The Effect of Design Patterns on (Present and Future) Cookie Consent Decisions

Nataliia Bielova, Laura Litvine, Anysia Nguyen,
Mariam Chammat, Vincent Toubiana, Estelle Harry

15th August 2024
USENIX Security Symposium

Cookie consent banners

How are they regulated?

'consent' of the data subject means any **freely given, specific, informed and unambiguous indication** of the **data subject's wishes**

EU case law (binding)

European Court of Justice · CNIL.

Decline option hidden on the second layer is not compliant

Guidelines with best practices (non-binding)

edpb · European Data Protection Board · CNIL.

Identical design of accept and decline options is compliant

?

Nataliia Bielova

3

Effect of cookie consent banners design

Dark patterns in consent banners!

Dark patterns are design practices that **deceive, coerce, or manipulate users** into making choices that are often not in their best interest (Gray et al. 2021).

Bright patterns are **dark patterns used for the interest of the users.**

Prior studies may not be specific enough to be used in guidelines or to inform policy makers!

No prior work studied the impact of consent banner design **on French population.**

Most studies are preliminary **with only 20-200 participants per banner** and rely on **different statistical tests,** making their results hard to compare and reuse (Bielova 2022).

Colin M. Gray, Cristiana Santos, Nataliia Bielova, Michael Toth, Damian Clifford. Dark Patterns and the Legal Requirements of Consent Banners: An Interaction Criticism Perspective. ACM CHI Conference on Human Factors in Computing Systems (ACM CHI 2021).
Nataliia Bielova, A survey of user studies as evidence for dark patterns in consent banners, CNIL, LINC report, 2022.
https://linc.cnil.fr/survey-user-studies-evidence-dark-patterns-consent-banners

Our objectives

Knowledge and attitudes on data sharing online
Measure the level of knowledge and understand the attitudes that Internet users have towards cookies and their use

Impact of dark patterns
Measuring the effect of dark patterns on the behavior of Internet users when faced with a cookie banner

Impact of bright and new patterns
Measure the effect of bright and new patterns, based on behavioral levers, on the same behavior.

The influence of the past
Explore whether banners seen in the past affect users future choices, and thus whether the effect of bright or dark patterns persists even in their absence.

Tested banners (1/2)

Your cookie preferences

Our site and our partners use **cookies** that are placed on your device.

Some of these cookies are said to be **essential** and are strictly necessary for the proper technical functioning of the site. They include tracers that **enable audience measurement**.

If you consent, **non-essential** cookies may also be placed (you may withdraw your consent at any time). They are used to:

- **accurately measure your interactions** with the site in order to improve our services;
- **display multimedia content** from other sites;
- **display personalised advertising** based on your profil and browsing history;
- **share content on the social networks** included on our site (e.g. Facebook).

Accept all

Decline all

Customise my choices

Control

Recommended consent design

Your cookie preferences

Our site and our partners use **cookies** that are placed on your device.
Some of these cookies are said to be **essential** and are strictly necessary for the proper technical functioning of the site. They include tracers that **enable audience measurement**.

If you consent, **non-essential** cookies may also be placed (you may withdraw your consent at any time). They allow:

- **to accurately measure your interactions** with the site in order to improve our services;
- **display multimedia content** from other sites;
- **display personalised advertising** based on your profil and browsing history;
- **share content on the social networks** included on our site (e.g. Facebook).

Accept all

Customise my choices

Dark Pattern – No decline

Only statistically significant result on 40 US students (Nouwens et al. 2020)

Your cookie preferences

Our site and our partners use **cookies** that are placed on your device.

Some of these cookies are said to be **essential** and are strictly necessary for the proper technical functioning of the site. They include tracers that **enable audience measurement**.

If you consent, **non-essential** cookies may also be placed (you may withdraw your consent at any time). They are used to:

- **accurately measure your interactions** with the site in order to improve our services;
- **display multimedia content** from other sites;
- **display personalised advertising** based on your profil and browsing history;
- **share content on the social networks** included on our site (e.g. Facebook).

