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USER EXPERIENCE OF HTTP COOKIE BANNERS



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ABSTRACT

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This study focuses on the user experience of cookie banners, with an aim to find a legitimate cookie banner or banners that provide the best experience for users. HTTP cookies are little pieces of information, that track the activity of website visitors. They have been around since the 1990's and are nowadays used by almost every website. All websites with European visitors are required to inform their users about the site's cookie usage and acquire user consent to use any other cookies than strictly necessary ones. This is usually done with cookie banners, which are little banners that pop up when the user first visits the website. There has been little research about cookie banners, and no clear understanding of what kind of banner offers the best user experience. An analysis of the top European websites was done to narrow down the most used types of cookie banners, resulting in three types of banners. Next, a survey was conducted to study the immediate user experience of these banners. The results revealed that having the option to reject cookies straight on the banner clearly enhances its user experience, and that from a user experience perspective, websites should always use one of two types of banners depending on their users. In addition, the results provided implications for a wider discussion around privacy communication between businesses and users.

Keywords: cookies, cookie banners, user experience, privacy

TIIVISTELMÄ

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Tämä tutkielma keskittyy evästabannereiden käyttäjäkokemukseen, ja tarkoituksena on selvittää, millainen tai millaiset lainsäädäntöä noudattavat evästabannerit tarjoavat parhaan kokemuksen käyttäjille. Evästeet ovat pieniä tiedostoja, jotka sisältävät tietoa verkkosivustojen käyttäjistä ja heidän toiminnastaan. Ne keksittiin alunperin jo 1990-luvulla, ja ovat nykyään käytössä lähes jokaisella verkkosivustolla. Kaikki verkkosivustot, joilla on eurooppalaisia kävijöitä, ovat velvoitettuja informoimaan käyttäjiään sivun käyttämistä evästeistä sekä hankkimaan käyttäjiltä luvan muiden evästeiden kuin välttämättömien evästeiden käyttöön. Tämä tapahtuu yleensä evästabannereiden avulla. Evästabannerit ovat pieniä bannereita, jotka ponnahtavat esiin käyttäjän vieraillessa verkkosivustolla ensimmäistä kertaa. Niistä on ollut hyvin vähän tutkimusta, eikä ole selvää tietoa siitä, millainen banneri tarjoaa parhaan kokemuksen käyttäjille. Tässä tutkielmassa analysoitiin Euroopan suosituimpia verkkosivustoja, jotta pystyttiin selvittämään, millaisia evästabannereita käytetään eniten. Tuloksena oli kolme erilaista banneria, joiden käyttäjäkokemusta arvioitiin kyselyn avulla. Tuloksista selvisi, että käyttäjäkokemus on selvästi parempi, jos käyttäjä pystyy hylkäämään evästeet suoraan bannerista. Lisäksi selvisi, että käyttäjäkokemuksen näkökulmasta verkkosivustojen kannattaisi aina käyttää yhtä kahdesta banneri-vaihtoehdosta riippuen sivuston käyttäjistä. Tutkimustulokset tarjosivat myös motivaatiota lisätutkimukselle yritysten ja yksilöiden välisestä kommunikaatiosta yksityisyyteen liittyen.

Avainsanat: evästeet, evästabannerit, käyttäjäkokemus, yksityisyys

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1 INTRODUCTION

Websites are gathering more and more data about their users to understand their behavior better. This data can be used for several purposes to help the business, their users, as well as third parties. “Data is more valuable than oil” has been thrown around widely during the past years, but the key is how one extracts and uses the data. One of the main uses for the massive amounts of data that is being gathered is targeted online advertisement based on user profiles, which is an enormous business in today’s world.

The most widely used way to gather this data and track visitors of websites is the usage of HTTP cookies (Sanchez-Rola et al., 2019), which give businesses important insights into their users’ activities (Koch, n.d.). HTTP cookies (referred to simply as cookies from now on) have been around for a while now. They are small pieces of data sent from websites and stored on the user’s computer by their web browser (Koch, n.d.). They were originally invented in 1994 to maintain the state between servers and clients (Cahn, Alfeld, Barford & Muthukrishnan, 2016). Fast-forward over 25 years, and cookies are used by almost every website. A great everyday example of maintaining this state between the server and client is when items stay in a user’s shopping cart despite the user closing their browser.

From the example above one can clearly see the benefits of cookies, as they make life easier for both users and websites. However, cookies are not only used to provide practical benefits to users, but also to form user profiles to model and predict their behavior, so advertisement can be targeted as accurately as possible. For online businesses, advertising is the main source of income (Evans, 2009). According to Beales and Eisenach (2014), advertisers put clear emphasis on users on which there is more information available. Cookies that have tracked the user for a longer period can increase the price of the advertisement shown to them up to 200% compared to advertisement shown to users with “new cookies”.

The huge amount of data gathered every day that can be used for targeted advertising has also completely transformed the way some of the biggest companies in the world do business. In traditional business, companies get their

revenue from their customers who buy their goods or services. Nowadays, for some of the world's biggest companies like Google and Facebook, their users' data is the product, and third-party advertisers are the customers. As the data gathered about users and the online advertising it is used for subsidizes a large part of the free content available in the web (Evans, 2009), one could say that we pay for these services with our data.

An increased amount of data gathered through cookies has led to more emphasis on privacy regulations. These legislations have eventually resulted in websites using cookie banners. Cookie banners are banners that pop up on the user's display when they first visit a website. They are used to inform visitors about the types of cookies the website uses, and to acquire the visitor's consent to use other cookies than strictly necessary ones. While cookie banners are used mainly to follow legislations, they are also a way to communicate privacy practices to users. In a world where few have the time and motivation to find and read lengthy texts, cookie banners provide a short and efficient way to communicate to users what data is collected about them and how.

As usually more data about users means more money for a business, it does not come as a surprise that some websites use cookie banners that are in a "gray area" or do not follow legislations at all to make as many users as possible accept all cookies. The so called "privacy paradox" does not help in this case. According to Barth and De Jong (2017), several recent studies have revealed that people say they care about privacy, but their actions do not match their attitude. They argue that this might be caused by risk-benefit evaluation and that the risks are viewed as negligible. If businesses are aware of this, they might purposefully choose to use cookie banners that do not provide enough information or choices for the user and therefore encourage them to accept all cookies to simply get rid of the banner.

The main motivation for this study comes from the fact that most web users face several cookie banners every day, but there is not much research about them. The banners vary in what information and functionality they include, which means there seems to be no commonly agreed best format for the banner. This study looks at the issue from the user-perspective with an aim to find out what type of legal cookie banner provides the best user experience. The goal is to provide not only practical results for businesses, but also implications for future research regarding communication about privacy between businesses and users. The research questions of the study are the following:

1. What types of cookie banners are legitimate?
2. What type of legitimate cookie banner or banners provide the best user experience?

To answer the first research question, the second chapter of this paper gives a more detailed look into cookies, their purposes and types, and current legislations affecting their usage. The third chapter explains the concept of user experience and provides different ways to evaluate it. In the fourth chapter, the re-

search methods are presented. An analysis was conducted to gain an understanding of the commonly used types of cookie banners. The main research method of the study was a survey, which was chosen as the best method for several reasons explained in the chapter in question.

The fifth chapter introduces the results of the study. The key finding was that three types of cookie banners are mostly used, and that two of these provide a good user experience compared to the third one. A cookie banner that gives a simple choice to accept or reject all cookies is especially good in its perspicuity and efficiency. A banner that gives more options straight in the banner is the best choice in terms of dependability and the feeling of control it provides. When a user does not have the option to reject cookies straight from the banner, the user experience is clearly worse. In the end, limitations of the study are discussed along with implications for future research, followed by a summary.

2 HTTP Cookies

This chapter focuses on cookies and cookie banners. The chapter starts off with a definition of cookies and an explanation about how and why they are used. Different types of cookies are introduced, and their differences are pointed out. Cookies can be a complicated subject as they may often comprise several networks, but the first section aims to describe cookies on a high level that serves the purpose of this research. This is followed by a brief history of cookies and legislations related to them. In the final section, cookie banners are looked at in more detail, and examples of sufficient and insufficient banners are presented. Based on this chapter it is possible to understand what cookies are and what types of cookie banners comply with current and upcoming legislations.

2.1 What cookies are and why they are used

Any discussion about cookies should begin by explaining what they are and why they are used. A cookie is a piece of information that passes back and forth between a server and a client (Kristol, 2001). Information is sent to the browser by the web server, after which it is sent back each time the browser contacts the server (Montulli, 2013). The information is stored on the user's device by their browser as a small text file, that usually contains data about the user's usage of the website (Peters & Sikorski, 1997), such as their username or shopping cart history. Figure 1 demonstrates how cookies connect users and websites.

HTTP cookies are also sometimes called browser cookies, computer cookies, internet cookies, web cookies, or simply cookies, all referring to the same thing. It is unclear where the term "cookie" comes from. According to Montulli (2013), he named cookies after the computing term "magic cookie". However, as the name was already used back then, the true origin remains a mystery. According to one theory (Stuart, 2002), the name refers to Chinese fortune cookies, which also hold a small piece of text inside them. Another popular theory states that the term comes from the tale of Hansel and Gretel, as they dropped cookie

crumbs to mark their trail in a dark forest (Fisher, 2019). While the true origin of the name is not important, these theories describe the nature of cookies: they hold information in text format and enable users to leave a trace when browsing the web.

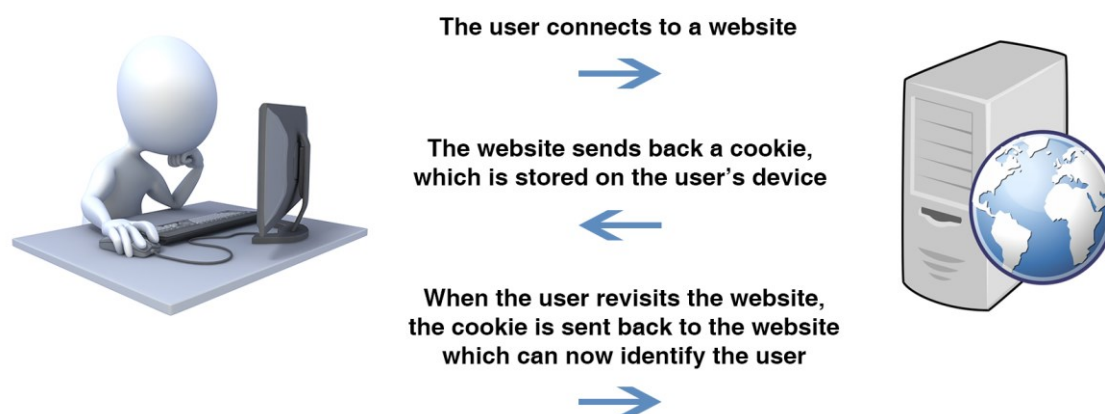


FIGURE 1 How cookies work

Cookies can be divided into two types based on their provenance: *first-party cookies* and *third-party cookies*. First-party cookies are sent and installed by the website that the user is visiting, meaning that they belong to the same domain of the website (Trevisan, Traverso, Metwalley & Mellia, 2017). Third-party cookies, on the other hand, are set by third-party servers, for example advertisement platforms. If the cookie is sent by a domain different from the one of the website, it is considered a third-party cookie. The context can determine which type the cookie is considered as. For example, a cookie from Twitter is classified as a first-party cookie if the user is visiting Twitter.com, and a third-party cookie if it is set through an embedded widget on another website.

Another way to classify cookies is their purpose (Koch, n.d.). Almost every website uses *strictly necessary cookies*, which are needed for the website to function correctly. *Preferences cookies* help the website to remember the user's preferences, such as their preferred choice of language. These two types of cookies are generally first party cookies, and examples of their usage are provided in the next section. *Statistics cookies* collect information about the user's behavior on the website and are used to improve the functions of the website. Finally, *marketing cookies* track the user's activities to target them with personalized advertisement. Marketing cookies are almost always third-party cookies, and they can be shared with relevant networks.

According to Trevisan and others (2017), cookies also vary based on their expiration time. *Session cookies* are temporary cookies, which are deleted once the browser is closed by the user or the session ends. If the cookie has a specified expiration date, it is considered a *persistent cookie*. Persistent cookies are a powerful way for third parties to build user profiles based on the users' browsing behavior (Englehardt et al., 2015), and they are clearly the more common type of cookies (Cahn et al., 2016). In the context of cookie banners, it is more

relevant to focus on the differences between first-party cookies and third-party cookies. Therefore, they are discussed in more detail in the next sections.

2.1.1 First-party cookies

First-party cookies can be usually considered as good and helpful cookies, as they facilitate the browsing activities of the user and provide the website with important information. From the user's perspective, first-party cookies have several practical benefits. For example, without them, clicking on a "back" button in an online store would lead to items being removed from the shopping cart (Kristol, 2001). First-party cookies also remove the need for users to login each time they visit a website (van Bavel & Rodríguez-Priego, 2016; Gomer, Rodrigues, Milic-Frayling & Schraefel, 2013), and make multi-page browsing possible (Gomer et al., 2013). Furthermore, first-party cookies allow content to be shown automatically in the user's preferred language (Kosta, 2013).

From the website-perspective, the role of first-party cookies is to assist the website in maintaining information about what their users are doing, what state they are in, or what preferences they have (Hormozi, 2005). Simply put, the information gathered through first-party cookies makes it possible to provide users with a better browsing experience (van Bavel & Rodríguez-Priego, 2016). With information about how users navigate through different pages, administrators of a website can organize and built their site to be faster, easier, and more logical to use (Kristol, 2001).

