

EMOTIONS OF ONLINE SHOPPING

A USABILITY STUDY OF ONLINE STORES USING EEG MEASUREMENTS

Sabrina Duda, users' delight GmbH, duda@users-delight.com

ABSTRACT

Our research study looked at two online stores in different industries - fashion and technology. Divided equally among their websites, a total of 16 men and women were searching for a product of their own choosing and completed a purchase. The subjects' brain waves were recorded as they shopped in order to provide a realistic measure of their actual experiences. In subsequent interviews, the subjects reported on these experiences by describing their impressions of the website they had visited. Using a qualitative method, we explored how users perceived the sites on an emotional level. Then we and each respective subject viewed their shopping experience, which consisted of video footage including of the site, their photo image, and EEG measurements, and the subject commented upon it. This allowed us to obtain information about the shopping experience at a deeper level without interfering with the shopping experience itself. The evaluation consisted of observations, interviews, ratings and EEG measurements.

Keywords: user experience, shopping experience, e-commerce, EEG, emotions, usability.

INTRODUCTION

This study focused on two online retailers in fashion and technology, and examined emotions expressed during actual shopping experiences by utilizing EEG measurements in the lab.

Questions:

- What happens during online shopping?
- What emotions do users experience?
- How do user emotions vary while surfing on different sites?
- What are the intersections between usability problems and emotions?

METHODOLOGY

SETTING UP THE EXPERIMENT

Zalando and Saturn were selected because both sites are well-known and offer a wide range of products and easy payment options, ensuring that users could find the products they were looking for. Zalando was found to cater to female shoppers while Saturn was considered to be preferred by men.

Women and men were equally distributed among both online retailers, with 4 women and 4 men each visiting either the fashion or technology retailer.

Table 1: Setting up the experiment

Zalando website (Fashion) www.zalando.de	Saturn website (Technology) www.saturn.de
N = 4 Women	N = 4 Women
N = 4 Men	N = 4 Men

SAMPLE

Participants in the study were an average of 39 years old (from 25 to 50) and most were employed. They had been using the internet for an average of 8 years, either daily or several times a week, and had made online purchases at least once a month or even on a weekly basis. All had used PayPal.

- User quote: "I think I am really a victim - a shopping victim, a victim of the Internet."
- Another quote from a user who has shopped online for 10 years: "It really is an addiction. I hardly go to stores anymore."

ONLINE SHOPPING EXPERIENCE

The users had shopped on Amazon and eBay the most, but Media Markt, Saturn, Conrad, Cyberport, Zalando, H&M, Zara, Baur, Bon Prix, Pizza.de, Dr Who Shop, Poster Shop, deinetorte.de, Brands for Friends, ZVAB, Prêt-a-porter, Stylebob, DealDoktor, China Gadget, my dealZ, Mr. Specs, firefind.de, and günstiger.de were also mentioned.

One user considered Amazon less cluttered than eBay. Another user said he no longer found eBay interesting because it had become too large; he liked eBay Classifieds better because they are published locally: "I need personal contact."

The users also bought large and expensive products online, such as refrigerators, bicycles, TVs, and computers, spending up to 2,800 Euros apiece. For bulky products, such as white goods, free shipping is a big plus.

PROCEDURE

After a brief introduction, the EEG device was adjusted. Following that, a pre-interview examining the online shopping experience was conducted; users indicated their favorite website, and once the website (Zalando or Saturn) had been accessed, the facilitator left the room.

The users could now select and buy a product of their choice without being disturbed. Most accomplished this in approximately 15 minutes, although one user needed 45. No time limits were imposed on participants, so as to render the shopping experience as natural as possible. For three users, the viewing and commenting segment was skipped due to time constraints. We made a point of letting users surf the internet without restrictions to enable them to select a product based on their own interests.

A special feature of this study is that users actually bought, paid and had their product delivered to their own addresses (although in two cases, delivery for pickup at the retailer was arranged). The price of the product was to be 15 Euros, which was to be reimbursed by adding the price to the participants' compensation. In many cases, the subjects purchased more expensive products.

Table 2: Study procedure

Introduction	2 min
EEG adjustment	10 min
Pre-interview	5 min
Favorite website	3 min
Online shopping	20 min
Interview	10 min
Viewing recording and commenting	30 min
Ratings	7 min
Signing off	3 min
Total	1 hr 30 min

DATA COLLECTED

Most data collected – except ratings - was observational or contained qualitative information, such as behavioral observations, pre- and post-interviews, and video commentary. The EEG device measures excitement, engagement and meditation. We have limited our interpretation to the “Current” curves, which are measured by the EEG in real time (“Long term” curves show curves in fast motion).