Accept all

Decline all

Customise my choices

Dark pattern – Highlighted accept

No statistically significant difference found in previous research.

Nataliia Bielova

Tested banners (2/2)

Your cookie preferences

Our site and our partners use **cookies** that are placed on your device.

Some of these cookies are said to be **essential** and are strictly necessary for the proper technical functioning of the site. They include tracers that **enable audience measurement.**

If you consent, **non-essential** cookies may also be placed (you may withdraw your consent at any time). They are used to:

- **accurately measure your interactions** with the site in order to improve our services;
- **display multimedia content** from other sites;
- **display personalised advertising** based on your profil and browsing history;
- **share content on the social networks** included on our site (e.g. Facebook).

Decline all

Accept all

Customise my choices

Your cookie preferences

Our site and our partners use **cookies** that are placed on your device.

Some of these cookies are said to be **essential** and are strictly necessary for the proper technical functioning of the site. They include tracers that **enable audience measurement.**

If you consent, **non-essential** cookies may also be placed (you may withdraw your consent at any time). They are used to:

- **accurately measure your interactions** with the site in order to improve our services;
- **display multimedia content** from other sites;
- **display personalised advertising** based on your profil and browsing history;
- **share content on the social networks** included on our site (e.g. Facebook).

Accept to be traced

Continue without being traced

Customise my choices

Your cookie preferences

Our site and our partners use **cookies** that are placed on your device.

Some of these cookies are said to be **essential** and are strictly necessary for the proper technical functioning of the site. They include tracers that **enable audience measurement.**

If you consent, **non-essential** cookies may also be placed (you may withdraw your consent at any time). They are used to:

- **accurately measure your interactions** with the site in order to improve our services;
- **display multimedia content** from other sites;
- **display personalised advertising** based on your profil and browsing history;
- **share content on the social networks** included on our site (e.g. Facebook).

Decline all | Customise my choices | Accept all

Bright Pattern – Highlighted Decline

No statistically significant difference found in previous research.