2.1.2 Third-party cookies

While first-party cookies usually lead to a win-win situation for users and websites, third-party cookies, and web tracking done through them are more controversial topics. According to Gomer and others (2013), the way in which third-party cookies work is that websites that do business with third parties host code embedded on their pages. When a user's browser connects to the page, the code connects to the third party's server. During this process, the third party can install or retrieve cookies. The embedded code can be for example a banner advertisement or a social media widget. A common way of how third-party cookies are implemented is demonstrated in figure 2.

The screenshot is from the frontpage of a European news site called Euronews (Euronews, 2019) visited on a mobile device. On the bottom of the page one can see several third-party widgets, which allow the user to click on them to navigate to different social media channels and platforms of Euronews. These widgets are the embedded code mentioned above and allow third parties to set and retrieve cookies. Services such as Facebook may already know the user's identity through their profile, which means that they can identify the user on any visit to a page that includes their social media widget (Mayer & Mitchell, 2012).

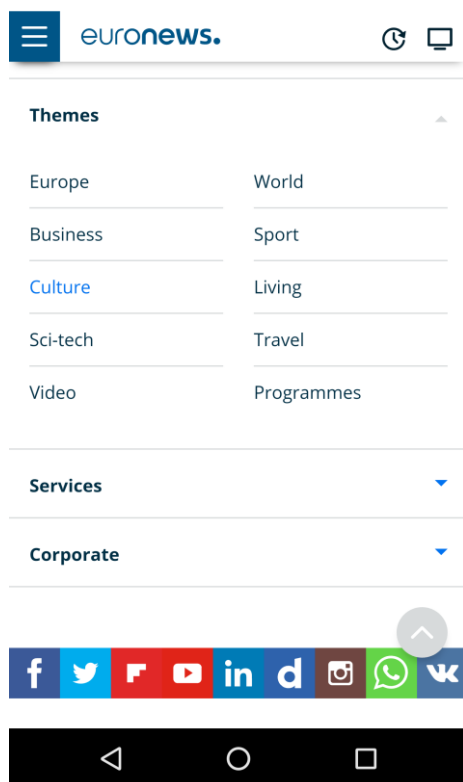


FIGURE 2 Third-party widgets on the bottom of a webpage (Euronews, 2019)

Third-party cookies are often used by online advertisers, tracking applications, and data brokerage companies. Their primary goal is usually to gather all information available on users to deliver targeted advertisement (Cahn et al., 2016), which is more efficient than traditional advertisement and thus creates more revenue (Schumann, von Wangenheim & Groene, 2014). In fact, the click-through-rate of advertisement can be raised by 670% by segmenting users for behavioral targeted advertising (Yan et al., 2009). Tracking via third-party cookies is also done for statistical purposes (Leenes & Kosta, 2015), as well as personalization and analytics (Roesner, Kohno & Wetherall, 2012).

Nowadays third-party cookies are used widely. They have made web tracking highly prevalent, and one study has estimated that more than 20% of users' browsing activities can be detected by several trackers (Roesner et al., 2012). Another study has reported a 99.5% chance for users to get tracked by all the top ten most prolific trackers within 30 clicks on search engine results (Gomer et al., 2013).

Although third-party cookies can offer users benefits such as more relevant advertisement, they are often considered controversial. From the user's perspective, a more comprehensive browsing profile means less privacy (Roesner et al., 2012). The possibility to use third-party cookies across several websites to form user profiles is a big fear among users (Hormozi, 2005), and surveys consistently show that users oppose third parties collecting browsing information and using it to form user profiles (Mayer & Mitchell, 2012).

2.2 History of cookies

It is important to know the history of cookies and legislations related to them to understand why and how cookie usage is regulated today and how these regulations will likely change in the future. Currently the two main legislations that websites must respect are the ePrivacy Directive and the GDPR, but this might change in the coming years. This section will briefly go through the main events regarding cookies and cookie legislations during the past decades.

2.2.1 Early days

According to Montulli (2013), he invented cookies originally in 1994 while working as a programmer for Netscape Communications. The motivation behind the invention was the fact that back then websites did not have any “memory” of individual users. No mechanism existed to identify users individually, which meant that the concept of a session did not exist. Each click to a new page would lead to the user becoming a new random user without any association to their previous actions. This could be compared to talking with someone who suffers from Alzheimer.

The idea that had been dominant for a few years was that each browser would have a unique identifier. However, this would mean that the user could be tracked on every website. As Montulli was against this idea, he eventually came up with the concept of allowing websites to send a session identifier to the users’ browser, which would send it back only to that server. This concept became later known as cookies. (Montulli, 2013).

With cookies implemented, the Netscape browser was released in fall of 1994, and it became the world’s most popular browser within a year (Montulli, 2013). A year after the launch of Netscape’s browser, Microsoft introduced Internet Explorer 2, which had support for cookies (Hardmeier, 2005). After that, cookies became a standard feature in browsers. However, they remained generally unknown to the public for a few years.

2.2.2 ePrivacy Directive - “Cookie Law”

Although the European Commission adopted Directive 95/46 (the Data Protection Directive) already in 1995, the first major legislative act regarding cookies was the Privacy and Electronic Communications Directive 2002/58/EC, known as the ePrivacy Directive or the “Cookie Law”. The Data Protection Directive already addressed the processing of personal data, but the ePrivacy Directive complimented it and added regulations specifically for electronic communications (Kirsch, 2011). According to the ePrivacy Directive, websites must give their users the option to opt out of cookies that are being stored by their browser, except if those cookies consist of information that is strictly necessary to provide services that the user explicitly requested (Mayer & Mitchell, 2012).

In 2009, the ePrivacy Directive was amended by Directive 2009/136/EC, which changed the opt-out practice regarding cookies to an opt-in one (McStay, 2013). The directive mandates, that websites must get the user's informed consent before installing cookies (Trevisan, Traverso, Bassi & Mellia, 2019). The interpretation of the directive varied between states, and some suggested that the already existing cookie practices would be sufficient (Mayer & Mitchell, 2012). However, the more common view and rising consensus was that explicit affirmative consent is required. The amended directive became mandatory in 2013, when each member state of the European Union implemented it in their national legislations (Trevisan et al. 2019).

2.2.3 GDPR

While the ePrivacy Directive is the one that requires websites to ask for users' informed consent to use cookies, a legislative act that has gathered more attention is the General Data Privacy Regulation, or GDPR. One reason for this is the large number of emails and other notices about updated privacy terms. In effect since May 2018, the GDPR sets strict regulations regarding the handling of users' personal data (Sanchez-Rola et al., 2019). Cookies that can be used to identify individuals are considered personal data and are thus subject to the GDPR (Koch, n.d.). The GDPR does not separate first- and third-party cookies, which is why both are affected (Sanchez-Rola et al., 2019).

As the GDPR is a regulation in the EU law opposed to a directive that each state interprets themselves, it has had its own effects on cookie usage. For example, the number of third-party cookies from websites in the United Kingdom dropped by over 10% since the introduction of GDPR (Hu & Sastry, 2019). It is widely considered that the GDPR has had a major impact on corporations around the world, likely because of the potential huge fines (Sanchez-Rola et al., 2019). Severe infringements can lead to fines as large as 20 million euros or 4% of the company's annual revenue (Wolford, n.d.). For example, in 2019 Google was fined 50 million euros for not being transparent enough regarding consent, Spanish airline Vuelin 30 000 euros for lacking the option to rejects cookies, and marketing bureau Bisnode 220 000 euros for not storing user consents (Cookie Information, 2019).

It is important to point out, that the GDPR did not replace the ePrivacy Directive. Instead, the two can be seen as complementing each other, and the ePrivacy Directive is still the main legislation guiding the usage of cookies. However, GDPR made the concept of consent stricter, which has resulted in businesses changing their cookie consent policies (Sanchez-Rola et al., 2019).

GDPR also introduced several changes related to cookies. For example, it is now mandatory for websites to keep record of their users' consent choices. Regarding cookie banners, that are talked about more in the next section, the two important changes are a stricter definition of user consent and the prohibition of "cookie walls". According to the GDPR, consent cannot be implicit, and it must be an affirmative act. There is even a part in Recital 32 clearly stating

that “Silence, pre-ticked boxes or inactivity should not therefore constitute consent” (GDPR.EU, n.d.). A cookie wall on the other hand refers to the situation where a website refuses its users access to content if they do not accept cookies. The GDPR prohibits cookie walls except if the cookies that are rejected are essential for the website to function properly (Sanchez-Rola et al., 2019).

On January 10th, 2017, the EU Commission presented a draft for a new ePrivacy Regulation, that would replace the ePrivacy Directive as well as clarify and specify the GDPR. With the introduction of the new regulation, issues such as user consent and cookie walls should become unambiguous. The directive will also address browser settings regarding cookies. The ePrivacy Regulation was originally supposed to come into effect in 2018 with the GDPR but has been constantly delayed because of a lack of agreement between the negotiating parties. At the time of writing, the ePrivacy Regulation remains a proposal.

2.3 Cookie banners

The main method that websites use to deal with cookies and cookie-related legislations is installing cookie banners, that appear when the user first visits the website (van Bavel & Rodríguez-Priego, 2016). Cookie banners are small banners, that include information about cookies, such as which cookies are used and why. They also include, or at least should include options for accepting or rejecting cookies. The banner is usually placed on the bottom of the screen view but can also sometimes be seen on the top, middle or even the side of the view.

Currently one can see several types of cookie banners across the web. Based on how they function and serve the user, cookie banners can be divided into five types: *notice only*, *opt-out consent*, *implied consent*, *opt-in consent*, and *custom* (CookiePro, 2021). Notice only banners only inform users about cookie usage, and the cookies are installed without any action from the user. Like with notice only banners, with opt-out consent banners cookies are also installed immediately as the user lands on the page, but in addition they offer the user an option to opt out of the cookies. Implied consent banners inform the user that by continuing to use the website they accept the use of cookies. Opt-in consent banners require an affirmative act from the user before cookies are installed. Finally, custom cookie banners can set different default statuses for different types of cookies and give users more settings in the banner.

From the five types of cookie banners, only the opt-in consent banner (and custom consent banner if built correctly) are completely compliant with the amended ePrivacy Directive and GDPR. Yet, several studies show that a large percentage of cookie banners are insufficient. For example, in a study by Leenes and Kosta (2015), 87% of the visited websites did not respect the ePrivacy Directive. Furthermore, Trevisan and others (2017) reported that 65% of websites installed tracking cookies before obtaining the user’s consent. In a similar study two years later, the number of websites installing profiling cookies before a user

had given consent was 49% (Trevisan et al., 2019). A likely reason for the 16 percentage-point drop is the introduction of the GDPR.

Many of the insufficient cookie banners seem to have been designed before the amended ePrivacy Directive, or at least before the GDPR. This can be seen from the fact that they can often be considered to comply with the original ePrivacy Directive, but do not fulfill the newer requirements. Figure 3 shows an example of a cookie banner, that does not comply with the amended ePrivacy Directive nor the GDPR, but unfortunately can still be seen used by some websites. The cookie banner is an implied consent banner. After the amended ePrivacy Directive there were still different opinions about the adequacy of this type of cookie banner, but the GDPR at the latest made it clear, that implied consent is not enough.

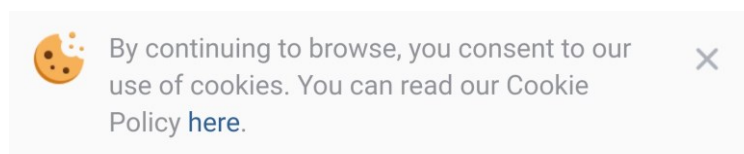


FIGURE 3 An implied consent cookie banner, that does not comply with current legislations (VK, n.d.)

Figure 4 and figure 5 show examples of cookie banners, that comply with the amended ePrivacy Directive, GDPR, and most likely with the upcoming ePrivacy Regulation. The first of the two (European Commission, n.d.) offers a simple option to accept or reject cookies and provides a link to more information and settings. It is classified as an opt-in consent banner. Although the second one (Information Commissioner's Office, n.d.) also offers a link to a separate cookie page, it shows more information already in the banner, and provides an additional function to manage certain types of cookies, in this case turning analytics cookies on or off. Therefore, it can be classified as a custom consent banner. Both are adequate, as they require an affirmative act from the user. They also offer the user the option to reject cookies without having to visit another page.

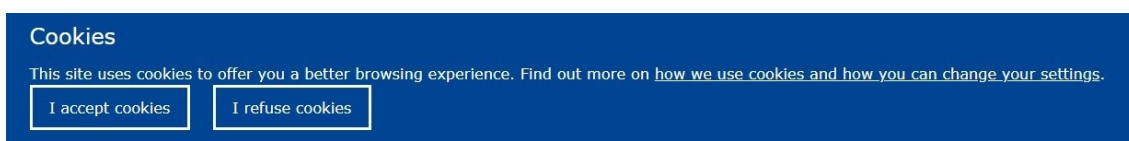


FIGURE 4 A simple but adequate cookie banner (European Commission, n.d.)

These two designs seem to be the two main ways of presenting a cookie banner that follow all current legislations, and probably the ones in the coming years as well. The first example is from the website of the European Commission, which makes it naturally a sufficient cookie banner. It offers a neutral choice between accepting and rejecting cookies, meaning that accepting cookies is not emphasized. The second example takes a different approach in that it offers a switch for accepting or rejecting analytics cookies, which is turned off by default. If not

directly on the banner, these types of options are usually available on a separate cookies page, for which there is a link in the cookie banner.

