



# Understanding Users' Knowledge about the Privacy and Security of Browser Extensions

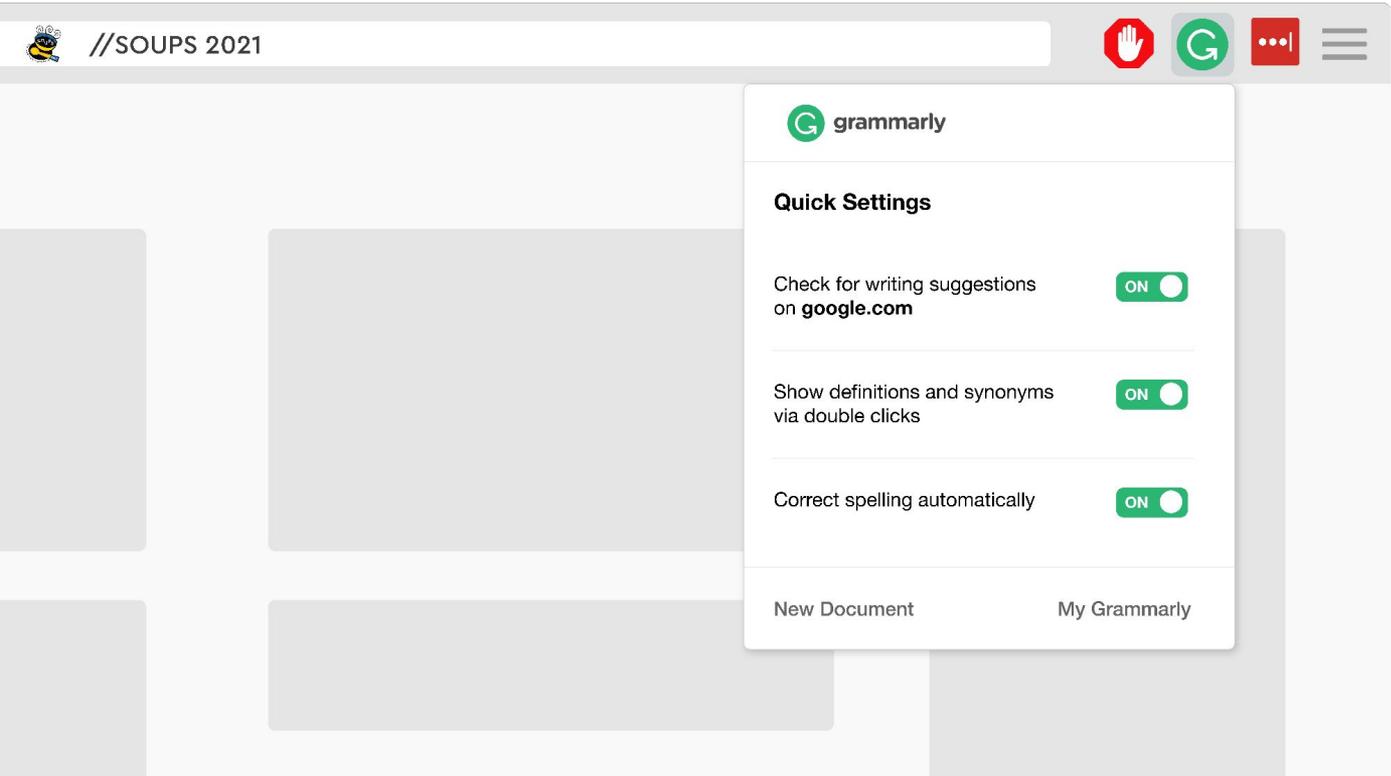
Ankit Kariryaa<sup>1,2</sup>, Gian-Luca Savino<sup>1</sup>, Carolin Stellmacher<sup>1</sup> and Johannes Schöning<sup>1,3</sup>

<sup>1</sup>University of Bremen <sup>2</sup>University of Copenhagen <sup>3</sup>University of St. Gallen