New Pattern - Consequences

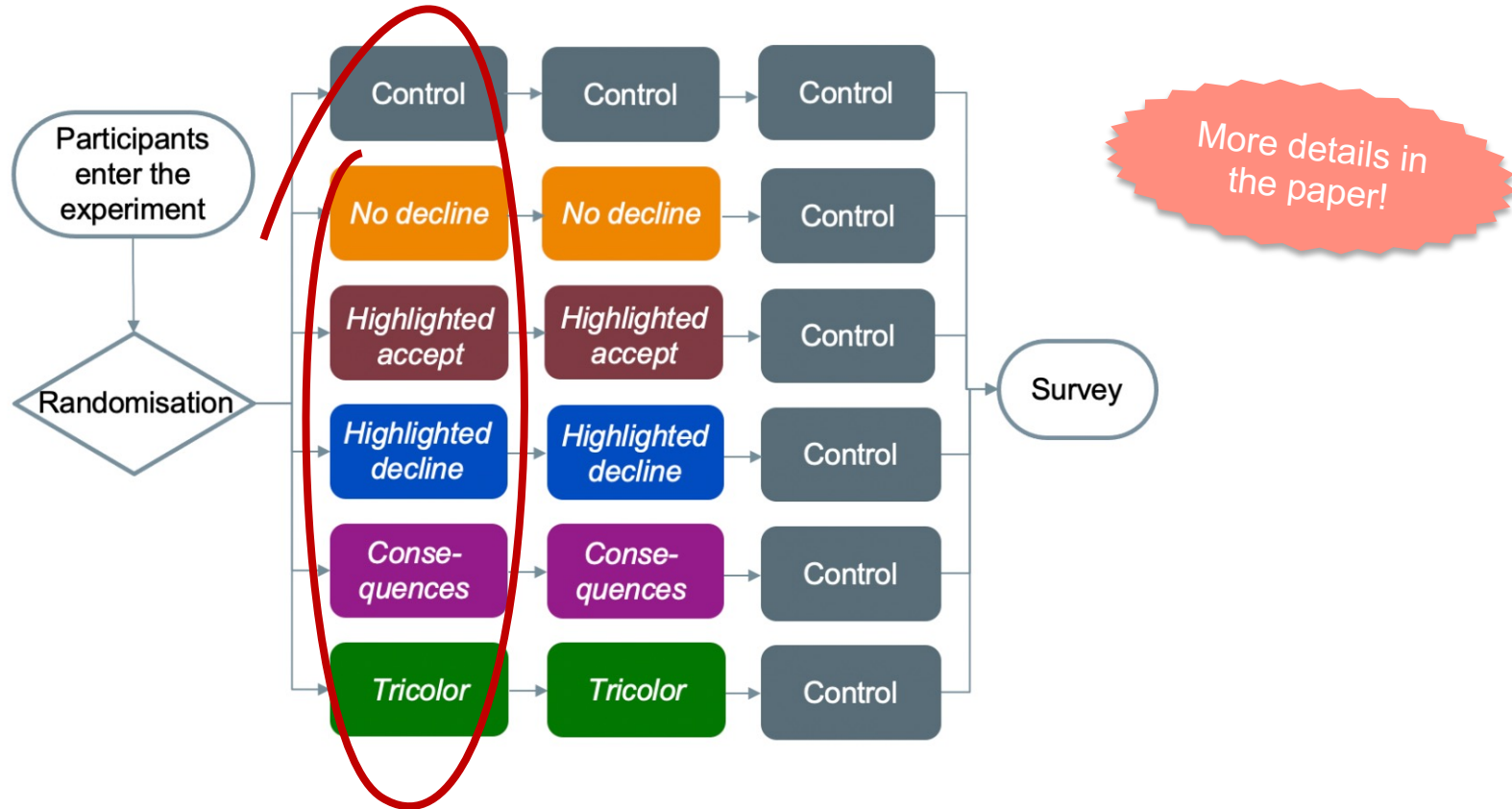*CNIL recommendations require users to be informed of the consequences of their choices.*

New Pattern - Tricolor

Inspired by (Egelman et al. 2013) who used colored bars to encourage users to create more complex passwords