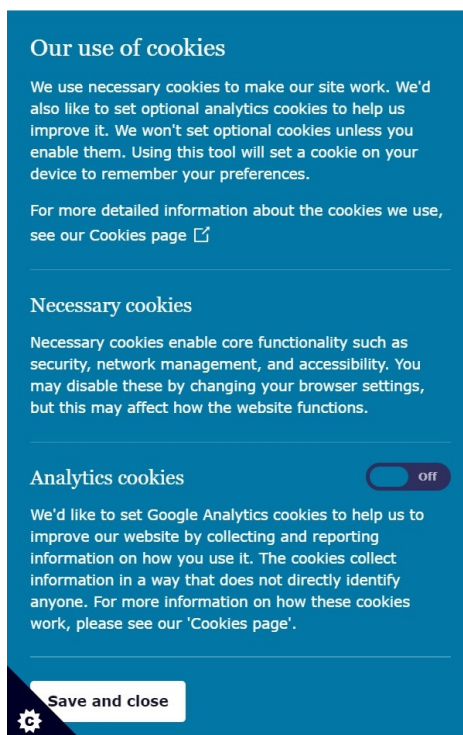


FIGURE 5 A more informational and functional adequate cookie banner (Information Commissioner's Office, n.d.)

In a study by the European Commission's science and knowledge service, van Bavel and Rodríguez-Priego (2016) examined the effects of cookie banner design on cookie-related user behavior. They compared seven different cookie banners like the one in figure 4, six of which only differed in the descriptive text on the banner (one is insufficient according to the GDPR and will therefore not be considered). They found no differences in cookie behavior based on the different banners, except that the one with the longest descriptive text led to people clicking less on the link that led to the separate cookie page. They argued that a longer descriptive text may decrease the effectiveness of the banner but called researchers to follow up on this.

3 USER EXPERIENCE

This chapter focuses on user experience. The first section aims to define the concept of user experience and shows that it is not simple nor unambiguous. This is followed by an introduction to different popular theories and models to evaluate user experience. The last section describes the chosen models in more detail and explains how they can be utilized to form the questions for the survey while keeping the scope relevant for the purpose of this study.

3.1 Definition of user experience

When looking at *user experience* as a term, its meaning might seem clear: the experience of the user. However, despite the continuously growing interest in the concept, there is no common agreement on what user experience encompasses or what its nature is, nor is there an unambiguous definition for it (Law, Roto, Hassenzahl, Vermeeren & Kort, 2009). Professionals have different views on the concept, often affected by several factors, such as social-cultural ones (Law et al., 2009; Rajanen et al., 2017).

User experience (often referred to as UX) could be described as a new phenomenon, however, the concept of *usability* has been around for longer. According to Law and others (2009), usability focuses traditionally on user cognition and how users perform in human-computer interactions. In contrast, user experience focuses on more qualitative aspects of human-computer interactions. Instead of the more practical aspects, like functionality, user experience highlights the user's emotions and sensations as well as the meaning and value of the interaction. Thus, user experience can be viewed as a broader and more subjective concept, and usability is just one part of it.

The International Organization for Standardization (2010, p. 3), or ISO in short, has defined user experience as the "person's perceptions and responses resulting from the use and/or anticipated use of a product, system or service". Hereafter the word *system* will be used to refer to all of three targets of use:

products, systems, and services. Although this short and formal definition from ISO can be seen as straightforward, it can be clarified even further to make it more encompassing. A similar but more comprehensive definition has been developed by Hassenzahl and Tractinsky (2006), which states that user experience is a result of the following three aspects:

- The user's internal state
- The characteristics of the designed system
- The context

According to Hassenzahl and Tractinsky (2006), the internal state of the user includes for example their expectations and needs as well as their motivation and mood. The designed system, which is the target of the use, consists of characteristics such as its purpose, functionality, and usability. Finally, the effects of the context or environment of the interaction have an impact as they determine the type of the setting (organizational or social), and if the interaction happens voluntarily or meaningfully. This definition was also validated by Law and others (2009), as it was the most popular choice when user experience experts were asked to choose their favorite option from five definitions.

Hassenzahl (2008) has suggested shifting the attention from the product-view towards the human-view. He emphasized the user's momentary evaluative feeling that rises from using a product or a service. In addition to subjectivity, the dynamicity of user experience has been highlighted (Law et al., 2009; Hassenzahl, 2008). This means, that with the continued use of the system, the user experience changes constantly.

Despite the lack of a unified view for the definition of user experience, some conclusions can be drawn from the work presented above. User experience refers to the user's subjective feelings that result from the interaction with different aspects of a product, system, or service. It is dynamic and context-dependent, meaning that it changes with use and different environmental factors. Now that some light has been shed on user experience as a concept, the next section will focus on the main methods to evaluate and measure user experience.

3.2 Components of user experience

To understand user experience better, it is useful to understand what it comprises. As explained above, it is an ambiguous concept, which also means that there is no single way to define what it consists of. There are several models that try to explain user experience by chopping it down into several components. The model that has been chosen in this paper is called the CUE-Model (Components of User Experience) by Mahlke and Thüring (2007). The model is shown in figure 6.

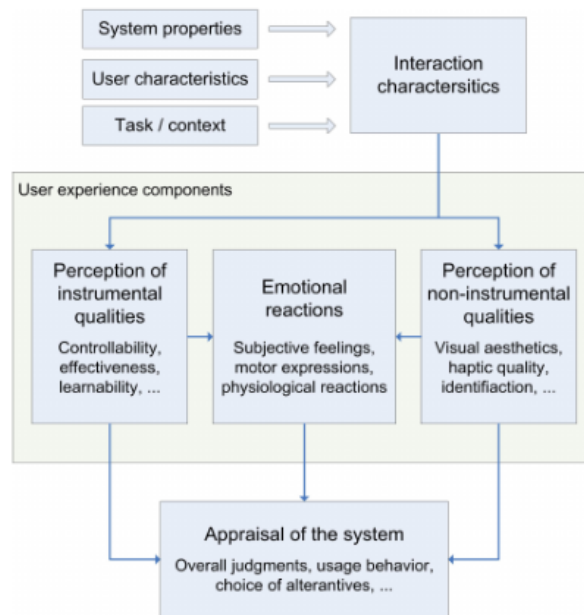


FIGURE 6 The CUE-model (Mahlke & Thüring, 2007, p. 916)

According to Mahlke and Thüring (2007), the characteristics of a system that determine its user experience can be grouped into two main groups: *perceived instrumental qualities* and *perceived non-instrumental qualities*. Perceived instrumental qualities are related to the support provided by the system, and how useful and easy to use it is perceived to be. They encompass characteristics such as controllability, effectiveness, functionality, and learnability. In contrast, perceived non-instrumental qualities refer to the look of the system and how it feels. Visual aesthetics, haptic quality, appeal, attractiveness, and identification are all non-instrumental qualities of a system. These two perceptions are affected by the characteristics of the system and user as well as the context of the use.

The third component of user experience, *emotion*, is affected by both the instrumental and non-instrumental qualities of the system (Mahlke & Thüring, 2007). For example, a well-functioning and aesthetically pleasing system can lead to the feeling of satisfaction whereas a confusing and unattractive one may cause frustration and dislike. Together the three components shape the user's overall experience of the system, and therefore have an impact on the behavior and choices regarding the system (Mahlke & Thüring, 2007). This model is in line with the user experience definitions outlined in the previous section. To further examine the sub-dimensions of the instrumental and non-instrumental components as well as user emotions, the next section focuses on different ways of evaluating user experience.

3.3 Evaluating user experience

Evaluating user experience is not by any means a simple or clear task. Several different methods have been proposed, perhaps because of the ambiguity of the

concept (Vermeeren et al., 2010). As an example, the website All About UX (n.d.) lists 86 different methods for evaluating user experience. Each method has its own perspective on how user experience should be viewed and measured, which complicates the task of choosing just one of them.

As mentioned before, the traditional way of evaluating human-computer interactions has focused on user cognition and performance. Objectively measurable aspects, such as user task-times and physiological responses, have been in the center of research (Law et al., 2009). However, since user experience research emerged, it was argued that these traditional usability metrics were too narrow, and more encompassing ways to evaluate the quality of interactions were needed (Bargas-Avila & Hornbæk, 2011). The traditional usability framework was seen as simply too limited (Law et al., 2009). This makes sense, as usability metrics are objective in contrast to user experience, which is subjective, as explained above.

As user experience is such a broad and ambiguous topic, the dimensions which are studied vary quite a lot. According to Bargas-Avila and Hornbæk (2011), one of the key questions in user experience research is which aspects to assess. In their study, they looked at 66 other studies and identified the main experiential dimensions of user experience research (table 1).

TABLE 1 Dimensions of user experience research (Bargas-Avila & Hornbæk, 2011)

UX Dimension	N
Generic UX	27
Affect & emotion	16
Enjoyment & fun	11
Aesthetics & appeal	10
Hedonic quality	9
Engagement & flow	8
Motivation	5
Enhancement	4
Frustration	3
Other constructs	15

Of these dimensions, the first two (generic UX and affect & emotion) clearly stood out as the most studied ones. Interestingly, most studies focused only on one dimension. This approach seems selective and restricted, as user experience is usually viewed as a multifaceted concept (Bargas-Avila & Hornbæk, 2011). The multidimensionality of user experience is important to keep in mind and will be highlighted later.

According to Hornbæk and Hertzum (2017), understanding what affects the acceptance and use of systems is crucial in understanding human-computer interaction, and two accounts have been especially visible regarding this. These two accounts are the technology acceptance model (TAM) and different user experience models. While these two have different approaches on the topic, they share one goal: better design through prediction of adoption and use of systems.

While TAM drives research as a uniformly accepted model (Hornbæk & Hertzum, 2017), it is not the only popular model, as it has been later expanded resulting in newer versions. It is useful to look at these models closer because of two reasons. First, these models examine the acceptance of technology, and as cookie banners are often the first thing the user sees when entering a website, they have the potential to play a major part in the acceptance of the website. Second, this study focuses on the moment the user is first presented with the cookie banner, which is a similar scenario to that in the technology acceptance models. The models also focus on the user's perceptions of the system, similarly to the CUE-model.

According to Hornbæk and Hertzum (2017), there is no single user experience model that has been widely accepted and used like with technology acceptance models. However, these models have similarities. Most of them separate practical attributes from hedonic ones and highlight the role of perceived aesthetics. Furthermore, they show how perceptions change with time and view emotions as a central construct. Because dealing with cookie banners is a fast action that only happens ones per website visit, the effect of time is beyond the scope of this study.

Traditional user experience research has relied mainly on usability metrics, such as task time or number of errors. However, it misses the other important part of user experience, which is emotion (Agarwal & Meyer, 2009). Emotion is a critical component of every computer-related activity (Brave & Nass, 2007). It is an essential part of user experience (Forlizzi & Battarbee, 2004), which is agreed on by most researchers (Bargas-Avila & Hornbæk, 2011; Law et al., 2009). Moreover, emotion should always be considered in the design process (Saariluoma & Jokinen, 2014).

Using the CUE-model as a basis, the first two components (instrumental and non-instrumental qualities) of user experience are addressed in the technology acceptance models, whereas the user emotions perspective focuses on the third component. Based on this, the author argues that these two perspectives are worth looking at in more detail. The former represents a more traditional view on the main constructs of technology acceptance, whereas the latter introduces the important role of emotion.

3.3.1 Technology acceptance perspective

Technology acceptance models examine variables, that impact an individual's choice to accept a certain technology, for example a product, service, or system. As cookie banners are shown to users immediately when they enter a website, they can play an important part on the user's choice on whether to accept the website and start using it or reject it and move to another one. While multiple technology acceptance models exist, only a few of them have been adopted widely. These models are examined next.

TAM is one of the most popular (Hornbæk & Hertzum, 2017) and concise models that focuses on the acceptance of information technology (figure 7). To

get an idea of the model's popularity, at the moment of writing, the original article presenting the model (Davis, Bagozzi & Warshaw, 1989) has been cited over 30 000 times. Furthermore, another article by Davis (1989) that further validates the model's main components has been cited over 60 000 times.

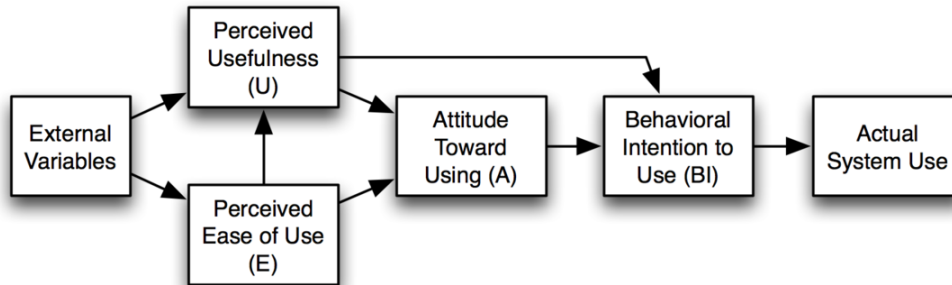


FIGURE 7 Technology acceptance model (TAM) (Davis et al. 1989, p. 985)

In TAM, a user's attitude towards using a system is determined by how useful and easy to use they perceive the system to be. This attitude then leads to the intention to use the system, which eventually leads to actual use of the system. In addition, the perceived ease of use of the system has a causal relationship with its perceived usefulness. While perceptions about usefulness and ease of use both correlate with system use, usefulness is the one with a stronger correlation (Davis, 1989).

14 years after the introduction of TAM, another popular model examining technology acceptance emerged, as the unified theory of acceptance and use of technology (UTAUT) by Venkatesh, Morris, Davis, G., and Davis F. (2003) was introduced. UTAUT is an expansion of TAM, that adds two constructs and four moderators to the model. As the name suggests, it is a unified model that was formed by integrating elements from eight prominent user acceptance models (Venkatesh et al., 2003).

Further expansion of the model resulted in a second version of UTAUT called UTAUT2 (Venkatesh, Thong & Xu, 2012). Next, instead of UTAUT, UTAUT2 (figure 8) is examined in more detail for two reasons. First, it is very similar to UTAUT, but newer and thus reflects today's world better. Second, it is designed to evaluate and explain technology acceptance in the context of individual consumers, whereas the first version focused on organizational context (Venkatesh et al., 2012). As this study focuses on individual users' experience of cookie banners, it makes sense to focus on UTAUT2.