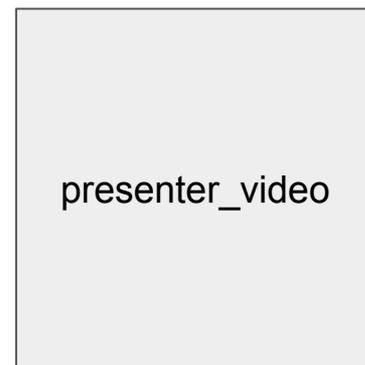
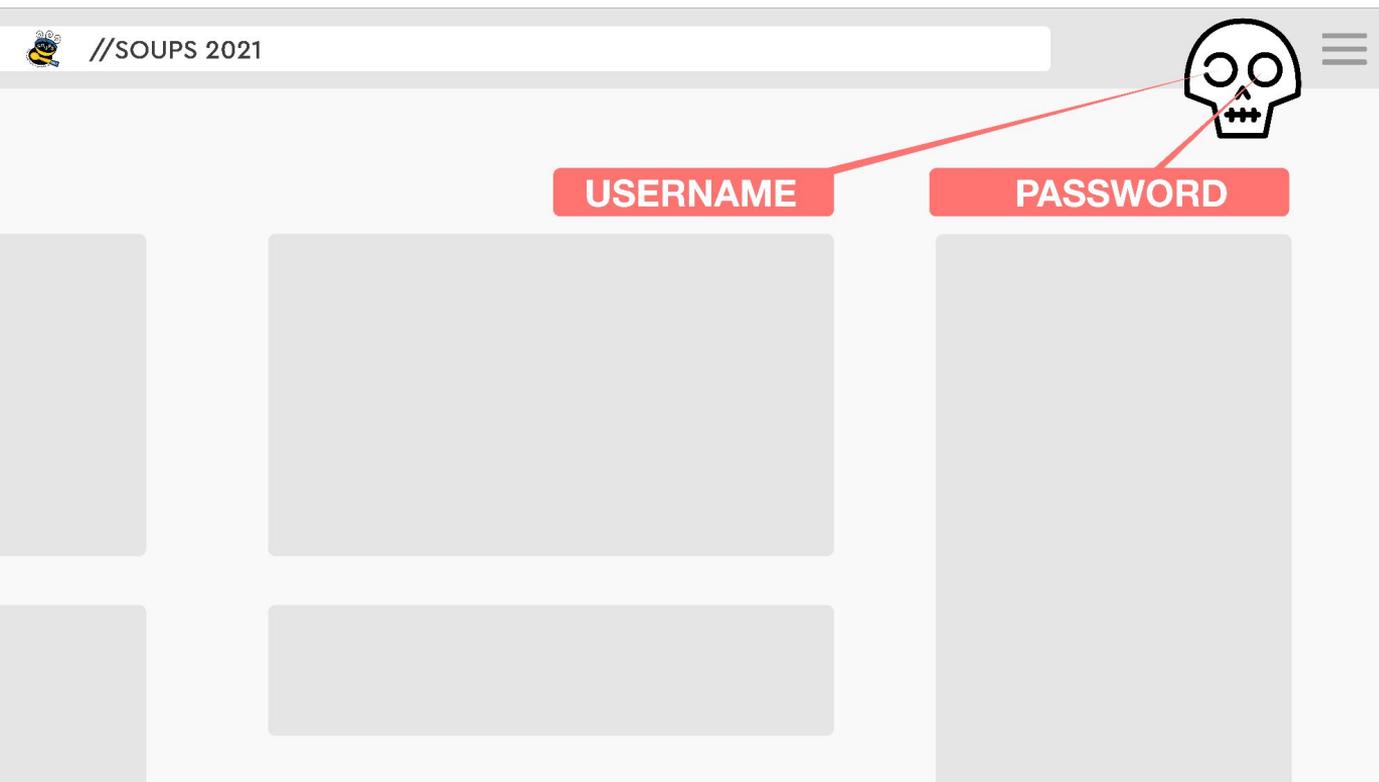
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# Browser Extensions

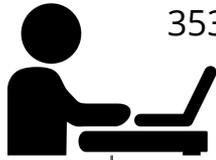


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# Browser Extensions



# Survey



353 Respondents (62% Male, mean 28 years)

## Attitude

*Have you ever read the privacy policy for any of your browser extensions?*

## Knowledge

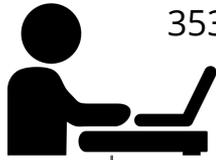
*Please indicate if you think it is technically possible for a browser extension to cause the following scenario*

## Preference

*Please indicate your preference for the following permissions*

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# Survey



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## Attitude

*Have you ever read the privacy policy for any of your browser extensions?*

## Knowledge

*Please indicate if you think it is technically possible for a browser extension to cause the following scenario*