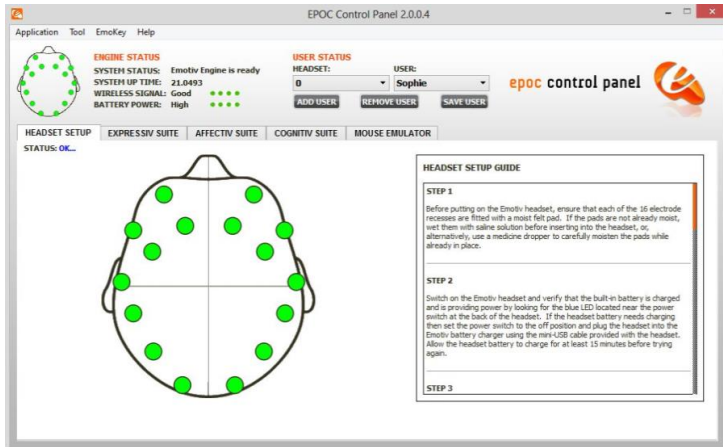


Figure 1: EPOC Control Panel

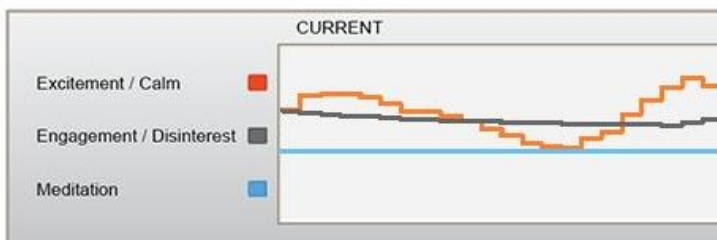
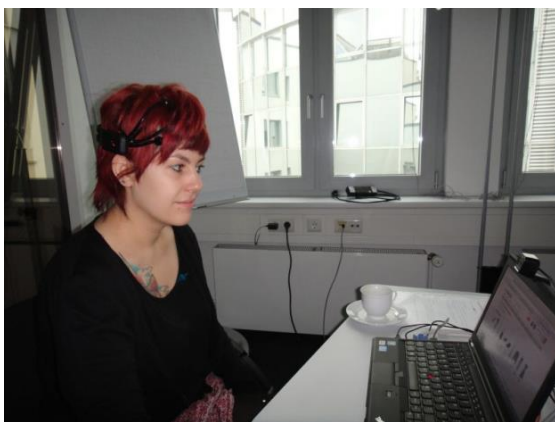


Figure 2: EEG curves showing excitement, engagement and meditation



Figures 3 and 4: User with EEG device

EVALUATION

Most data was qualitatively evaluated. As reported by M. Pike, ML. Wilson, A. Divoli, and A. Medelyan in 2012 (CUES: Cognitive Usability Evaluation System), the greatest benefit of EEG data in usability studies lies in identifying EEG data patterns and matching them with “Thinking Aloud” data. In this study, however, Thinking Aloud was omitted, since EEG data was to be collected without being influenced by other cognitive activities such as verbalization. Speech, movements and other activities interfere with the EEG recording and produce disturbing artifacts.

EEG data have the great advantage of being more objective than surveys or user preference decisions. A 2013 study conducted by F. Kretschmar, D. Pleimling, J. Hosemann, S. Füssel, I. Bornkessel-Schlesewsky, and M. Schlesewsky, which compares readings from paper with those of digital media and uses EEG and eye tracking, demonstrates that actual cognitive and neural efforts do not match subjective judgments and preferences.

FINDINGS

WHAT TYPES OF PURCHASES WERE MADE?

Purchases at Saturn

Men bought 1 set of headphones (EUR 9.99), blank DVDs (EUR 9.99), 1 citrus press (EUR 34.99), and speakers (EUR 79.00). Women bought 1 USB stick (EUR 13.99), 1 curling iron (EUR 29.99), 1 book (EUR 14.99), and 2 books (EUR 19.98).

Purchases at Zalando

Men bought 1 shower curtain (EUR 13.95), 1 fitness ball and tennis racket with grip cover (EUR 17.94), 1 pair of shoes (EUR 40.95), and 1 t-shirt (EUR 15.95). Women bought 1 pair of shoes (EUR 14.95), 1 pair of shoes (EUR 36.95), 1 bag (EUR 14.95) and 1 container of face cream (EUR 32.95).

Total purchases

Overall, men spent the most money! On average, men spent more money at Saturn while women spent more at Zalando. Overall, slightly more money was spent at Saturn than at Zalando.

Table 3: Average Purchase Values

	Saturn	Zalando	Average
Men	33.49 €	22.20 €	27.85 €
Women	19.74 €	24.95 €	22.34 €
Average	26.62 €	23.57 €	

HOW MUCH TIME WAS SPENT SHOPPING?

The fastest user spent a total of 9 minutes, while the slowest took 46 minutes. The time period for product search and selection ranged from 6 minutes to 43 minutes; checkout lasted between 1 minute and 16 minutes.

The graph shows that the time for product search and selection (shopping: marked green) takes up the largest portion:

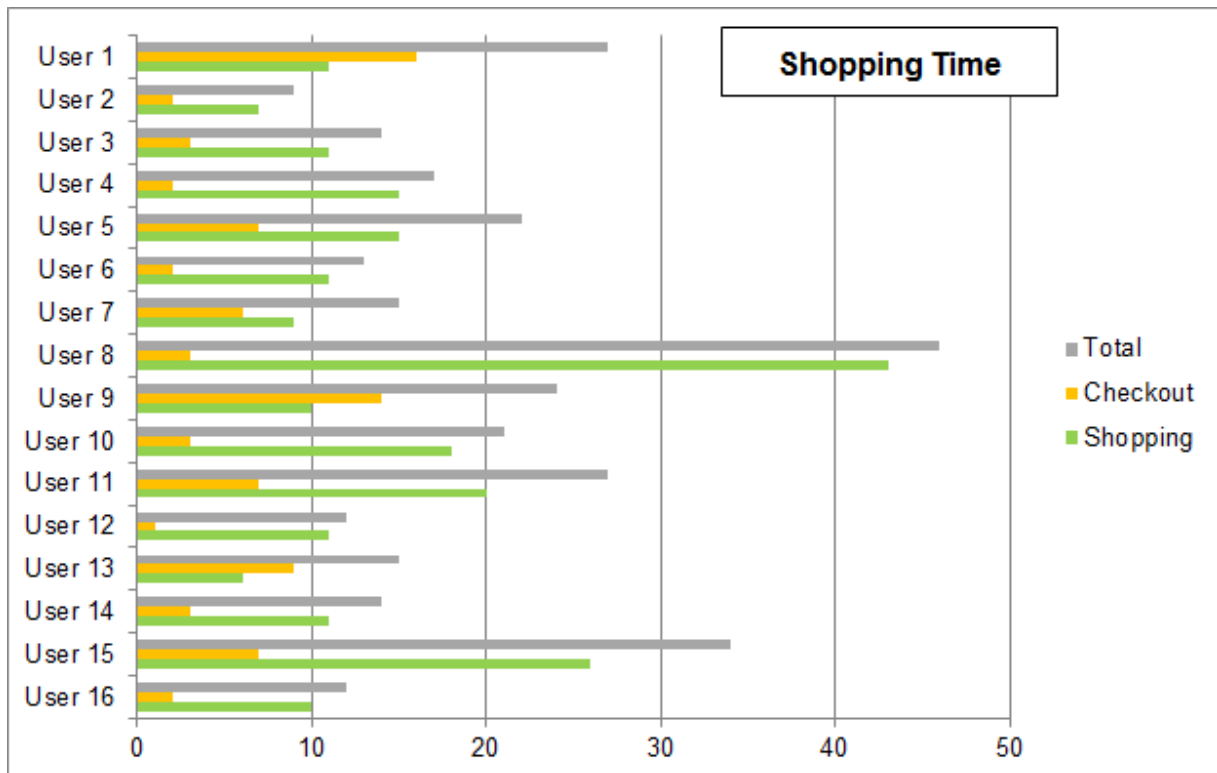


Figure 5: Shopping time

HOW DID PEOPLE RATE THEIR SHOPPING EXPERIENCE?