The constructs *performance expectancy* and *effort expectancy* in UTAUT2 are equivalent to perceived usefulness and perceived ease of use in TAM. According to Venkatesh and others (2003), performance expectancy refers to a user's expectations on how the system can benefit the user when performing activities, whereas effort expectancy means how easy the user expects using the system to be. *Social influence* refers to the effects that important others and their opinions about using the system have on the user, and *facilitating conditions* consist of the resources and conditions that the user believes can support the use.

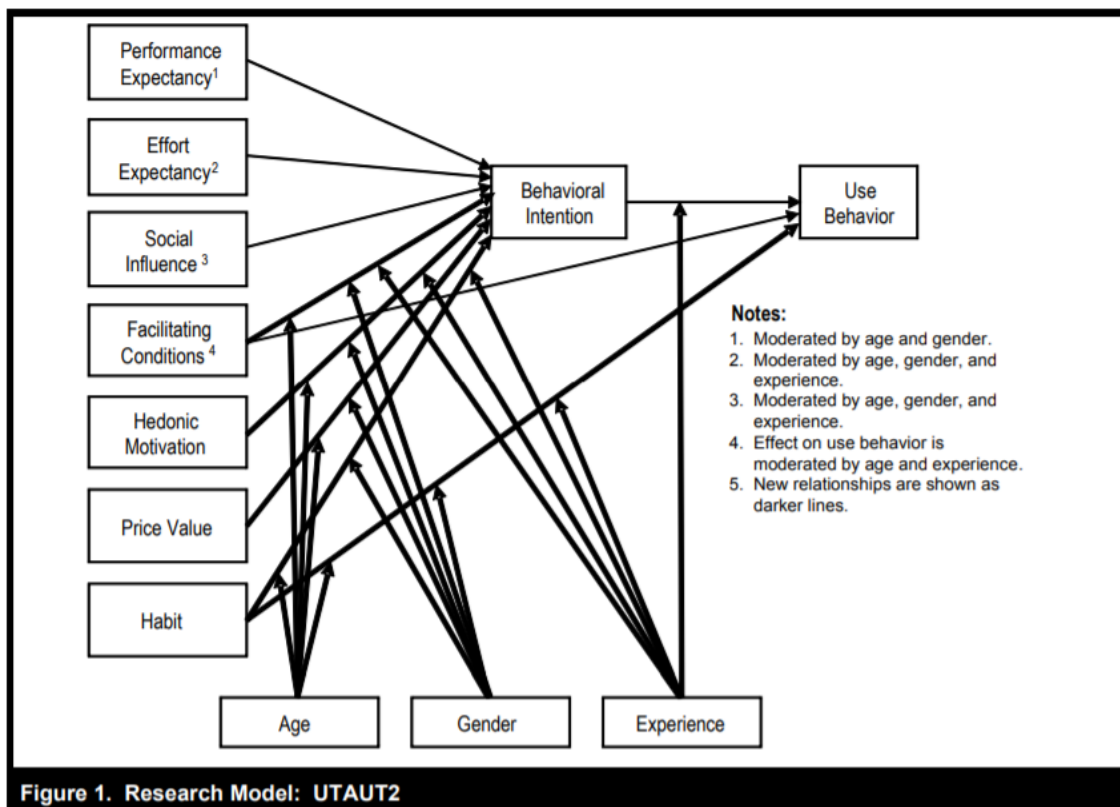


FIGURE 8 UTAUT2 (Venkatesh et al., 2012, p. 160)

The three new constructs that were added to UTAUT2 are *hedonic motivation*, *price value*, and *habit*. Hedonic motivation refers to how fun or pleasing the user perceives the system use to be, whereas price value is the perceived tradeoff between the benefits of using the system and the monetary costs that result from it (Venkatesh et al., 2003). For habit, the model used the definition by Limayem, Hirt and Cheung (2007), according to which it refers to how automatically the user performs the task because of learning. The effects of these six constructs on behavior and use are moderated by the age, gender, and experience of the user (Venkatesh et al., 2003). The relevant constructs of these models will be further discussed in section 3.3.4.

3.3.2 User emotions perspective

As explained above, emotions are a part of every human-computer interaction, and thus an important part of user experience. By considering user emotions in designing and testing interfaces, even the simplest ones, designers can create effective and enjoyable interfaces (Brave & Nass, 2007). Emotion is a complex phenomenon to study for several reasons (Agarwal & Meyer, 2009). Like with user experience, multiple different definitions exist for emotion. However, two characteristics are generally agreed on (Brave & Nass, 2007). First, emotion is a human response to events, that are relevant to a person's goals, needs, and per-

ceptions. Second, it has affective, behavioral, cognitive, and physiological dimensions.

In human-computer interaction, it is crucial to understand what causes emotions, and looking at the basic needs and goals of humans creates a good starting point (Brave & Nass, 2007). One of the most widely spread theories explaining these needs is Maslow's hierarchy of needs, which originates all the way back to 1943. According to Maslow (1943), humans have stages of basic needs, that motivate our behavior in a hierarchical manner. This means, that the need at a previous stage must be fulfilled for the next one to arise. The needs are (starting from the most basic need): physiological, safety, love/belonginess, esteem, and self-actualization. Especially the middle three stages are interesting and relevant in the context of this study and will be discussed further in the next section.

In the area of HCI, the emotions that are relevant are frustration, pride, and satisfaction (Brave & Nass, 2007). In the context of using a system, satisfaction can also be a result of the user feeling competent enough to use the system. One model analyzing these emotional dimensions of user experience is the competence-frustration model (Saariluoma & Jokinen, 2014). According to the model, emotional user experience is determined by four aspects: the user's technological problem-solving tendency, frustration tendency, pre-task self-confidence, and task performance (Jokinen, 2015).

3.3.3 Relevant dimensions of user experience

The previous sections introduced multiple dimensions of user experience and perspectives for evaluating it. As the concept is so multifaceted, it makes sense to incorporate several dimensions of user experience into research (Bargas-Avila & Hornbæk, 2011). In this section, the scope is narrowed down to the relevant dimensions and aspects of the presented perspectives. It is important to identify the relevant aspects, since they guide the creation of the questionnaire, which is presented in the next chapter. The relevancy of the different aspects is decided based on their relevance in a scenario, where a user faces a cookie banner when visiting a website.

The three components of user experience are the perceived instrumental qualities, perceived non-instrumental qualities, and user emotions (Mahlke & Thüring, 2007). This study will focus only on the perceived instrumental qualities and user emotions based on two reasons. First, dealing with a cookie banner is a fast process, where the goal is usually to get rid of the banner as quickly as possible, which highlights the functionality and other instrumental qualities. Second, even though the non-instrumental qualities of the banner would affect its user experience, there are countless possibilities for visual choices, such as colors and fonts. Businesses may for example want the look of the cookie banner to be in line with their brand, and they may even need to follow visual brand guidelines. Therefore, non-instrumental visual factors are left outside of

the scope of this study. However, they could offer interesting avenues for further research.

Starting off with the main dimensions in user experience research, “other constructs” are excluded as they do not represent specific dimensions. Enjoyment & fun, aesthetics & appeal, hedonic quality, engagement & flow, motivation, and enchantment fall in the category of non-instrumental qualities and are thus excluded. This leaves us with generic UX, affect and emotion, and the more precise feeling of frustration as the relevant dimensions of user experience research. Emotion was also the most studied dimension after generic user experience, which reinforces the idea of it being an important aspect of user experience.

Continuing with the technology acceptance perspective, the two main constructs from TAM (perceived usefulness and ease of use) are prime examples of instrumental qualities. As cookie banners are placed on websites for a reason and they serve a function, users have perceptions about how useful the cookie banner might be. It is interesting to note that the banner might be useful to the user and business for different reasons. On the other hand, perceived ease of use is important as well, because a user might exit the website just because a cookie banner seems too complicated to deal with, or it forces the user to make decisions they do not want to make.

From the five constructs that UTAUT2 added, facilitating conditions and price value are not relevant, as cookie banners function similarly in all conditions, and bear no monetary costs to the user. Hedonic motivation is excluded for the same reason as hedonic quality, which was explained above. However, there is no reason to not include social influence, as all users must deal with cookies, and habit plays a role because most users deal with cookie banners daily. Since the effect of the constructs on behavioral intention and use is moderated by all or some of age, gender, and experience, all these moderators are relevant.

Moving on to the user emotions perspective, it is useful to first look at the basic needs presented by Maslow (1943) as they determine user emotions. From the five needs, safety, love/belongingness and esteem are relevant. In the context of online privacy, safety can be interpreted as security. From the love/belongingness stage, especially the belongingness part is related to the social influence from UTAUT2, as they both focus on the need of people to be accepted by other people. Regarding esteem, Maslow (1943) mentions feeling capable as a part of a good self-esteem that people aim for. Businesses can enhance the user’s feeling of being capable through clear design.

The other two important emotions in HCI research are frustration and satisfaction (Brave & Nass, 2007). According to the competence-frustration model, the emotional part of user experience is determined by the user’s technological problem-solving tendency, frustration tendency, pre-task self-confidence, and task performance (Jokinen, 2015). The technological problem-solving tendency and pre-task self-confidence of the user are naturally higher with increased experience with technology, which is why they are related to the experience mod-

erator from UTAUT2. The role of frustration in user experience is again highlighted here, but task performance is not relevant as this study focuses on the immediate user experience of just seeing the cookie banner.

Based on these findings, the author argues that the following aspects of user experience are important to consider when studying the user experience of cookie banners and their effect on the user's perceptions of the website:

- Instrumental qualities:
 - Perceived ease of use
 - Perceived usefulness
 - Security
- User emotions:
 - Frustration
 - Capability
 - Satisfaction

In addition, the following characteristics of the user should be considered, as they can have a moderating impact on the previous aspects:

- Age
- Gender
- Experience
- Social influence

This section focused on user experience as a concept and tried to point out its dimensions relevant to cookie banners. As a conclusion, user experience comprises the user's subjective feelings resulting from interacting with a system. Perceived ease of use, usefulness and security of the system all affect these emotions, most importantly the feelings of frustration, capability, and satisfaction. The user's age, gender, and experience as well as social factors can all moderate the perceptions and emotions users have regarding cookie banners.

4 RESEARCH METHODS

This chapter introduces the research methods that form the empirical part of this study. As a recap, the main goal of the study was to find out, what type of legitimate cookie banner provides the best experience for website users. The legal restrictions for cookie banners were outlined in the second chapter. The first section of this chapter presents an analysis of cookie banners used in the most popular European websites. The aim of this analysis was to narrow down the relevant legitimate options for cookie banners, that are later compared in the survey. The second section explains the choice of a survey as the main research method and describes the development of the questionnaire form. The goal of the survey was to reveal which type of cookie banner or banners the users prefer.

4.1 Analysis of top European websites

To compare the user experience of legitimate cookie banners, one must first find out which types of cookie banners are worth studying. While in theory there are countless ways to build a cookie banner, it makes sense to look at the most popular choices, as they are the ones generally appearing across the web. Although the EU directives and regulations apply to all websites targeting European users, this analysis focuses on the most popular websites in Europe. By doing this, the websites that are used the most in Europe are studied, and any possible vagueness regarding the targeted users can be avoided.

Alexa's "Top Sites" tool (11.8.2020) was used to list the current top 100 European websites. The list is gathered based on a combination of daily visitors and page views from the previous month. Each website was then manually opened, and if the cookie banner was legitimate, it was categorized based on the method it used to acquire the user's consent for cookie usage. Three categories were first chosen based on the author's hypothesis regarding the most frequently used cookie banners, and if any other types of banners would appear, a

new category would be added. However, it turned out that there was no need to add new categories as all the legitimate cookie banners in the analysis fell into one of the original three categories, which are listed below:

- **Type 1:** the banner offers a simple choice between accepting or rejecting cookies.
- **Type 2:** the banner offers a choice between accepting the cookies or following a link to learn more about the website's cookie usage and/or change the cookie settings.
- **Type 3:** the banner enables the user to choose which types of cookies to accept and which to reject straight from the banner.

The full results of the analysis can be seen in table 2. Most of the websites used a Type 2 -banner, giving the user the choice of either accepting the cookies or following a link for more settings and information. Six websites offered the user a simple choice between accepting or rejecting all cookies (except strictly necessary ones). Four sites enabled the user to choose straight from the banner which types of cookies to accept or reject.

TABLE 2 Results of cookie banner analysis

Type of banner	Amount
Type 1	6
Type 2	57
Type 3	4
No cookie banner appeared	11
Implied consent was used	20
No option to reject cookies	2

In 11 website visits no cookie banner appeared, and in two there was no clear option to reject cookies. In 20 of the cookie banners implied consent was likely used, which could be seen from the text on the banner. It is important to note, that also some of the 67 websites that seemed to use legitimate cookie banners could still potentially install cookies before a confirming action from the user. However, the way websites install cookies is beyond the scope of this study, as the focus is on the user experience of cookie banners.

The analysis confirmed the hypothesis that these three types of cookie banners are the most frequently used ones, and that a Type 2 -banner is the most widely used one. While a Type 1 -banner was only encountered six times, it seems reasonable to take it into account when studying cookie banners as it enables the user to accept or reject all cookies with one click. Furthermore, while a Type 3 -banner was used in only four cases, a similar settings view was often found behind one click on Type 2 -banners. Thus, it makes sense to study a Type 3 -banner as well. The results of this analysis created a foundation for the survey, that is introduced in the next section.