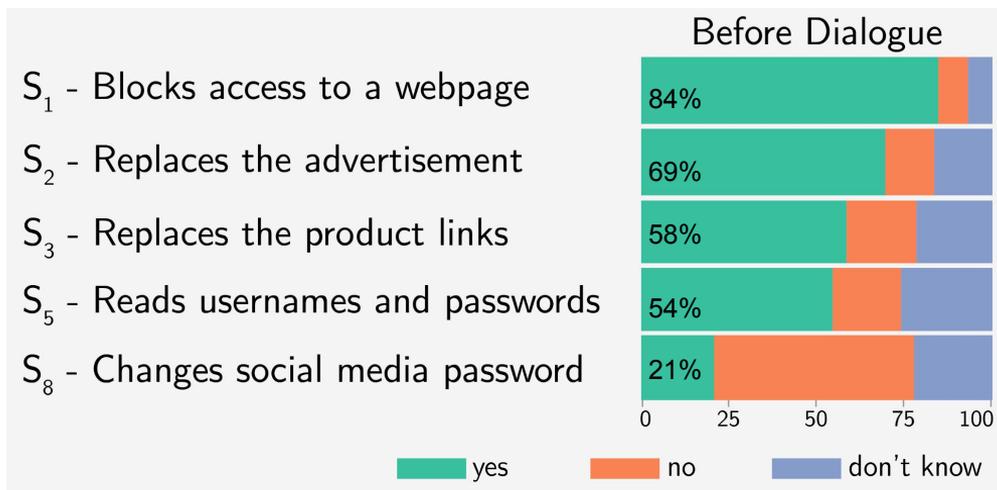
## Preference

*Please indicate your preference for the following permissions*

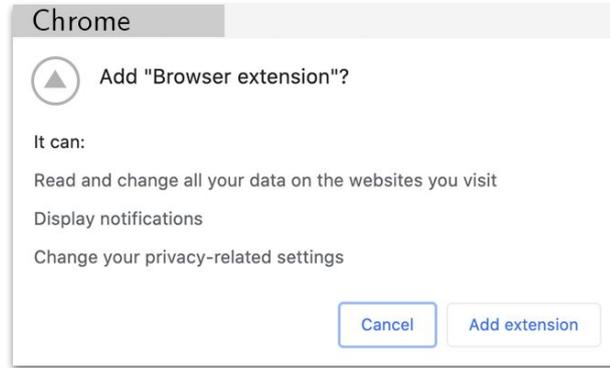
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# Results

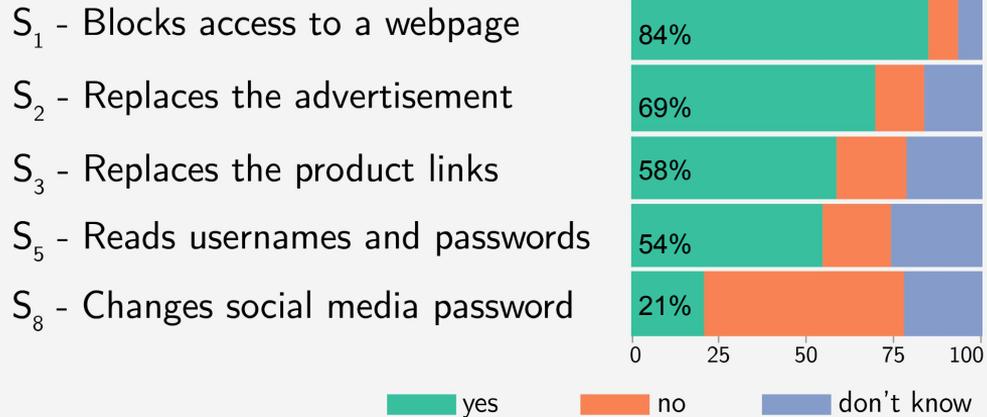
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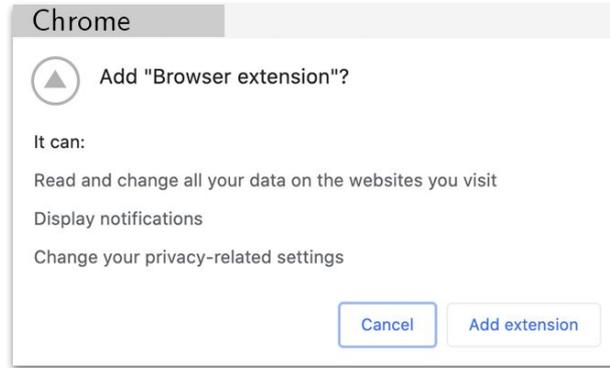
# Results