Personal appeal

Saturn had a polarizing effect on shoppers; Zalando seemed to appeal to both sexes.

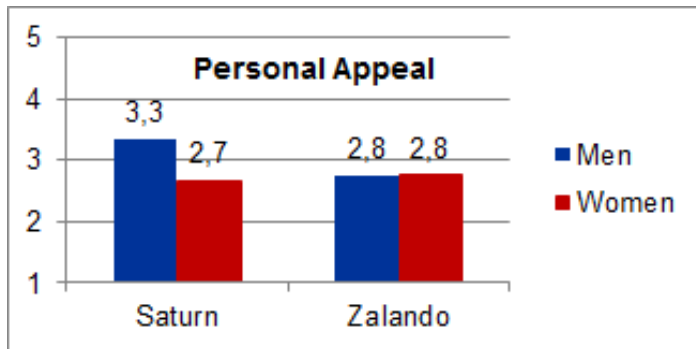


Figure 6: website's appeal (rating from 1 = none to 5 = high)

Overall appeal of online shopping

Men liked shopping at Saturn and Zalando equally well; women preferred shopping at Zalando.

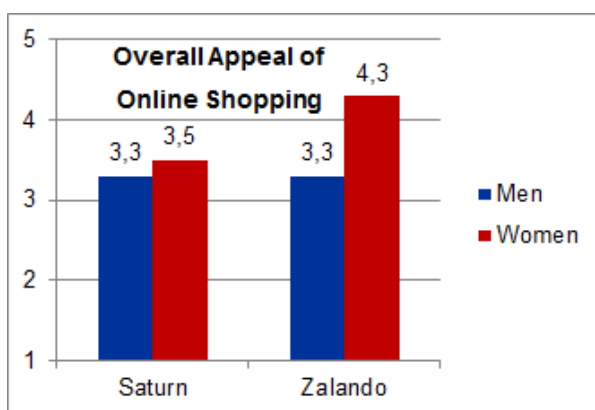


Figure 7: Overall appeal of online shopping (rating from 1 = "don't like it" to 5 = "like it very much")

Evaluation of website

Table 4: Overall evaluation UX

Overall UX	Saturn	Zalando
Men	3.33	3.13
Women	4.13	4.17

Both sites were ranked higher by women than by men. There was little difference in men's evaluation of Saturn and Zalando.

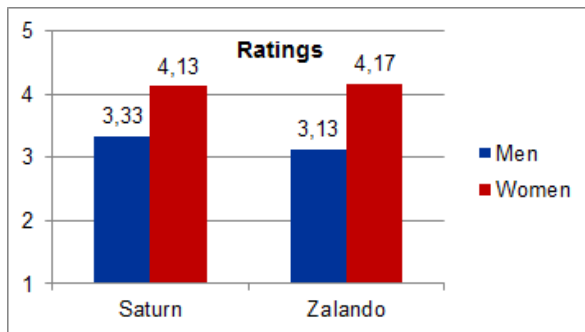


Figure 8: website evaluation (rating from 1 = very poor / very little to 5 = excellent / very much)

Ratings pertained to design, fun, confidentiality, user friendliness, product search, and ease of ordering.

WHAT IF... THIS WEBSITE WERE A PERSON

This method worked remarkably well. All participants except one developed vivid impressions of this person's personality. This method helps to explore the extent to which users identify with the site and its "personality," and helps to identify the audience being targeted from a user perspective. If the "website person" is described as less than likeable, this means the website has little appeal for users. If users describe the "website person" as very different from themselves, this indicates that users are emotionally detached from the website. It is assumed that users are more likely to shop on websites, or are more likely to have a positive shopping experience, if the site is perceived as having a likeable personality that is somewhat similar to theirs. In short, this method examines the emotional impact of websites.

Saturn

The Saturn "person" would be male, named Tim, Jens or Dennis, in his mid-30s, wear casual business attire with a jacket, blue shirt and sneakers, have a salesman's or manager's personality, be athletic, technologically adept, slightly superficial but likeable with an interest in technology and travel, drive a sports car, have a very large circle of friends, and be trustworthy but also under stress from being overworked.



Figure 9: Saturn website as a person

Zalando

Some users felt that, as a "person," the Zalando website lacked personality. In their mind, this person would be conservative, without strong opinions, moderately dressed, semi-trendy, and either a woman or a man.

One female user saw the Zalando website as a woman named Helga in her mid-30s, fashion-conscious but not a leader, and dressed rather conventionally. While she is nice and helpful, she's also a bit pushy. She's rather conventional, without much personality of her own. Helga is a housewife and doesn't work. She started throwing Tupperware parties out of boredom, and now her hobby is selling. Helga lives in a Berlin suburb or in Bottrop.

Another user envisions the website as an unlikeable woman named Emma in a flowery dress, aged between 60 and 70, who "doesn't keep up with the times and always complicates things."

One user sees Zalando as a man in his mid- to late 30s, and rather likeable with casual business attire.



Figure 10: Zalando website as a person

CONCLUSION

Saturn should make its website more "feminine," since it offers many products for women, many of whom perceive the site as unattractive ("masculine, unlike me"). This applies more to the website than the actual store.