4.2 Cookie banner survey

The main research method of this study was an online survey, in which participants evaluated the user experience of three different types of cookie banners, which were based on the three categories resulting from the cookie banner analysis outlined in the previous section. The goal of the survey was to gain insight into the differences between the user experience of these banners. Ideally, the goal was also to identify the banner that provides the best user experience and should thus be used by websites if they want to emphasize the experience of their users.

4.2.1 Choosing the research method

When choosing a research method, one must consider several factors. The method or methods must be suitable for achieving the goals of the study and answering its research questions. The aim of this study was to find out, which type of cookie banner provides the best user experience, and how the user experience varies between different types of cookie banners. To answer this question, an online survey was chosen as the most suitable research method for several reasons.

Surveys are a dominant user experience evaluation method and a very common method for data collection (Bargas-Avila & Hornbæk, 2011). They are an easy way to measure attitudes of customers (Sauro & Lewis, 2016), and are commonly used for user-driven evaluation of usability. Asking users to assess the user experience is an effective way to gain helpful feedback (Bargas-Avila & Hornbæk, 2011). Unlike objective metrics such as task-time, surveys can measure the subjective perceptions of users, which user experience is all about. Surveys can also be good for evaluating short-term or momentary experiences (Vermeeren et al., 2010), such as dealing with a cookie banner.

While an online survey seemed the best research method for this study for the reasons mentioned above, it was also the most logical choice in the light of some restrictions. As the study was conducted for a master's thesis, the time and budget were limited, and questionnaires offer an efficient way for quantitative measurement (Laugwitz, Held & Schrepp, 2008). In addition, the covid-19 pandemic overlapped heavily with this study, which is why an online survey was suitable, as it enabled people to participate in the study completely remotely while ensuring their safety by avoiding face-to-face interactions.

4.2.2 Constructing the questionnaire

The questionnaire revolved around three pictures (figure 9), that represented examples of the three common types of cookie banners based on the analysis in section 4.1. In the survey, the banners were named Banner 1, Banner 2, and Banner 3, which are also the names used for the banners in this paper from now on. The pictures were the main independent variables in this study. In addition, the other independent variables were pieces of information collected about the participants. This information included the participants' age, gender, nationality, understanding of cookie banners, and self-assessed importance of online privacy. These variables represented the relevant moderators highlighted in the previous chapter, although social influence was considered too complicated to measure in this survey, as it would likely affect people's choices unconsciously.

The cookie banners represented in the pictures follow current legislations and should be in line with the legislations of the near future. The main point of the pictures was to portray the way the banner works. The visual style of a given cookie banner can vary in so many ways, that it is impossible to study all these variables. To minimize the effects of these visual aspects, a consistent design was used in the three cookie banner pictures in this questionnaire, so that they differ from each other as little as possible visually. For example, all banners use the same font and shapes, and are black and white to remove the effects of different colors.

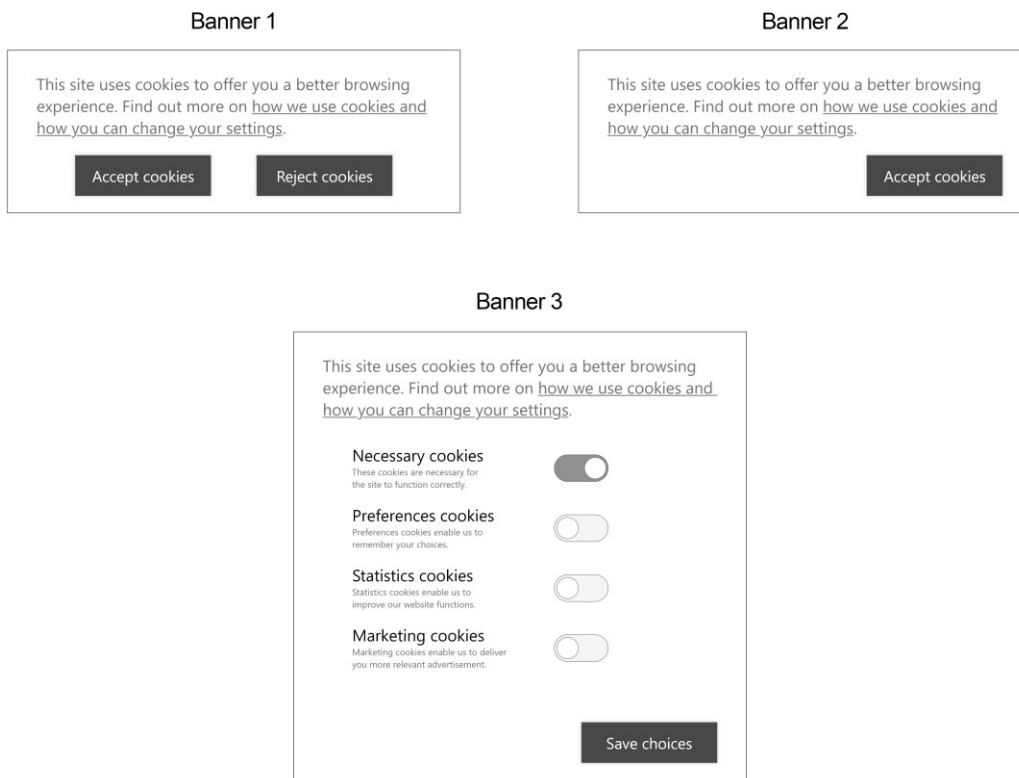


FIGURE 9 The pictures of cookie banners in the questionnaire

Participants were shown all three cookie banners once already on the first page of the questionnaire to mitigate the effects of the order that the banners would appear in. After that, each of the next three pages would include one cookie banner, followed by a set of contrasting attribute pairs as well as a set of questions in a Likert-scale format. Both sets were the same for each cookie banner, but the order of the items in the sets was randomized. The attribute pairs and Likert-scale questions were based on the following five relevant dimensions of user experience:

- Perspicuity
- Efficiency
- Dependability
- Feeling of frustration
- Feeling of control

The first three dimensions, perspicuity, efficiency, and dependability were each represented by four attribute pairs, which can be seen in figure 10. The participants could indicate how they perceive the different cookie banners by choosing between each pair of attributes on a scale from one to seven.

6. Rate the cookie banner by choosing a number from 1 to 7 between the contrasting attributes: *

	1	2	3	4	5	6	7	
Confusing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Clear
Difficult to learn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy to learn
Complicated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy
Not understandable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Understandable
Inefficient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Efficient
Slow	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fast
Cluttered	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Organized
Impractical	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Practical
Obstructive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Supportive
Does not meet expectations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Meets expectations
Unpredictable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Predictable
Not secure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Secure

FIGURE 10 Contrasting attribute pairs in the survey.

The questions were based on the User Experience Questionnaire, or UEQ in short, by Laugwitz and others (2008). UEQ is a comprehensive way to measure user experience, and several studies have confirmed its reliability and construct validity. The goal of UEQ is to evaluate user experience in a simple and quick way while remaining comprehensive (Laugwitz et al., 2008), which matches the

goal of this study perfectly. In the development of UEQ, both “hard” and “soft” aspects of user experience were collected, resulting in the following six factors: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. As argued before, in the context of this study it makes sense to focus on the instrumental, or “hard”, aspects of user experience. As it is beneficial to only choose relevant aspects of a method (Bargas-Avila & Hornbæk, 2011), only perspicuity, efficiency, and dependability were applied in the questionnaire. They are closely related to the relevant user experience dimensions relevant for this survey: perceived ease of use, perceived usefulness, and security.

To study user emotions, the feeling of frustration and feeling of control were both measured by four statements, shown in figure 11. The respondents could state how strongly they agree with each statement by choosing from a 5-point Likert scale. Likert-scales are commonly used in surveys (Sauro & Lewis, 2016), and they are often used to measure emotion (Agarwal & Meyer, 2009). As the goal was to quantify the subjective feelings of the users regarding frustration and control, a Likert-scale was chosen as a suitable method to measure this.

7. This type of cookie banner... *

	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly agree
makes me feel frustrated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel annoyed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel interrupted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel irritated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel in control over my privacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
enables me to do what I want	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has enough options	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has enough information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

FIGURE 11 Likert-scale statements in the survey.

Frustration is clearly relevant for this study, and it could be seen as the opposite of satisfaction. Therefore, only frustration was focused on, as due to the nature of cookie banners, they generally create more frustration rather than satisfaction. The third relevant emotion, capability, is part of the feeling of control, which was considered a more relevant emotion to study in this context.

The combination of the three relevant aspects from the UEQ and the Likert-scale for measuring user emotions provided a multidimensional and comprehensive way to measure the user experience of each type of cookie banner. Each of the five aspects of user experience that was evaluated in this survey was measured with four statements. This removed the risk of unwanted impact of certain word choices, while keeping the survey relatively compact and easy to answer. On the last page of the survey, all three banners were shown once again, and participants were asked to choose the banner that they think provides the

best overall user experience. In the end of each page showing a banner as well as the last page, the respondents had the possibility to explain their answers in more detail by typing their thoughts into a text field.

The survey was shared publicly via the author's networking profiles, including Facebook, Instagram, and LinkedIn. While this method was an easy, fast, and free way of reaching hundreds of people, the trade-off was the homogeneity of the participants. In addition, the survey was shared on the email list of students at the IT Faculty of the University of Jyväskylä. While this was another great way to collect respondents, it might have affected the generalizability of the results, as IT student would likely have a better understanding of cookies than the average website user. The participants and the generalizability of the study are discussed in more detail later. The full survey can be found in appendix 1 at the end of this paper.

5 RESULTS

This chapter goes through the results of the survey. The results of the cookie banner analysis were already discussed in the previous chapter, as they laid out the foundation for the rest of the chapter. First, the demographics of the participants are presented, followed by their understanding of cookies and perceived importance of online privacy. Next, the results of the main survey questions evaluating the three cookie banners are discussed, starting from the description of the sum variables, and followed by the comparison of the user experience between the banners. Finally, a conclusion is provided.

5.1 Background information

The survey collected a total of 191 responses ($N = 191$). All the responses were complete, since the main questions were mandatory, and one could not submit their answers if these questions were not answered. Of all the respondents, 129 were male (69.6%), 61 female (31.9%), and one respondent (0.5%) replied “Other”. The gender distribution of the respondents can be seen in figure 12.

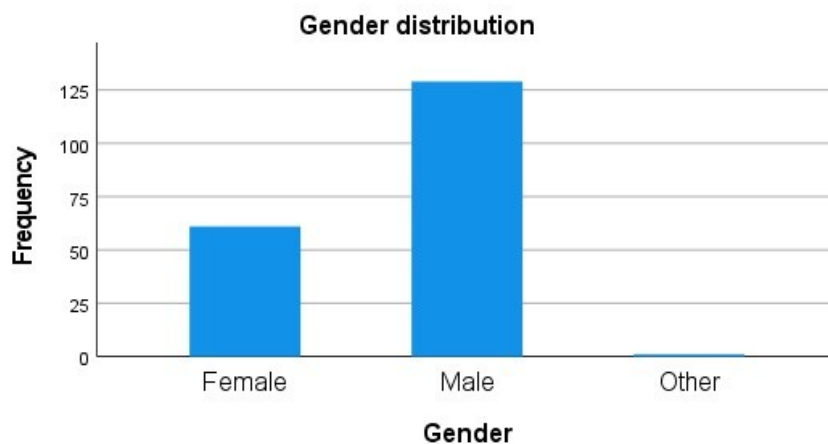


FIGURE 12 Gender distribution of the participants

The average age of the respondents was 29 and the median age 26. The youngest respondent was 19 years old, whereas the oldest was 65 years old. The standard deviation of the age distribution was 9.1. The age distribution of the participants is displayed below in figure 13.

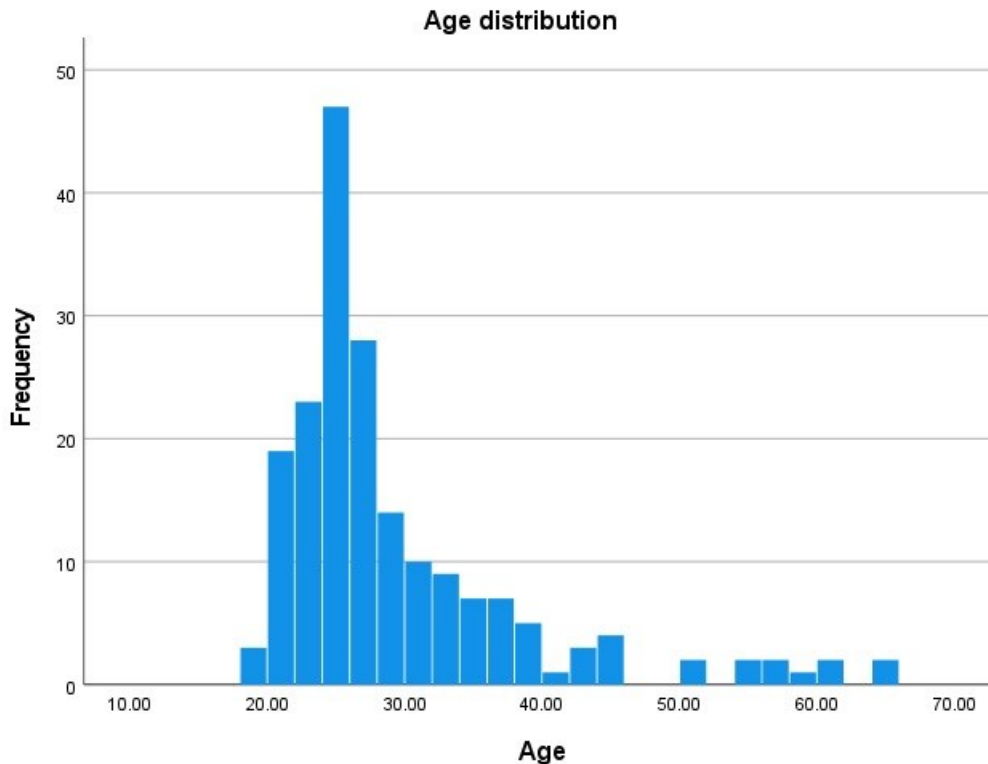


FIGURE 13 Age distribution of the participants

From the figure it can be clearly seen that it does not follow a normal distribution and is heavily weighted towards the left side (younger ages). Most of the participants (71.2%) were between 20 and 30 years old. This was a result of how the study was shared, as most of the participants were reached by the author's social media posts and an email to the IT faculty student list, as discussed in the previous chapter. The fact that a high number of the participants were students of the IT Faculty also affected the gender distribution, as there were twice as many men respondents compared to female respondents.