Before Dialogue



# Results



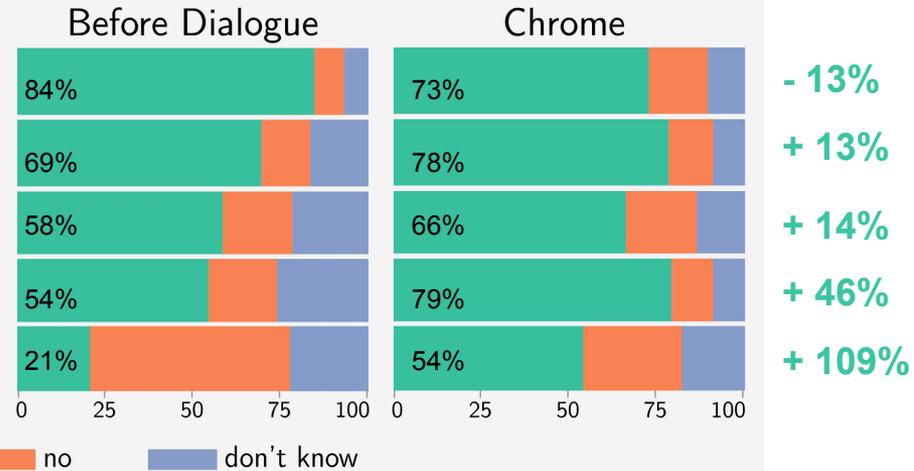
$S_1$  - Blocks access to a webpage

$S_2$  - Replaces the advertisement

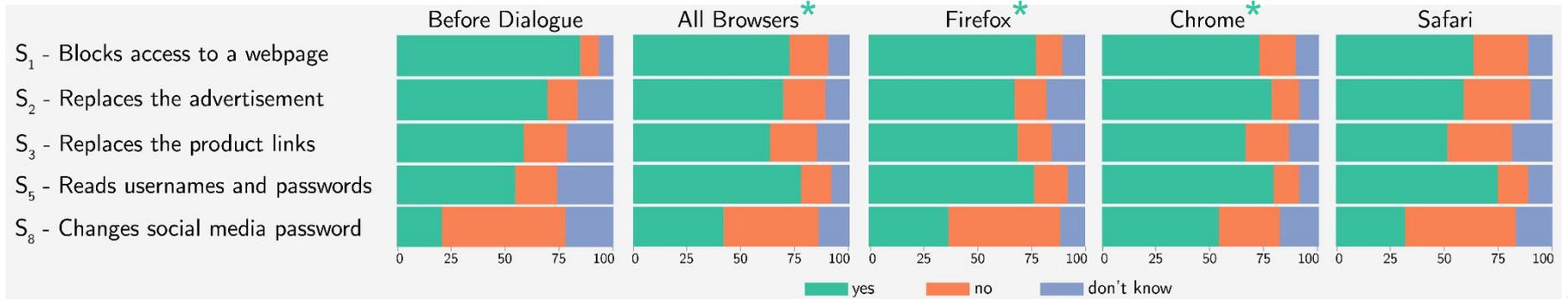
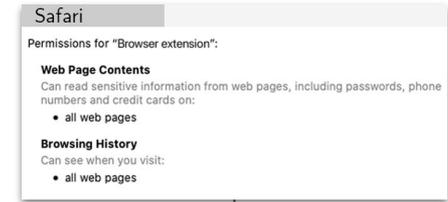
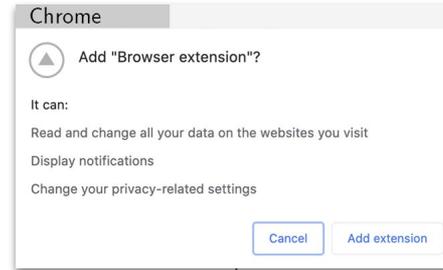
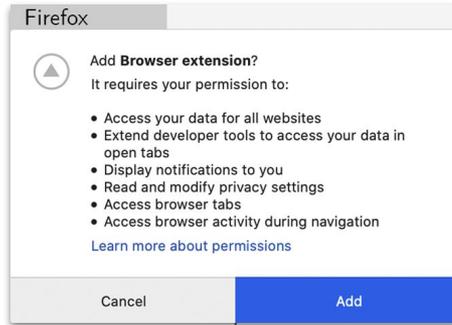
$S_3$  - Replaces the product links