Interestingly, not all users perceived the Zalando website as clearly feminine. This is appropriate if Zalando's target group is not to be confined to women but should address women and men alike. The website's design slightly resembles that of Amazon, which is also perceived as "gender neutral," as it

were. Beyond that, the site could use a little “pizzazz” to more closely match other advertising media (TV commercials). Some users expressed surprise that the site’s style was so different from that of TV commercials.

SELECTED SHOPPING EXPERIENCE

Below, we present an example of a shopping experience (each of the 16 users had their own story, but due to limited space, only the summarized results are presented below).

Emotional Shopper

This user shopped for approximately 12 minutes, spending 10 minutes on selecting products and 2 minutes on the checkout process:

First, she looks at bags under “Accessories.” She likes the cosmetic bag: “I saw something colorful; I really love colorful stuff. I really liked it and thought about it for a moment. But then I thought to myself that I really don’t need it.” Sharp deflections on the excitement curve indicate she really did like the bag:

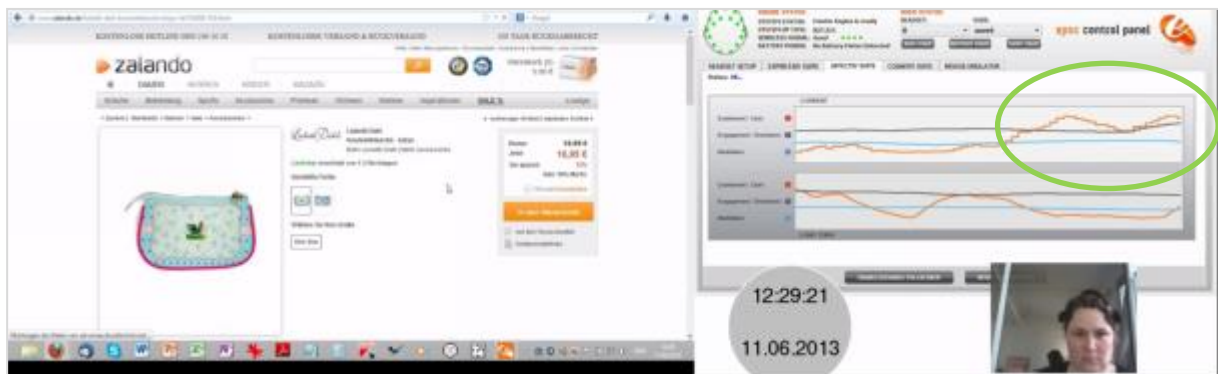


Figure 11: Zalando user: likes bag

User looks at a pair of sunglasses: “Thinking they are normal glasses, I increase the size of the image and immediately get stars in my eyes - great!” She opens a new tab to put the sunglasses in the shopping cart for a possible purchase. She looks at several other products in detail; whenever she really likes something, her excitement rises:

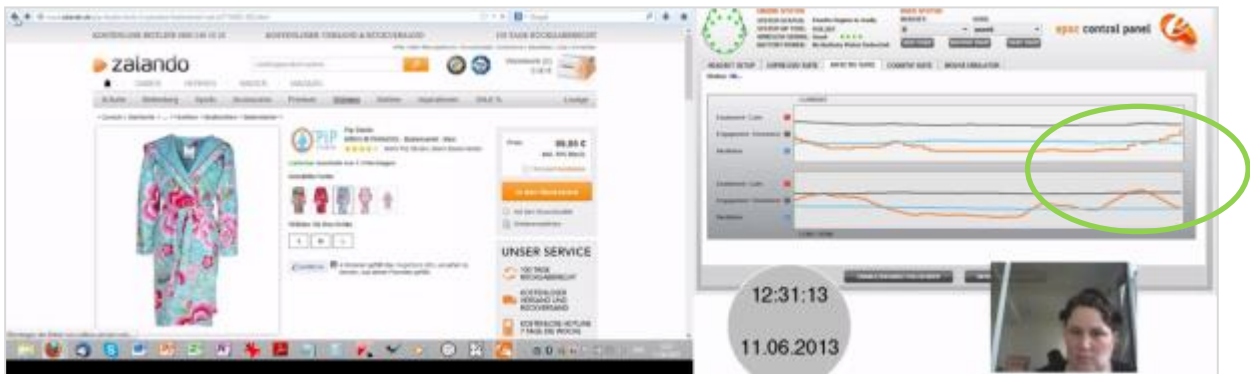


Figure 12: Zalando user: likes the morning gown



Figure 13: Zalando user: likes tea lights

She looks around in the clothing category, noticing the sizes. Up to this point, her excitement has been limited. In the beauty section, she looks in vain for a perfume. When she returns to the accessories, she says: "Somehow, I am intrigued by accessories [...] because that's where ... [...] you get the most inspiration." She finds the price filter and puts in a price limit:

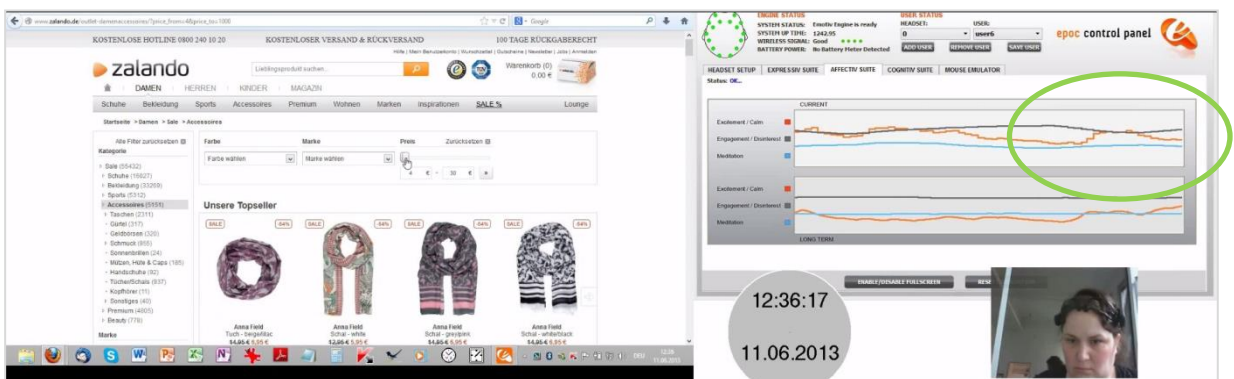


Figure 14: Zalando user: price filter

She is now looking at bags again, and after a while she discovers the Adidas shoulder bag:

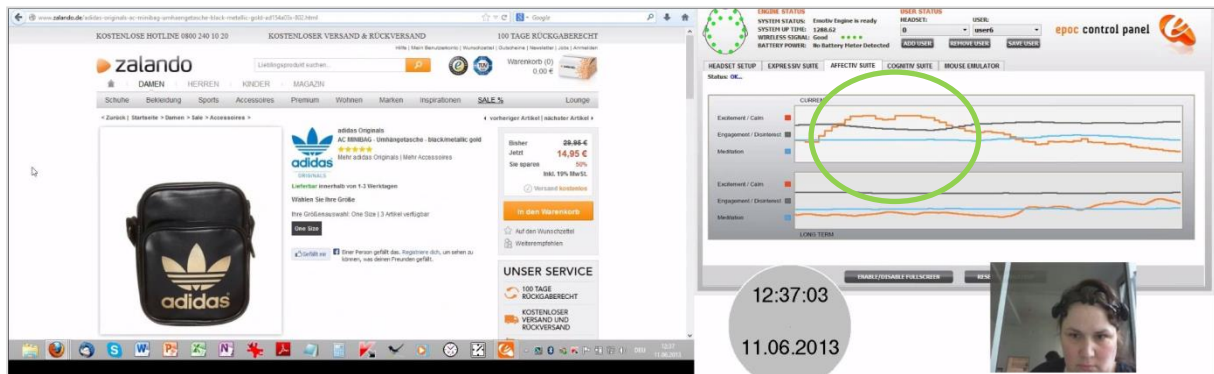


Figure 15: Zalando user: purchase decision

She looks shortly at the image in detail and says, "I'll take it." She buys an Adidas Originals AC Minibag shoulder bag, black / metallic gold, for EUR 14.95. She made a quick decision and is happy about the order:

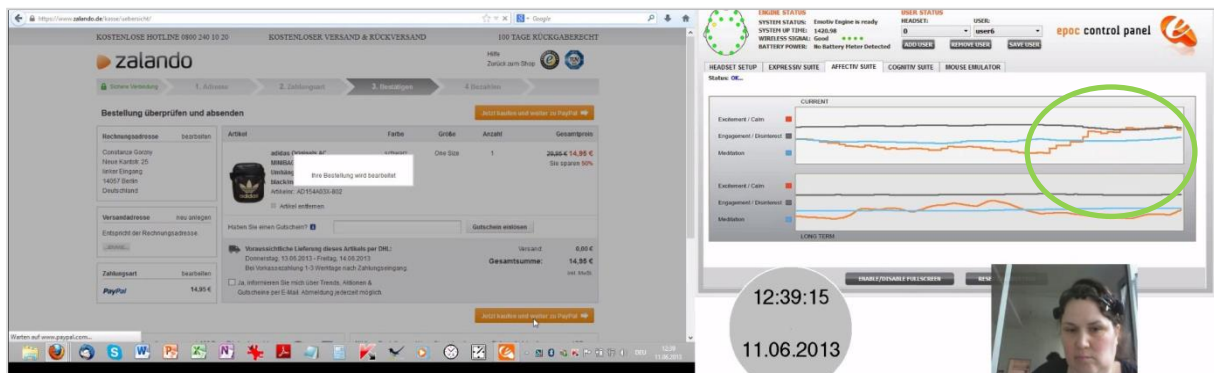


Figure 16: Zalando user: making a purchase

When asked how she feels about her purchase, she says, "Great, I've got a new bag, yeah!" She looks forward to the delivery. "I'm excited to see how it looks in real life." She says she experienced a burst of joy when she discovered the bag: "Had a feeling of 'yes, that's the one.'"

The user comments: "Internet orders are such a primordial matter - you get packages. Kids love packages." She explains that packages are like presents; she orders all the birthday presents for herself and her daughter over the Internet and lets them sit in the middle of the room, waiting 4 weeks to open them.

USER CRITIQUE AND USABILITY PROBLEMS

Saturn

Not everyone felt that the design of Saturn’s website was appealing; some thought it was cold. In addition, product presentation was criticized as being cluttered (too many distractions). People expressed a need for better sorting and filtering options.

Most problems occurred when registering. There were complaints across the board about being forced to register with a site, and filling out the form was also problematic (awkward arrangement of fields, lack of clarity regarding which fields were optional, etc.). One user was very irritated about the fact that shipping costs were displayed even if the pickup option was selected, and some users had trouble entering a password or had issues with the PayPal login.

The user below is generally quite relaxed and has no major excitement deflections except when registering:

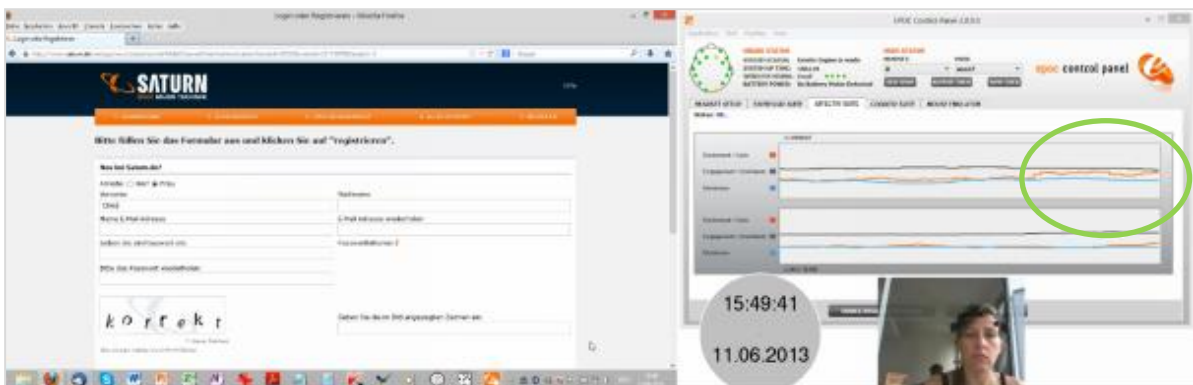


Figure 17: User registering at Saturn

As this user encounters usability problems when entering the address, the curve rises:

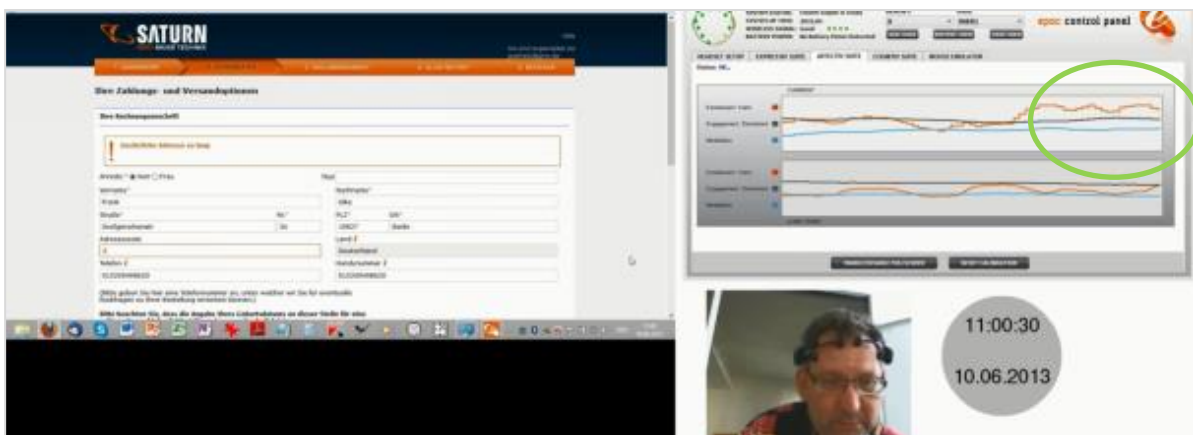


Figure 18: User entering an address at Saturn

When the PayPal logo was not immediately clickable as a payment method, the user's stress level rose:

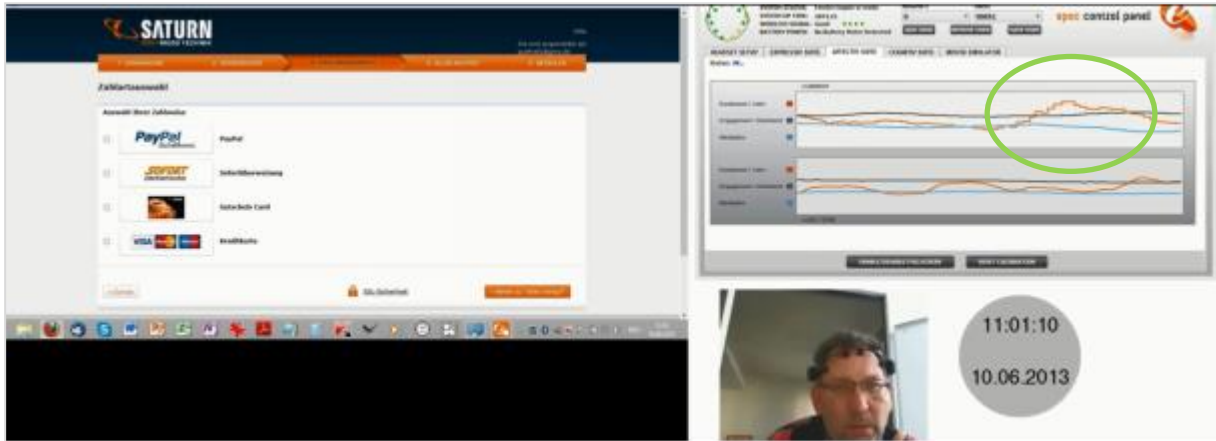


Figure 19: Saturn user selecting the payment method

This user experiences stress when encountering problems with email input at PayPal:

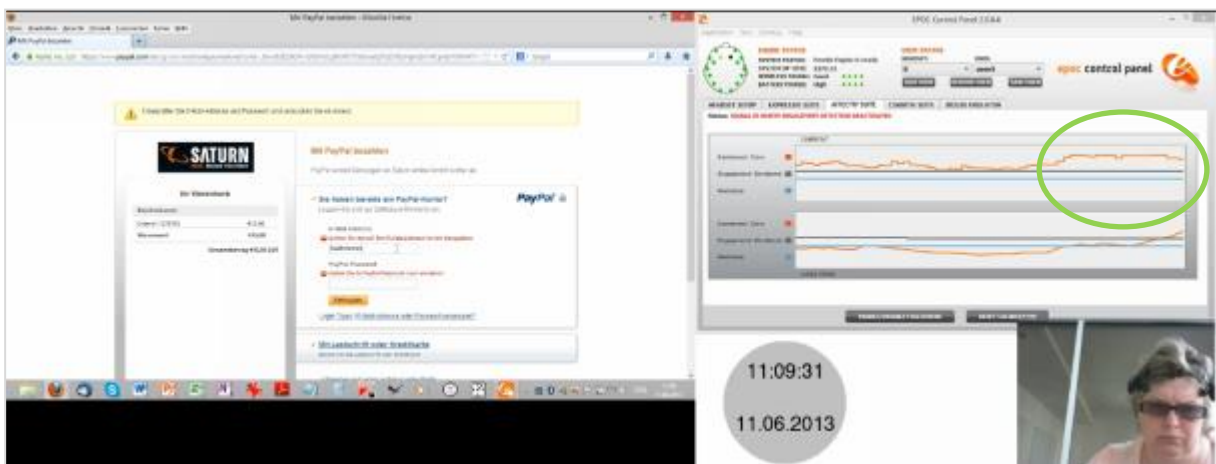


Figure 20: User at Saturn: PayPal

This user checks on Idealo reviews at the Saturn website, which keeps him occupied.