Most of the participants (172) were Finnish, again due to how the survey was shared. From the non-Finnish respondents, 17 out of 19 came from Europe, one from Brazil, and one answered "???" when asked to write their nationality. As 90.1% of the respondents were Finnish, the impacts of the nationality were not examined further in the results of the survey. However, the high number of Finnish respondents might have influenced the generalizability of the results.

In addition to their age, gender, and nationality, the respondents were asked about their understanding of cookies as well as how important they considered online privacy to be. The distribution of the respondents' understanding of cookies can be seen in figure 14. The level of understanding was meas-

ured with a scale from one to five, where one meant “no understanding”, two “little understanding, three “some understanding”, four “good understanding”, and five “excellent understanding”.

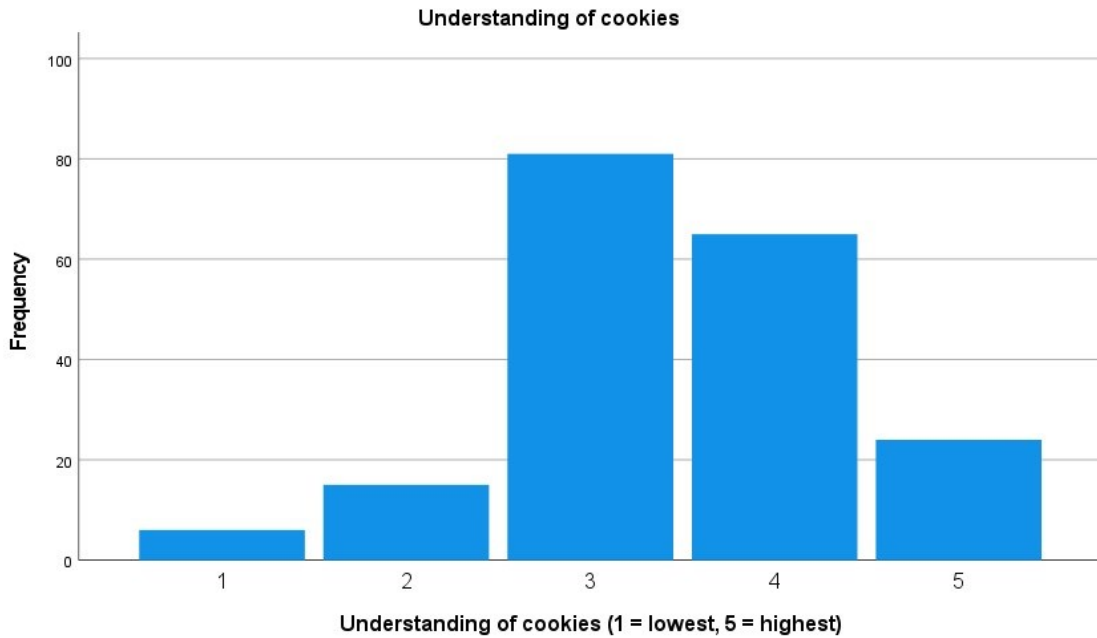


FIGURE 14 The distribution of the respondents' understanding of cookies

The perceived importance of online privacy was measured with a 5-point Likert scale, as the question was phrased “Online privacy is important to me”. The distribution of the answers can be seen in figure 15.

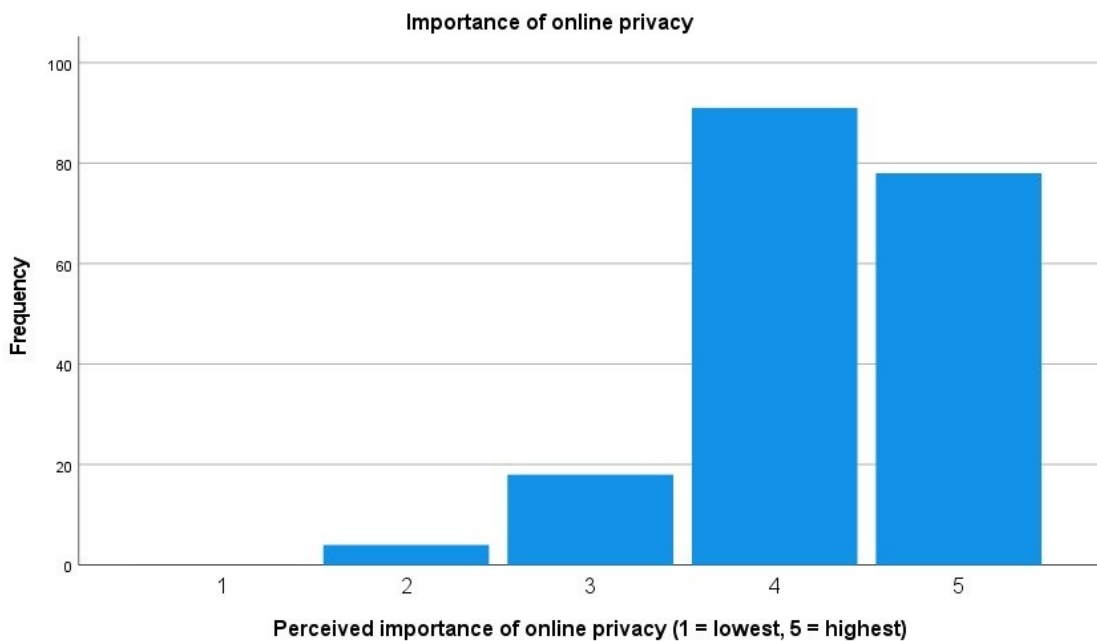


FIGURE 15 Respondents' perceived importance of online privacy

As one can see from the figures, both the understanding of cookies as well as the perceived importance of online privacy were at a high level among the participants. Again, this can be explained by the fact that a lot of the participants were students of the IT Faculty in University of Jyväskylä. The impacts of these independent variables are discussed in the last section of this chapter.

5.2 User perceptions on the cookie banners

The last page of the survey was created to achieve a simple way to decide, which of the three banners is the most user-friendly one. It showed all three cookie banners on the same page and included a question where the respondents had to select the banner that provided the best overall user experience in their opinion. The distribution of the answers can be seen in figure 16. As a reminder, Banner 1 was the one offering a simple choice of accepting or rejecting the cookies, Banner 2 offered the option to accept the cookies or read more about them, and Banner 3 had more detailed options available straight in the banner.

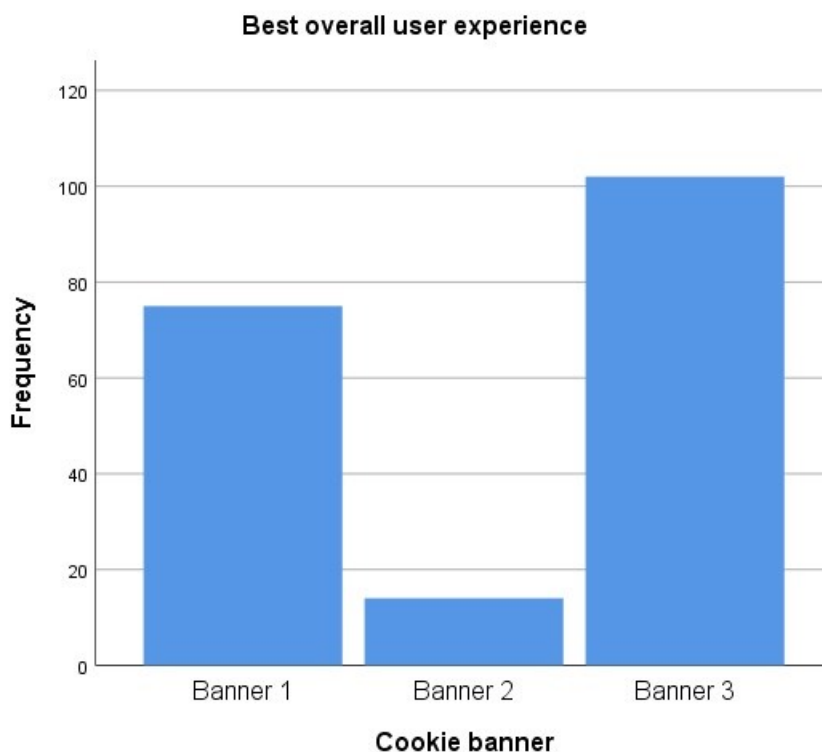


FIGURE 16 Respondents' opinions about the cookie banner that provides the best overall user experience

From the respondents, 75 (39.3%) chose Banner 1, 14 (7.3%) preferred Banner 2, and 102 (53.4%) liked Banner 3 the most. From these results one can see that Banners 1 and 3 were clearly preferred over Banner 2. Simply based on this

question it is clear, that banners with more control over the cookies used are more user-friendly than a banner which requires users to follow a link to reject or modify the cookie settings. A more detailed look into the differences between the user experience of the banners is provided in the following sections.

5.2.1 Sum variables

To get a better understanding of how and why the user experience varied between the three banners, sum variables were calculated for each of the five relevant dimensions of user experience. The sum variables along with some relevant values are provided in table 3. It is good to note that the first three sum variables were calculated from questions with a 7-point scale, and the latter two from questions with a 5-point scale.

TABLE 3 Sum variables

Sum variable	Banner	Cronbach's Alpha	Mean	Standard deviation	Median	IQR
Perspicuity	1	0.82	5.93	1.04	6.25	1.25
	2	0.87	5.12	1.61	5.50	2.50
	3	0.91	4.81	1.58	5.00	2.50
Efficiency	1	0.82	5.80	1.07	6.00	1.00
	2	0.81	4.76	1.60	4.75	2.25
	3	0.86	4.65	1.40	4.75	2.00
Dependability	1	0.76	5.07	1.12	5.25	1.50
	2	0.83	3.54	1.55	3.50	2.25
	3	0.75	5.42	1.18	5.75	1.50
Feeling of frustration	1	0.91	3.04	1.04	3.00	1.50
	2	0.92	3.84	1.03	4.00	1.50
	3	0.92	3.06	1.07	3.00	1.75
Feeling of control	1	0.83	3.33	0.89	3.50	1.50
	2	0.78	1.91	0.80	1.75	1.25
	3	0.82	4.22	0.70	4.25	0.75

The internal reliability of the sum variables was good, as the Cronbach's Alphas varied between 0.75 and 0.92, and most were above 0.80. The reliability coefficient for each can be considered acceptable, and therefore the sum variables can be used to further examine the differences in user experience between the banners. Friedman tests were conducted for each sum variable, and the results showed that in all five cases there were meaningful differences between the user experience of the banners.

5.2.2 Comparison of the user experience of the banners

A Wilcoxon signed-rank test provided more detailed information about how the user experience varied between the banners. Of the 15 comparisons, 12 re-

sulted in statistically significant differences. The results along with the effect sizes are presented in table 4.

TABLE 4 Comparison of UX dimensions between banners

Banner comparison	UX dimension	Z	p	d
B1 vs. B2	Perspiciuity	5.57	.000	0.60
	Efficiency	7.01	.000	0.76
	Dependability	9.87	.000	1.13
	Feeling of frustration	-8.17	.000	-0.78
	Feeling of control	10.98	.000	1.68
B1 vs. B3	Perspiciuity	7.18	.000	0.84
	Efficiency	8.04	.000	0.92
	Dependability	-2.82	.005	-0.30
	Feeling of control	-9.78	.000	-1.11
B2 vs. B3	Dependability	-9.46	.000	-1.36
	Feeling of frustration	6.84	.000	0.74
	Feeling of control	-11.78	.000	-1.11

There were no statistically meaningful differences regarding the perspicuity and efficiency between Banners 2 and 3 and the feeling of frustration between Banners 1 and 3, so those comparisons are left out of the table. The results show that Banner 2 clearly provided the worst user experience, which is in line with the results of the survey's last question shown in the previous section. It was less dependable and resulted in more frustration and less control than Banners 1 and 3. In addition, it was rated worse in perspicuity and efficiency compared to Banner 1.

Banners 1 and 3 both provided a good overall user experience, but in different ways. While Banner 1 scored clearly better in perspicuity and efficiency, Banner 3 was perceived as slightly better in its dependability, and clearly better in the feeling of control it provided. The scores for perspicuity, efficiency, dependability, and feeling of control were good for both, but they still resulted in some frustration. While the two banners resulted in less frustration than Banner 2, the frustration score for both was still slightly over three out of five, with five being the most amount of frustration.

5.2.3 Insights from open-ended questions

After rating each banner there was an open-ended question where respondents could explain their answers in more detail. This text box was also present after the last question, where participants had to choose the banner which they thought provided the best user experience overall. As the rating of the banners was done using the scales presented in the previous chapter, the aim of the open-ended questions was to reveal any additional meaningful information that the respondents could not communicate by only giving ratings.

The open-ended questions gathered surprisingly many and surprisingly detailed answers. The relatively high response rate to the open-ended questions and the amount of detail in the responses also indicate that the user experience of cookie banners does matter, as it generated emotions and opinions that people wanted to share despite not being required. TABLE 5 Answers to open-ended questions Table 5 shows the number of answers to each open-ended question.

