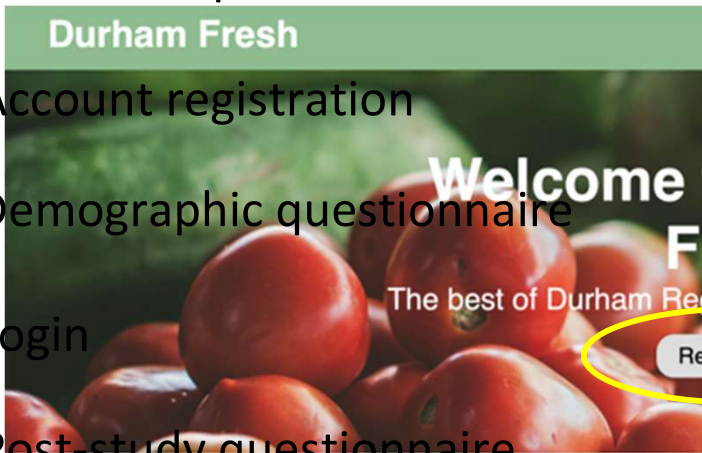
Task 2: Account registration

Task 3: Demographic questionnaire

Task 4: Login

Task 5: Post-study questionnaire

Task 6: Debriefing The actual purpose



Results

RQ1: Is Safari's Design Effective or Its Users?

	Adoption rate	
Chrome	67.7%	← (χ ² = 7.95, p= 0.0038*, V = 0.16)
Safari	81.1%	
PwdField	75.2%	
PwdField-No-Visual	83.1%	
Pop-up	57.9 %	
Safari-Social	80.0 %	

Results

RQ2: Which of Safari's Nudge Design Elements?

	Adoption rate
Chrome	67.7%
Safari	81.1%
PwdField	75.2%
PwdField-No-Visual	83.1%
Pop-up	57.9 %
Safari-Social	80.0 %

($\chi^2 = 9.33$, $p = 0.002^*$, $V = 0.18$)

Results

RQ2: Which of Safari's Nudge Design Elements?

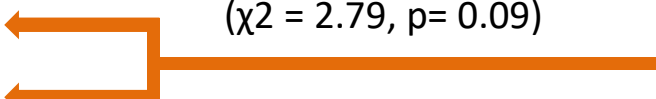
	Adoption rate	
Chrome	67.7%	
Safari	81.1%	← (χ ² = 2.38 , p= 0.122)
PwdField	75.2%	
PwdField-No-Visual	83.1%	
Pop-up	57.9 %	
Safari-Social	80.0 %	

Results

RQ2: Which of Safari's Nudge Design Elements?

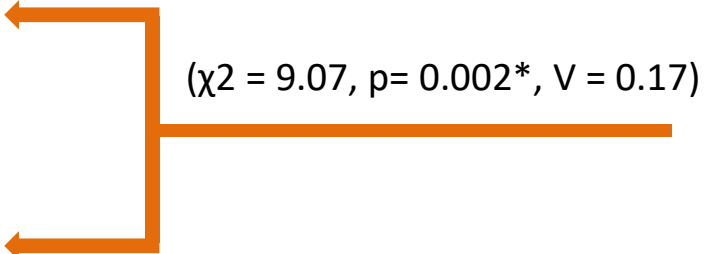
	Adoption rate
Chrome	67.7%
Safari	81.1%
PwdField	75.2%
PwdField-No-Visual	83.1%
Pop-up	57.9 %
Safari-Social	80.0 %

($\chi^2 = 2.79, p = 0.09$)



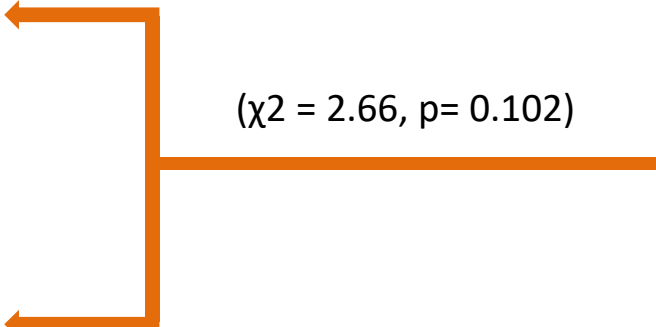
Results

RQ2: Which of Safari's Nudge Design Elements?