Experimental design with 3,947 participants

Overview of results and interpretation
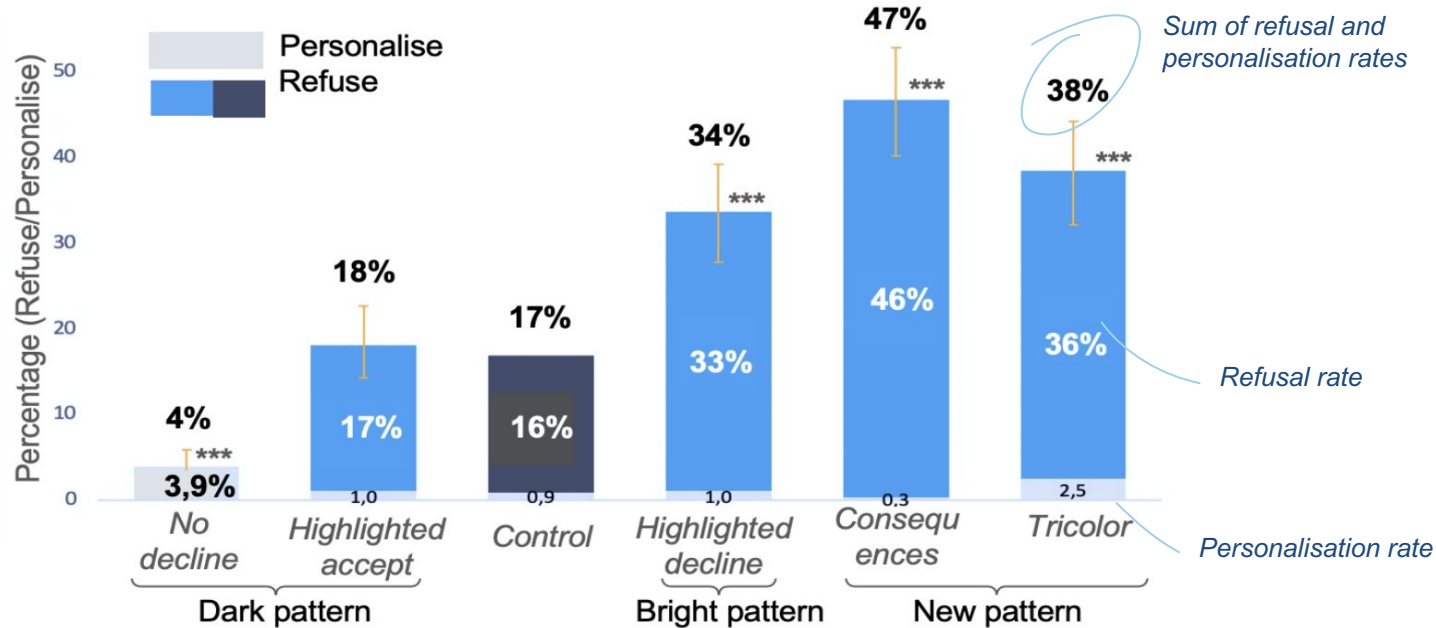
N=3 947
*** p<0.01, * p<0.05
Primary analysis corrected for multiple comparisons, and controlling for age, gender, education level and employment status of individuals. Numbers above the bars represent the sum of the refusal and personalization rates. Numbers above the bars do not exactly match the sum of the numbers displayed in the bars of the graph due to rounding.

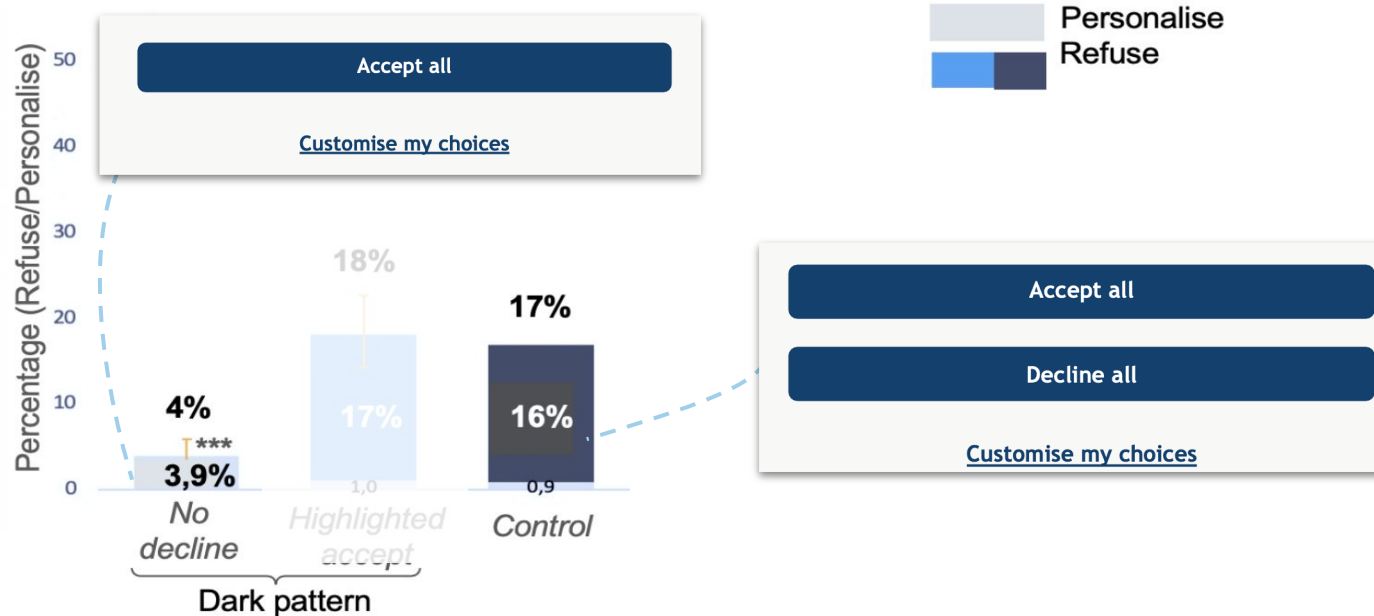# More effect for decline (more clicks) decreases the refusal rate by 76% (from 17% to 4%)