$S_5$  - Reads usernames and passwords

$S_8$  - Changes social media password

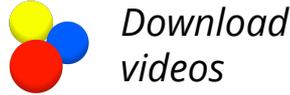


# Results



\*significant improvement

# Results



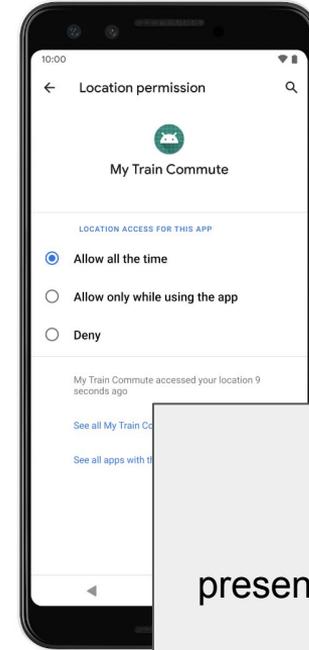
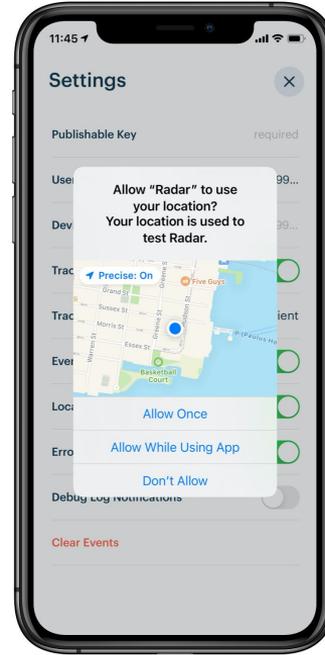
"Read and change all your data on the websites you visit"



# Recommendations

Users' perspective: Improve understanding

- The goal of the permission dialogues should be to increase informational self-determination by users
- Existing permission statements are not a suitable representative of their underlying meaning
- Similarity to related symbols, complexity and vocabulary all impact comprehension
- Parity with similar systems can help



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# Recommendations

Browser's perspective: Limit access

- Browser extensions should be provided access only to the relevant part of the DOM
- Most browsers already identify sensitive fields (such as password or credit-card fields) and, thus, they can be encapsulated with separate permissions

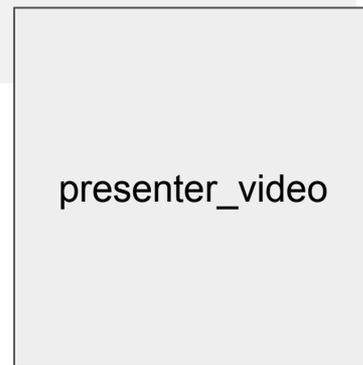
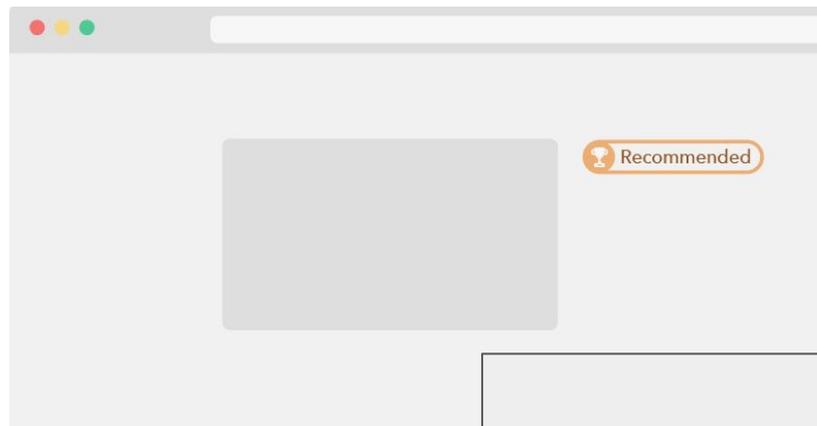


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# Recommendations

Policy perspective: Convey responsibility

- Browsers should make users aware of their responsibilities as well as the responsibilities browsers take on themselves
- Example: Firefox Recommended Extensions program to promote the safest and highest quality extensions





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