Figure 21: User at Idealo

Zalando

The design of the Zalando website was not subject to much criticism; its users noted that it differed in style from its advertisements, if at all. One user complained that the top-selling products took up too much space. One female user wanted to see images of the products being worn. That being said, users did perceive the search process as difficult. One user, for instance, complained that the shopping cart and list were not easy to find, that filter settings were not easy to manage, and that filters switched back to the default setting too quickly. Zalando's checkout process was easier to manage than Saturn's. One user experienced a problem when adding a product to the cart; and another initially failed to notice that the option "bill me" was preset for payments.

The excitement curve goes up during registration, which seems to be a stressful process for this user:

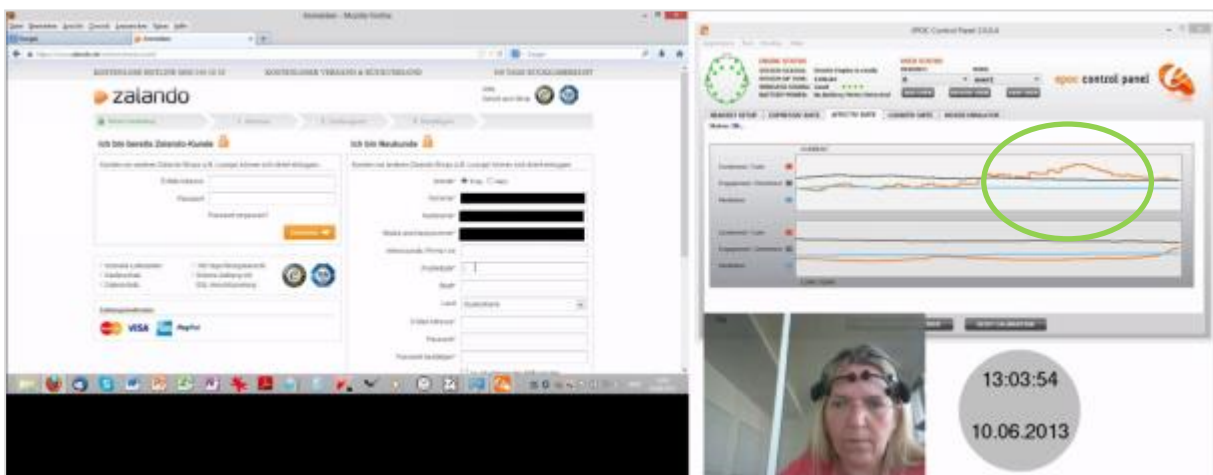


Figure 22: User at Zalando: registration

When the User wants to add a pair of shoes to the cart, the operation is prevented by a pop-up. This apparently causes some anxiety, since the curve rises at this moment:

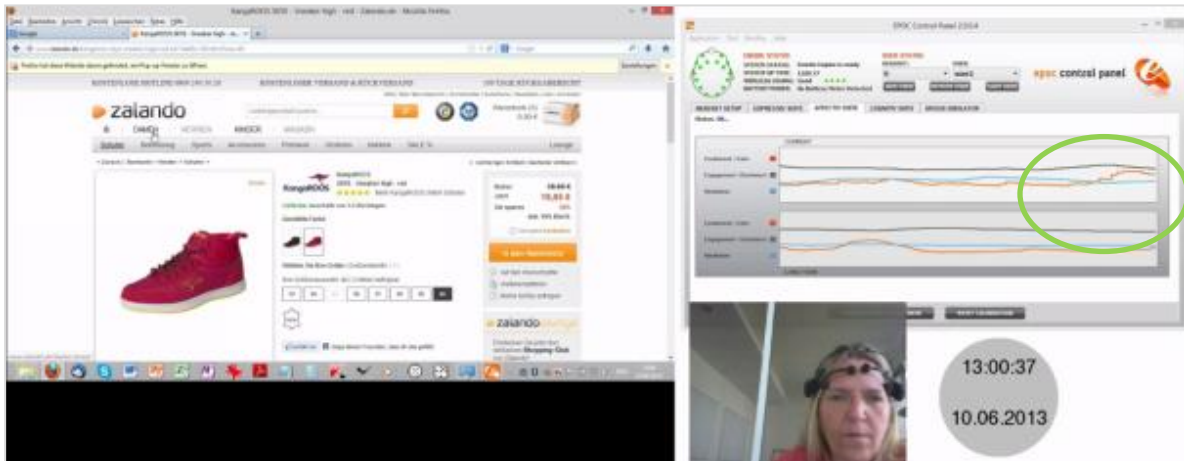


Figure 23: User at Zalando: Pop-up issue

Here, a user logs in to obtain a credit for 5 Euros; and excitement sharply rises:

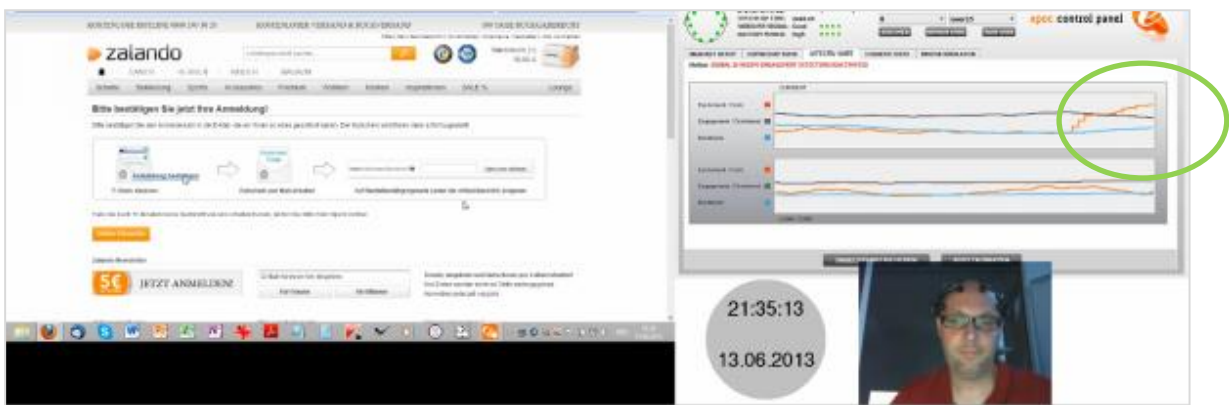


Figure 24: User at Zalando: credit

This user adds the word "hairdryer" to the search field, and two high-heeled shoes appear. Her excitement curve jumps higher than ever, since she is obviously wondering what happened.