N=3 947
*** p<0.01, * p<0.05
Primary analysis corrected for multiple comparisons, and controlling for age, gender, education level and employment status of individuals. Numbers above the bars represent the sum of the refusal and personalization rates. Numbers above the bars do not exactly match the sum of the numbers displayed in the bars of the graph due to rounding.

Stating the consequences of acceptance directly on the buttons multiplies by three the proportion of participants who decline

Potential explanation

According to our survey, **48% participants are not ready to share their data** (31% in any case, 17% depending on the purpose)

Moreover, **57%** participants state that they decline consent to **avoid being tracked**
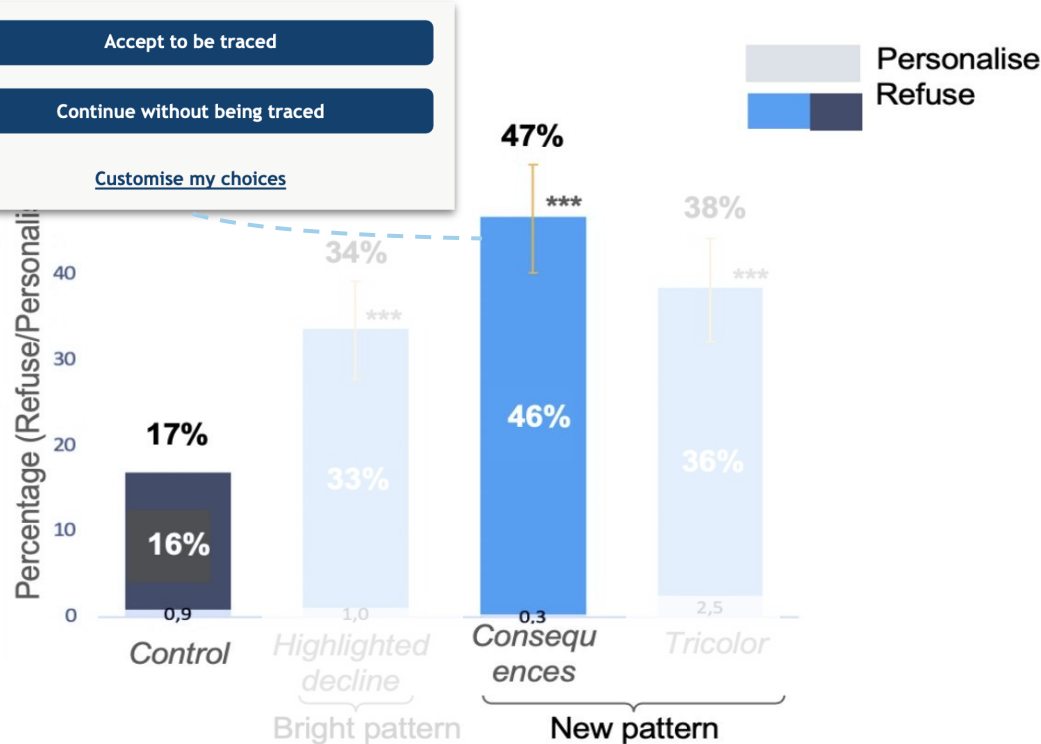
N=3 947
*** p<0.01, * p<0.05
Primary analysis corrected for multiple comparisons, and controlling for age, gender, education level and employment status of individuals. Numbers above the bars represent the sum of the refusal and personalization rates. Numbers above the bars do not exactly match the sum of the numbers displayed in the bars of the graph due to rounding.