TABLE 5 Answers to open-ended questions

Question	Number of answers	Percentage of respondents
Rate Banner 1	58	30.4%
Rate Banner 2	54	28.3%
Rate Banner 3	51	26.7%
Choose the best banner	72	37.7%

As can be seen from the table, the fixed order of the banners most likely impacted the answers, since the number of answers declined with each of the pages showing one banner. In addition, more answers about cookie banners in general were found in the answers related to Banner 1, since that page had the first open-ended question where respondents could express their thoughts in more detail.

The general inductive approach by Thomas (2006) was applied to analyze the text data and develop categories for reoccurring themes. It is a simple and easily used approach with a main goal of creating around three to eight categories that summarize the data and conveys its key themes. As the aim was to identify the themes that were mentioned the most in an easy and fast way, the general inductive approach was seen as a fitting solution. According to Thomas (2006), the five steps of inductive analysis are:

1. Preparation of the data
2. Reading the text closely
3. Creating categories
4. Overlapping coding and uncoded text
5. Continuous revision of categories

First, the text data was exported into a spreadsheet, but no further “cleaning” was needed as the format was the same for all answers. Next, the answers to each question were read closely to gain a general understanding of the data and its main themes. The answers were then read through again, and new categories were created each time a new relevant theme emerged. Some answers included several themes fitting into more than one category, and some parts or even full answers were left uncoded as they were deemed irrelevant for the purpose of the study. Finally, the answers were read through again, and some

categories were merged resulting in four to five categories per cookie banner. In addition, comments that represented the general tone of the answers were highlighted so they could be presented with the findings to enhance transparency.

The main comment categories that emerged regarding Banner 1 can be seen in table 6. From the 58 comments regarding Banner 1, 10 were excluded as they did not provide any meaningful or relevant information, or the respondent had misunderstood something about cookie banners. Many of the comments emphasized that Banner 1 is the best option of the three, and that it is clear and efficient. On the other hand, respondents also perceived it as frustrating or annoying, and mentioned the lack of information and more detailed cookie choices in the banner. However, comments about frustration were aimed more towards cookie banners in general than Banner 1 specifically. The following comment echoed the general tone of the comments: “This the best option. But any type of cookie banner makes me feel annoyed, interrupted and irritated.”

TABLE 6 Banner 1 comments

Comment	Number of mentions
Good option	20
Clear/efficient	15
Frustrating/annoying	15
Not enough information	16
Not enough options	4

Regarding Banner 2, seven answers were excluded for the same reasons as with Banner 1. The most popular comment categories are presented in table 7. Expectedly and in line with the results presented in section 5.1, the most popular comments that emerged were related to the feeling of frustration or annoyance, and the lack of options in Banner 2. Frustration or annoyance was usually caused by the fact that there was no “reject”-button, and more options were hidden on another page. Unlike with Banner 1, this time the frustration was aimed directly at Banner 2. For example, one participant commented that “Putting deny option behind a link is frustrating and too slow to use”, whilst another one commented: “This one is bad, making me hop through extra hoops to reject cookies. Annoying as all hell.”

TABLE 7 Banner 2 comments

Comment	Number of mentions
Efficient	6
Frustrating/annoying	19
Not enough options	34
Not enough information	8
Affects image/behaviour regarding website	9

One interesting phenomenon that only emerged from the comments on Banner 2 was the fact that for some respondents, negative perceptions about a banner like Banner 2 affected their image of the website, or even their intention to use it. The following comments are clear examples of the participant's intention to not use a website that uses a banner like Banner 2: "I have to go to the settings to set up my cookies... Mostly I'd just rather go to another site", "I refuse to go sites like these where they dont clearly state how to disable cookies, even though I would accept them if there would be disable button.", and "Usually page with this kind of cookie banner will get closed immediately." Some also blamed the designers for the poor design instead of just commenting on the banner. This could mean that the negative perceptions about Banner 2 had a more personal impact compared to Banners 1 and 3.

In the case of Banner 3, seven comments were excluded because of the same reasons as with the previous banners. As can be seen from table 8, the main consensus was that on the other hand Banner 3 gives you control and feels secure, but on the other hand it can be frustrating, complicated, and slow to use. People who liked the banner also often indicated that it might be confusing for other people. One respondent said: "It is practical but a bit time consuming" while another reported "I like the fact that you are in control, but I hate the fact that it is so labour intensive". Two comments also mentioned that this type of banner enhances their image of the business behind the website.

TABLE 8 Banner 3 comments

Comment	Number of mentions
Gives control/feels secure	33
Frustrating/annoying	11
Inefficient/slow	7
Confusing/complicated	11

The comments on the last page, where participants had to choose their favorite banners in terms of user experience, mostly echoed the comments on the individual banner pages. While the nature of the comments was slightly different as they compared the banners to each other, the content was mostly the same. However, one interesting view pointed out in a few comments was that the choice for the best banner can also depend on the situation. As an example, a respondent commented the following: "For site that I will use only once, the first one is best because it is fastest to click reject button. For commonly visited site the banner 3 is good."

In general, the common opinion seemed to be that cookie banners are often frustrating and annoying, but that a banner like Banner 1 or Banner 3 can be the "least bad one". While many respondents indicated a lack of motivation to spend time reading about cookies, they also thought the banners were missing information, which causes a dilemma. Some respondents also thought that rejecting cookies would also reject the ones that are strictly necessary for the site

to work as intended, which is not the case as businesses are not required to acquire user consent to use these cookies.

5.2.4 Impacts and relationships of independent variables

Mann-Whitney U tests were conducted to reveal the potential effects of the independent variables on the participants' perceptions of the user experience of the cookie banners. The test revealed that female participants compared to male participants considered Banner 2 to be more dependable ($U = 3141, p = .025, d = 0.33$) and less frustrating ($U = 3083.5, p = .015, d = 0.37$). Other statistically significant results regarding the user experience perceptions of the banners were not found based on gender.

Another test was conducted to see if there is a relationship between the gender of the participants and their understanding of cookies as well as how important online privacy is to them. The test did indeed reveal statistically significant results, as female participants had a lower understanding of cookies than male participants ($U = 2091, p < .001, d = 0.89$), and considered online privacy to be less important ($U = 3225.5, p = .027, d = 0.38$). However, it is important to note that the gender distribution of the participants was uneven, and other factors not included in the survey might have affected the results.

To study the impacts of the participants' age, the answers were divided into two: people under the age of 30 and people 30 years old and over. The only statistically significant results were that people under the age of 30 compared to the older group rated Banner 1 better in its perspicuity ($U = 2895, p = .008, d = 0.48$) and efficiency ($U = 3062.5, p = .030, d = 0.36$).

The answers to the questions about the participants' understanding of cookies and perceived importance of privacy (ranging from 1 to 5) were recoded into two groups based on the distribution of the answers. Regarding the understanding of cookies, answers 1-3 were recoded into one group, and answers 4-5 into another. For the perceived importance of privacy, answers 1-4 were separated from answers of 5. These two groups from both questions were then compared to each sum variable for each banner (15 in total).

Respondents with a better understanding of cookies considered Banner 2 less dependable than people with less understanding about cookies ($U = 3735.5, p = .035, d = 0.30$). Respondents with better understanding of cookies were also more frustrated about Banner 2 ($U = 2924, p < .001, d = 0.56$) and interestingly also Banner 3 ($U = 3543.5, p = .009, d = 0.40$). The remaining 12 relationships to sum variables did not provide any statistically significant differences between the two groups.

The results also showed that the perceived importance of online privacy affected the participants' perceptions of all five user experience dimensions regarding Banner 2. People who strongly agreed that online privacy is important to them rated Banner 2 worse in its perspicuity ($U = 3639, p = .040, d = 0.35$), efficiency ($U = 3133, p = .001, d = 0.51$), and dependability ($U = 2986.5, p < .001, d = 0.57$) compared to people who did not consider online privacy to be that im-

portant to them. They also felt that Banner 2 is more frustrating ($U = 3112, p = .001, d = 0.40$) and provides less control ($U = 3016, p < .001, d = 0.52$) than the other group. Regarding Banners 1 and 3, the tests did not reveal any statistically meaningful relationships.

6 DISCUSSION AND CONCLUSIONS

In this study cookie banners were looked at from the user-perspective. The aim was to use literature and empirical research methods to find out which type of legitimate cookie banner or banners provide the best user experience. The idea was also that studying this main method that businesses use to communicate privacy practices and acquire user content can have further implications on the topic on a wider scale. To recap, the research questions of the study were the following:

1. What types of cookie banners are legitimate?
2. What type of legitimate cookie banner or banners provide the best user experience?

To answer the first research question, the second chapter of this paper explored the concept of cookies and the legislations regarding them via relevant literature and legal documents. Cookies can be classified in several ways, but the most relevant way for this study is to look at their purpose. According to Koch (n.d.), cookies can be divided into strictly necessary, preferences, statistics, and marketing cookies. Strictly necessary cookies can be used without user consent, as they are needed to make the website work as intended. The other types of cookies are non-necessary cookies and require websites to inform their users about the cookie usage.

Before websites can install cookies, an affirmative act is required from the user (Trevisan et al., 2019), which is usually acquired via a cookie banner that pops up when the user first visits the website. Websites also need to give their users a way to reject the non-necessary cookies and cannot require users to accept cookies to access certain content (Sanchez-Rola et al., 2019). To conclude, a legitimate cookie banner must:

- inform users about the way the website uses cookies
- offer users a way to opt into the cookie usage
- offer users a way to reject the cookies

To get a better understanding of what types of cookie banners are generally used, and analysis was conducted looking at the top 100 websites in Europe. The results showed that three types of banners are commonly used, which were named Banner 1, Banner 2, and Banner 3 in this study. Banner 1 offers a simple choice between accepting and rejecting cookies, and usually a link to more information. Banner 2 also offers the option to accept the cookies, but if the user wants to reject the cookies, they must click on a link leading to another page, where they usually have the option to reject the cookies or adjust the settings in more details. Banner 3 offers these advanced settings straight in the banner, so users can choose which type of cookies to accept or reject without navigating to another page.

Of the websites studied, 20% used banners with implied consent, as the banners stated that cookies will be used if the user continues using the website. As this does not require an affirmative act from the user, these banners were not legitimate. This many companies using a non-legitimate banner can mean that they are not aware or do not care about legislations and might want to acquire as much user data as possible even with ways that are non-legitimate or “in the gray area”. The author suspects the latter. Some of the previous studies showed an even higher percentage of websites that did not follow legislations. For example, a study by Leenes and Kosta (2015) revealed that 87% of the visited websites did not use a legitimate cookie banner, whereas in a study by Trevisan and others (2019) almost half of the visited websites installed cookies before acquiring user consent. While 20% means that there is a clear drop from the results of studies from previous years, the author argues that the number is still way too high, and more transparency is needed.

The simplified answer to the second research question is that Banner 3 provides the best user experience, as over 50% of the respondents chose it as the best option. However, Banners 1 and 3 were both rated well, just in different aspects. Banner 3 provided the best dependability and feeling of control, whereas Banner 1 was rated high in its perspicuity and efficiency. While more people chose Banner 3 as the best option, Banner 1 received more positive comments via the open-ended questions. Therefore, from the user-perspective, websites with users who emphasize trust and want control over their privacy should use a banner like Banner 3. On the other hand, if your users want to have a clear and fast way to deal with cookies, you should use a banner like Banner 1.

When selecting a banner like Banner 1, websites should make sure to include information about strictly necessary cookies being used even if the user rejects cookies. Another solution could be changing the options from “Accept” and “Reject” to “Accept all cookies” and “Use only necessary cookies”. Figure 17 shows a great example of a cookie banner on the website of a Finnish company called Loupedeck (Loupedeck, n.d.), that includes these choices and has enough information while not being too long. The study also revealed the dilemma that people want enough information and options in the cookie banner, but at the same time are not ready to spend much time reading the information

on it. This finding is line with the hypothesis by van Bavel and Rodríguez-Priego (2016), according to which longer texts in a cookie banner might make it less effective, as seen in their study where fewer people clicked on the link on a banner with a longer text.

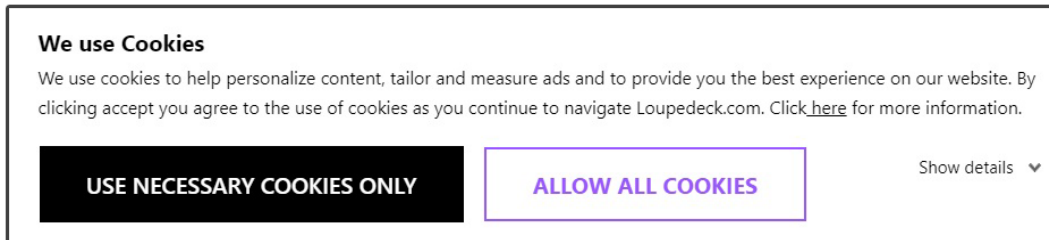


Figure 17 Example of a good cookie banner solution (Loupedeck, 2021)

One potential solution to the dilemma presented above would be a cookie banner like the one on the website of the University of Jyväskylä (University of Jyväskylä, 2021), which is presented in figure 18. It offers more options than a regular cookie banner, while keeping the banner simple and not too obstructive. If the user wants to read more about the cookies used, they can click on the button on the bottom of the banner to reveal more information while staying on the same page.