	Adoption rate	
Chrome	67.7%	 <p>($\chi^2 = 9.07$, $p = 0.002^*$, $V = 0.17$)</p>
Safari	81.1%	
PwdField	75.2%	
PwdField-No-Visual	83.1%	
Pop-up	57.9 %	
Safari-Social	80.0 %	

Results

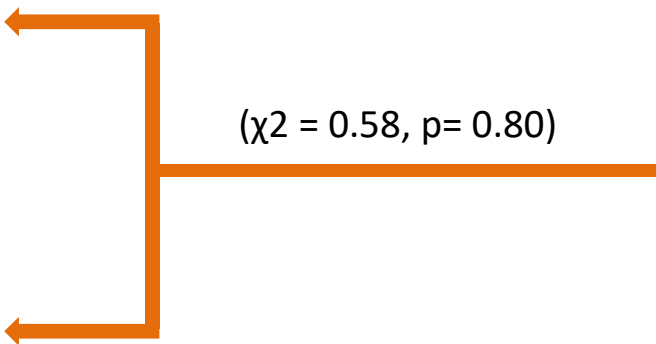
RQ2: Which of Safari's Nudge Design Elements?

	Adoption rate	
Chrome	67.7%	 <p>($\chi^2 = 2.66, p= 0.102$)</p>
Safari	81.1%	
PwdField	75.2%	
PwdField-No-Visual	83.1%	
Pop-up	57.9 %	
Safari-Social	80.0 %	

Results

RQ3: Can a Social Nudge Improve Safari's Nudge?

	Adoption rate
Chrome	67.7%
Safari	81.1%
PwdField	75.2%
PwdField-No-Visual	83.1%
Pop-up	57.9 %
Safari-Social	80.0 %



($\chi^2 = 0.58, p= 0.80$)

Results

	Adoption rate
Chrome	67.7%
Safari	81.1%
PwdField	75.2%
PwdField-No-Visual	83.1%
Pop-up	57.9 %
Safari-Social	80.0 %

Autofill vs. non- autofill
($\chi^2 = 28.27$, $p < 0.0001^*$, $V = 0.18$)

Which Nudge Type is Most Effective?

UI elements	Default	Social Comparisons	Deceptive Visual	Suggest Alternatives	Just-in-time Prompt
Chrome's UI				✓	✓
Autofill	✓			✓	✓
Pop-up				✓	✓
Visual			✓		✓
Social Pop-up		✓		✓	✓

Simple Defaults are Powerful

Table 2: Nudge types employed in UI design elements
(Caraban et al.,2019)

Ethics of a Default Nudge

- Does the visual element in Safari's design hold any value?
- Visually striking interface does not result in higher rates of RGP adoption (**“missed opportunity”**).
- However, ethical concerns arise if users accept defaults without understanding the implications.
- Best choice defaults may be unethical if users are unaware of alternatives.

Password

9gzfwP-4WTTyS-p4CR4 Strong Password

Chrome will save this strong password in your Google Account. You won't have to remember it.

Confirm Password

9gzfwP-4WTTyS-p4CR4 Strong Password

PwdField prototype (**90.1%** notice rate)

Password

zKM2JE-I7OrgE-IWY3Fk Strong Password

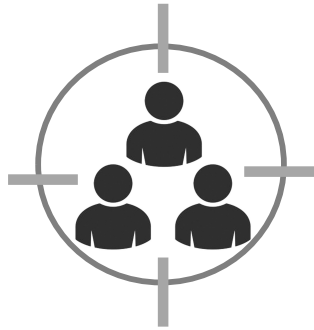
Chrome will save this password in your Google Account. You won't have to remember it.

Confirm Password

zKM2JE-I7OrgE-IWY3Fk Strong Password

PwdField-No-Visual prototype (**88.2%** notice rate)

Future Work



Personalize security nudges



Missed opportunity

Questions?

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