11

Measuring the short-term effect on future decisions
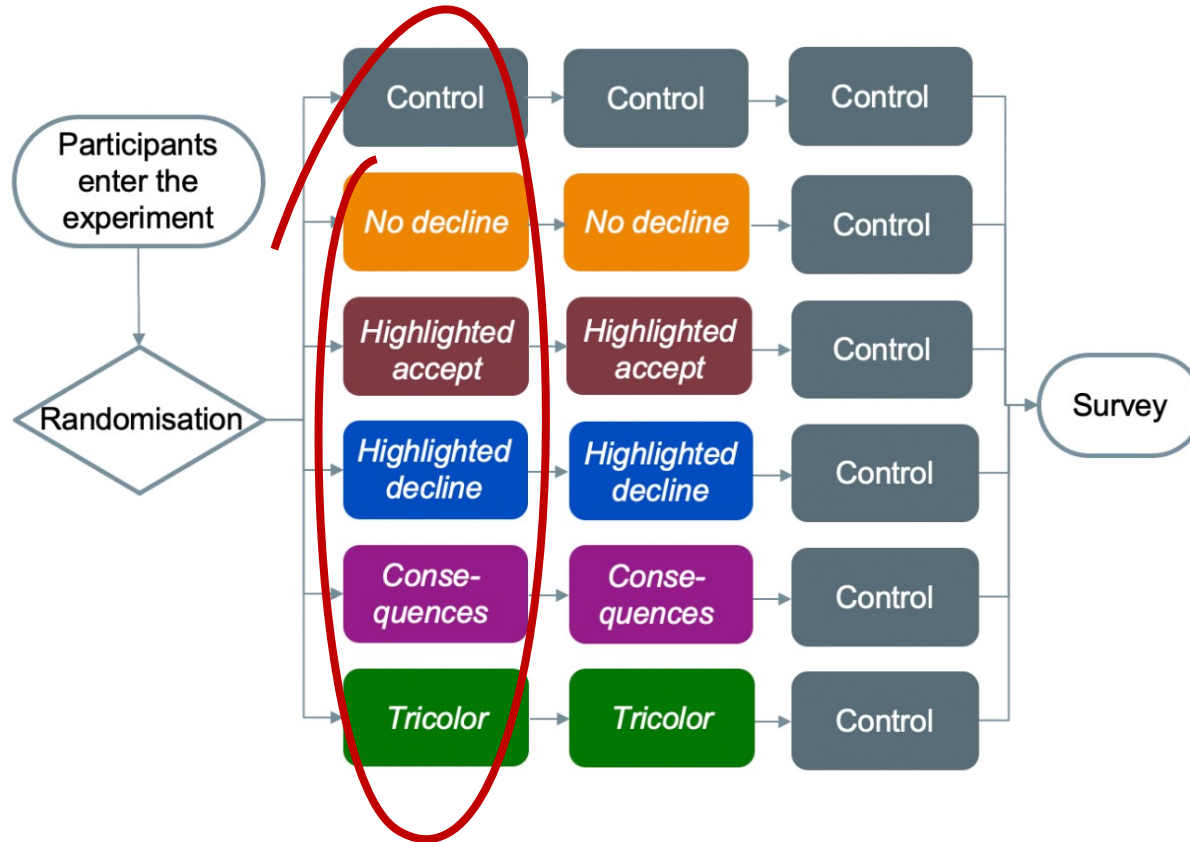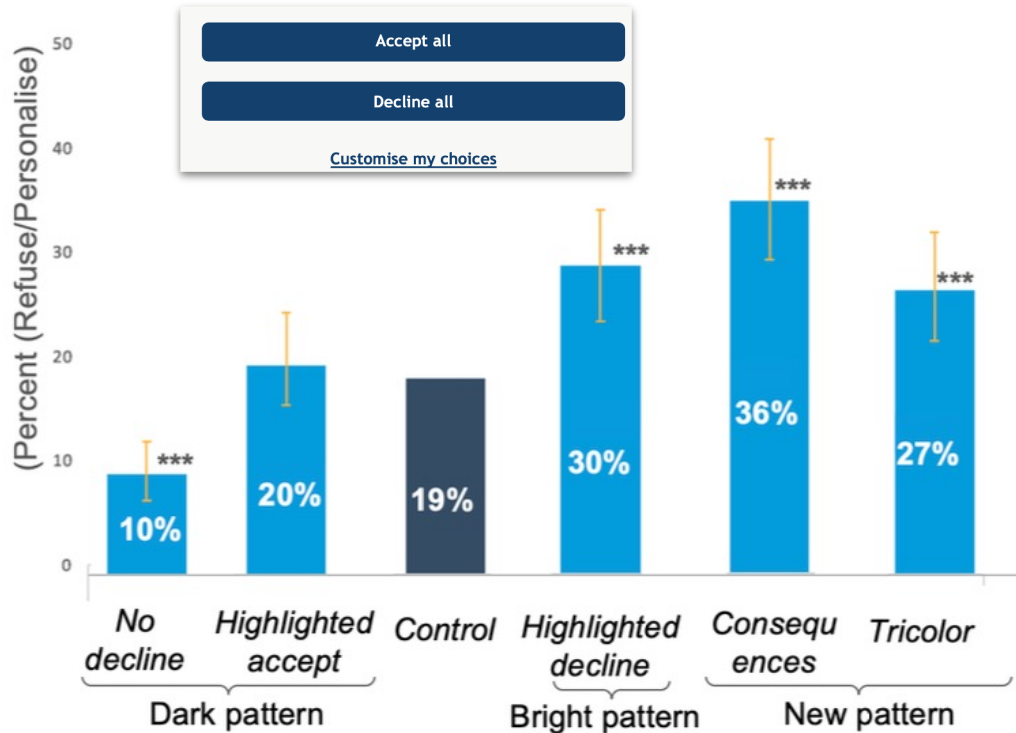
Interacting with two banners impacts the refusal rate on the next banner, even when the banner is neutral!

Observations

Users behavior when facing the **neutral banner is already affected by the past banners** the user has interacted with. Another baseline is needed for the control group!

The adoption of bright pattern even by a small number of sites (if possible influential) **could therefore be enough to generate new habits.**

N=3 947
Exploratory analysis carried out on the choice made by individuals facing the first banner (#1) and the third banner (#3), controlling for the age, gender, level of education and professional situation of the individuals.

Design implications & conclusions

- **Impact of dark patterns on user decisions**
  - *No decline* design **should be prohibited** uniformly across the EU
  - **True privacy preferences** should be taken as control group additionally to *Neutral*
  - Need to further quantify **long-term effect** of design

- **Need for legally-required built-in solutions**
  - **Only half (54%) users are satisfied** with their choice in *Neutral* banner
  - **62% participants would be willing to use browser extensions to automatize consent**

- **Recommendations and call for action**
  - **Regulators** could target most popular platforms in their enforcement actions
  - **Developers and practitioners**, who put privacy and ethics at the core of their business values, could be motivated to provide exemplary banners
  - **Researchers** should collaborate more closely with the regulators and practitioners to study their motivations and interests in improving consent banner design