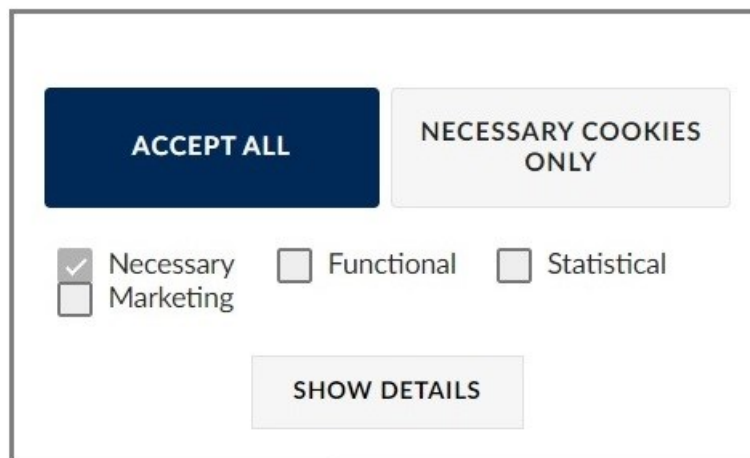


Figure 18 Another example of a good cookie banner solution (University of Jyväskylä, 2021)

If one simply thinks about user experience, websites should never use a banner like Banner 2, that does not offer an option to reject cookies straight from the banner. From the three cookie banners in the study, it clearly offered the worst user experience. However, this type of banner can lead to the most amount of people accepting the cookies, as people are usually impatient, and if there is no clear and fast way to reject the cookies, they might accept them just to get rid of the banner. This hypothesis is in line with the fact that a banner like Banner 2 is clearly the most used cookie banner. Many studies have also shown that people do not care about privacy as much as they say they do (Barth & De Jong, 2017).

Businesses might emphasize larger amounts of user data over their users' experience, as they do not see a cookie banner affecting the experience that much. Another possibility is that businesses are not aware of the bad user experience, or how it can affect the user's image of the company. However, the study revealed that for some people, the bad user experience resulting from the lack of a reject-button in the cookie banner affected their image of the website negatively, even to the point in which they would not use the website at all. There were also two cases, where the additional choices in a cookie banner created trust between the participant and the website. While the magnitude of these effects of a cookie banner on the users' perceptions of the website is unclear, businesses still face a dilemma: more user data versus better user experience.

The background factors of the participants mainly affected their perceptions of Banner 2. People with better understanding of cookies considered Banner 2 to be less dependable and more frustrating than people with less knowledge about cookies. This makes sense, since if you understand how cookies track your information, it might be frustrating to not have a fast and dependable option to reject them. Moreover, people who considered online privacy important perceived Banner 2 worse in all aspects of user experience. Therefore, a banner like Banner 2 should be steered clear of especially by websites with technology-oriented users who care about their privacy.

The reliability of the survey can be considered quite good, as the internal reliability of the sum variables was proven to be at a great level. For all five sum variables that were created, questions regarding the same dimension of user experience proved to produce consistent answers. In addition, the well-studied and widely used User Experience Questionnaire (UEQ) by Laugwitz and others (2008) was used as a basis for the questions, which gave the questionnaire a solid foundation.

The limitations of the study were mainly related to the generalizability of the results. While a fairly good number of responses was achieved ($N = 191$), it can still be considered small when trying to generalize the results to everyone in the world who uses European websites. The participants also represented a very specific group of people, as most of them were young males with a good understanding of cookies who considered online privacy very important. These background factors mainly affected the respondent's perceptions of Banner 2. Therefore, a more balanced group of participants would likely bridge the gap between the user experience of Banner 2 compared to the other two banners.

On the other hand, the survey was in English and included terms that are not necessarily fully easy to understand, and only a few of the respondents were native English-speakers. The language of the survey might have also affected the response-rate and responses of older people, since the survey was mainly distributed in Finland. As social-cultural factors can affect people's perception of user experience as a concept (Law et al., 2009; Rajanen et al., 2017), over 90% of the respondents being Finnish might have also played a role in the answers.

In addition, the order in which the banners were shown could have influenced how respondents perceived them. As their order could not be randomized, Banner 1 was always shown first, and Banner 3 last. To mitigate the impact of the order of the banners, they were all shown together on the first page of the survey. The differences between cookie banners viewed on desktop versus banner viewed on mobile devices were also not studied.

The study resulted in some interesting implications for future research. While the topic of the study might have seemed very specific and cookie banners might not be the solution used for several years to come, communication between businesses and customers about privacy will likely be even more relevant and receive more attention in the future. The results showed that the user experience between the different banners did clearly vary and that it might affect the image that users have about specific websites, or even their intention to use them. Therefore, it makes a difference how companies communicate privacy practices and acquire user content for data collection.

The author encourages future studies to look at this communication between businesses and users on a wider scale, and how different socio-cultural factors can impact this. Another interesting topic would be to look in more detail at how these practices affect users' perceptions of the website and the business behind it. As information is more and more available and people are starting to take privacy more seriously, businesses might even find transparency to be a competitive advantage. However, enhancing the user experience for website users is valuable already in itself.

7 SUMMARY

This study was motivated by the observation that several different cookie banners are used across the web, but no common agreement seems to exist on what choices the banner should offer its users. Different cookie banners include different choices and different amounts of information, and surprisingly many of them still do not follow legislations completely. In addition, little research existed regarding cookie banners in general, their user experience, and how it could affect user perceptions and their intentions to use websites. Therefore, the main aim of the study was to find out what type of generally used legitimate cookie banner or banners offer the best user experience.

Previous literature was used to define the concepts of cookies and user experience, and legal documents along with literature were used to set clear guidelines for cookie banners that follow current legislations. An analysis of the top European websites was conducted to reveal the most used cookie banners. The analysis resulted in three types of cookie banners, which were named Banner 1, Banner 2, and Banner 3. Banner 1 provides a simple choice between accepting and rejecting cookies, whereas Banner 2 requires the user to click on a link to reject cookies on a separate page. Banner 3 provides more detailed cookie settings straight in the banner without the need to navigate to another page.

A survey was used to compare the user experience of these three types of cookie banners and gain other meaningful insights. Images were created to represent each banner type, which were then presented to participants followed by a set of attribute pairs and Likert-scale questions to evaluate the user experience of each. In the last page of the questionnaire, participants were asked to choose their favorite banner in terms of user experience. The questionnaire also included open-ended questions where participants could explain their answers in more detail.

The survey revealed that from the user-perspective, websites should always use a banner like Banner 1 or Banner 3 depending on their users. Banner 1 is the best choice for websites with visitors who might emphasize efficiency and perspicuity, whereas Banner 3 provides a better experience for people who want more control over their privacy settings. Websites should never imple-

ment a banner like Banner 2, as it clearly provided the worst user experience. The study also revealed that the user experience of a cookie banner can in fact have an impact on people's perceptions of a website and even their intention to use it.

While the internal reliability of the questionnaire was on a great level, the generalizability of the study has some limitations. The group of respondents was heavily weighted towards young Finnish males with a great understanding of cookies who considered online privacy important. This might have increased the popularity of Banner 3 and decreased the popularity of Banner 2 compared to a demographically evenly split group of participants. People under the age of 19 and over the age of 40 were also represented with only a few participants. The number of respondents ($N=191$) can be seen as low if the goal is to generalize the results to all users of European websites.

The study provided interesting new insights regarding cookie banners and their user experience, which businesses can consider not only when designing their cookie banner, but also when thinking about privacy communication in general. While seemingly only a minor part of a website, the results showed that cookie banners do matter. As their user experience can affect users' behavior, the author recommends future research to study this impact in more detail. Furthermore, the effects of businesses' privacy communication on individuals' perceptions and behavior could be studied on a deeper level.

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APPENDIX 1 QUESTIONNAIRE FORM

The questionnaire form used to compare the user experience between the chosen cookie banner types.

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Cookie Banner survey

Thank you for choosing to take part in this survey!

The goal of this survey is to gain insight into differences in the user experience of three different types of web cookie banners, that work in different ways. It doesn't matter how much or little you know about cookies. The material is used for a master's thesis in the University of Jyväskylä. Answering the survey should take no longer than 5 minutes.

All answers will be collected and stored anonymously.

In the next page you are asked to answer five background questions. The following three pages include a picture of a cookie banner each followed by a series of questions. In the end you are asked to choose your favorite banner.

If you have any questions about the survey, you can contact me:

Anton Geier
anton.l.geier@student.jyu.fi

The three cookie banners are shown below, and again in the following pages where you are asked to evaluate them.

Banner 1

This site uses cookies to offer you a better browsing experience. Find out more on [how we use cookies and how you can change your settings](#).

Banner 2

This site uses cookies to offer you a better browsing experience. Find out more on [how we use cookies and how you can change your settings](#).

Accept cookies

Banner 3

This site uses cookies to offer you a better browsing experience. Find out more on [how we use cookies and how you can change your settings](#).

Necessary cookies
These cookies are necessary for the site to function correctly.

Preferences cookies
Preferences cookies enable us to remember your choices.

Statistics cookies
Statistics cookies enable us to improve our website functions.

Marketing cookies
Marketing cookies enable us to deliver you more relevant advertisement.

Save choices

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1. Gender *

- Female
- Male
- Other

2. Age *

3. Nationality *

4. Rate your understanding of cookies *

1	2	3	4	5
No	Little	Some	Good	Excellent
understanding	understanding	understanding	understanding	understanding
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Online privacy is important to me *

1	2	3	4	5
Strongly	Disagree	Neither agree	Agree	Strongly
disagree		nor disagree		agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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This type of cookie banner allows you to accept or reject all cookies with one click straight from the banner. Clicking on the link (underlined text) takes you to another page with more information and settings regarding the cookies used on the website.

This site uses cookies to offer you a better browsing experience. Find out more on [how we use cookies and how you can change your settings](#).

6. Rate the cookie banner by choosing a number from 1 to 7 between the contrasting attributes: *

	1	2	3	4	5	6	7	
Confusing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Clear
Difficult to learn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy to learn
Inefficient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Efficient
Unpredictable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Predictable
Impractical	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Practical
Cluttered	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Organized
Does not meet expectations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Meets expectations
Obstructive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Supportive
Complicated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy
Slow	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fast
Not understandable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Understandable
Not secure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Secure

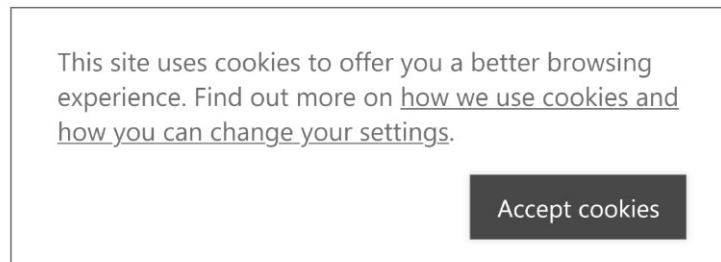
7. This type of cookie banner... *

	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly agree
makes me feel frustrated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel annoyed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel irritated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has enough information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
enables me to do what I want	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel in control over my privacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has enough options	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel interrupted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Here you can explain your answers in more detail:

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This type of cookie banner allows you to accept all cookies with one click straight from the banner. However, rejecting cookies requires you to click on the link (underlined text), which takes you to another page with more information and settings regarding the cookies used on the website.



9. Rate the cookie banner by choosing a number from 1 to 7 between the contrasting attributes: *

	1	2	3	4	5	6	7	
Obstructive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Supportive
Confusing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Clear
Complicated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy
Not understandable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Understandable
Inefficient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Efficient
Not secure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Secure
Unpredictable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Predictable
Does not meet expectations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Meets expectations
Cluttered	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Organized
Difficult to learn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy to learn
Impractical	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Practical
Slow	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fast

10. This type of cookie banner... *

	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly agree
has enough information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

has enough options	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel frustrated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel interrupted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel in control over my privacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel irritated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel annoyed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
enables me to do what I want	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Here you can explain your answers in more detail:

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This type of cookie banner allows you to choose straight from the banner which types of cookies you want to accept or reject. Clicking on the link (underlined text) takes you to another page with more information about the cookies used on the website.

This site uses cookies to offer you a better browsing experience. Find out more on [how we use cookies and how you can change your settings](#).

Necessary cookies
These cookies are necessary for the site to function correctly.

Preferences cookies
Preferences cookies enable us to remember your choices.

Statistics cookies
Statistics cookies enable us to improve our website functions.

Marketing cookies
Marketing cookies enable us to deliver you more relevant advertisement.

Save choices

12. Rate the cookie banner by choosing a number from 1 to 7 between the contrasting attributes: *

	1	2	3	4	5	6	7	
Cluttered	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Organized
Unpredictable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Predictable
Confusing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Clear
Impractical	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Practical
Does not meet expectations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Meets expectations
Not secure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Secure
Obstructive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Supportive
Inefficient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Efficient
Slow	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fast
Not understandable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Understandable
Complicated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy
Difficult to learn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy to learn

13. This type of cookie banner... *

	1 Strongly disagree	2 Disagree	3 Neither agree nor disagree	4 Agree	5 Strongly agree
makes me feel in control over my privacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has enough information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel frustrated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
enables me to do what I want	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has enough options	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel irritated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel interrupted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
makes me feel annoyed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. Here you can explain your answers in more detail:

15. In your opinion, which cookie banner provides the best overall user experience? *

- Banner 1
- Banner 2
- Banner 3

Banner 1

This site uses cookies to offer you a better browsing experience. Find out more on [how we use cookies and how you can change your settings](#).

Banner 2

This site uses cookies to offer you a better browsing experience. Find out more on [how we use cookies and how you can change your settings](#).

Banner 3

This site uses cookies to offer you a better browsing experience. Find out more on [how we use cookies and how you can change your settings](#).

Necessary cookies These cookies are necessary for the site to function correctly.	<input checked="" type="checkbox"/>
Preferences cookies Preferences cookies enable us to remember your choices.	<input type="checkbox"/>
Statistics cookies Statistics cookies enable us to improve our website functions.	<input type="checkbox"/>
Marketing cookies Marketing cookies enable us to deliver you more relevant advertisement.	<input type="checkbox"/>