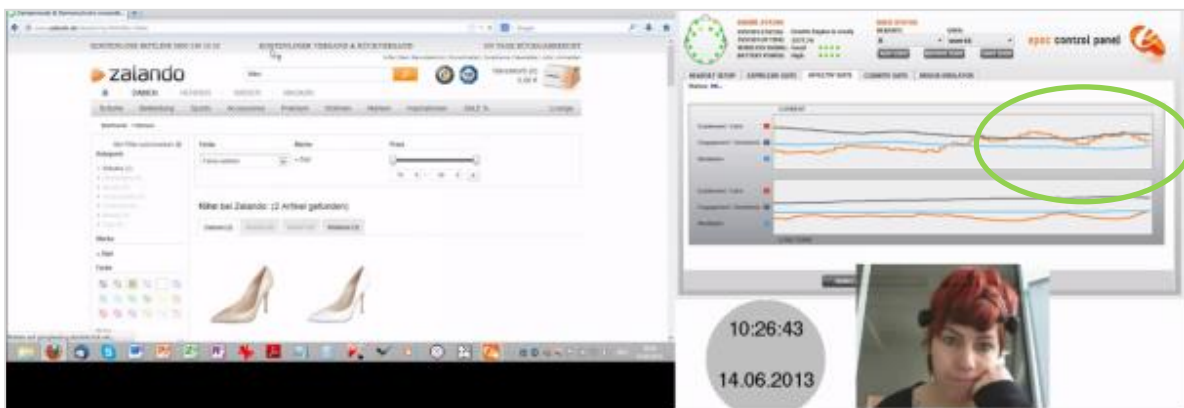


Figure 25: User at Zalando: Strange search results

CONCLUSION SHOPPING STORIES

In this study, very different types of shoppers have emerged. Emotional buyers are influenced by powerful images and messages. They also sometimes buy things they don't need, yet are happy about it. The EEG image shows exaggerated movement: any product that appeals to them will send the excitement curve sharply upward. Pragmatic shoppers, by contrast, carry out most purchases with a strong sense of purpose, by comparing and reading product reviews. These shoppers buy only what they need, and are less likely to be swayed by attractive product presentations. Their EEC images fluctuate less, and their engagement curve points upwards. They are fully engaged in the task but aren't carried away emotionally. There is also the "seasoned shopper," who navigates many products in a short amount of time. The "overwhelmed shopper" struggles with a huge selection and clicks around aimlessly. This type would benefit from a smaller product pool and support in the form of product suggestions.

The process of product search, selection and elimination challenges users, and is often more problematic than the checkout. The phenomenon of being overwhelmed by too great a product range is not limited to online shopping, and actually constitutes the very reason why some users prefer to buy online. The advantages of online shopping are that consumers can view products and read information at their leisure, and more options are available to them for selecting products and narrowing down a product range. Some users seem to be overwhelmed by the task of picking a product from a wide range. This particularly applies to purpose-driven shoppers who typically only shop when looking for something specific.

Online shopping sites would do well to offer users more support in their product search. There should be more sorting options in the form of filters or sub-categories. A price check tool by itself is a good thing, but it often fails to produce results, and is often not immediately discovered by users. Categories such as sales, news or suggestions work very well as an introduction to the page, but users are often disappointed when they discover nothing exciting there. Reviews are important for many users. They sort products based on them, and also indicate that they read them. Some users left the shopping sites to read product reviews on Google, Amazon and Idealo. One user said, "I'm always very easy to influence when it comes to user reviews."

It was striking that during the product search, a number of users repeatedly returned to the product group on the shortlist; jumping back and forth, and often eventually buying a product they had seen at the beginning. They were already fairly certain, but first wanted to quickly check something else or cover all their bases before making the final purchase. Therefore, it would be helpful for shoppers to have a kind of non-binding interim wish list of products on a shortlist next to the shopping cart, perhaps even with a marking or sorting function. Four users in this study solved this problem by opening multiple tabs and navigating in a new tab, thus saving products for possible future purchases. Some participants used documentation on products they had already reviewed to guide their additional searches.

When a user viewed a product in detail, they were very likely to buy it. Some users complained about having to register with the retailer before shopping.

RECOMMENDATIONS

- Limit product range (not too many products of one variety; more sub-categories)
- Offer more sorting functions
- Provide price filter that is easy to find and operate
- Provide reviews by other users
- Provide a kind of wish list that can be saved temporarily
- Provide access to documentation for products the user has already viewed
- Provide suggestions through categories such as “News,” “Sales,” “Ideas” or product suggestions
- Images of clothing and shoes should show the items being worn

DISCUSSION AND OUTLOOK

It was surprising that the purchase and payment process caused less trouble than expected, while the search and selection process downright overwhelmed some users. It is crucial for a good shopping experience that users find support during the decision-making process.

Methods using EEG measurements are suitable for assessing user and shopping experiences. An EEG indicates when a user gets frustrated with usability problems, as well as when a user finds a product very attractive. We uncovered a number of usability and design problems that allowed us to analyze the emotional impact of both web sites. However, the effectiveness of an EEG measuring system strongly depends on the type of user. Users can be classified as emotionally involved or more pragmatic. EEG measurements are effective regarding specific events, but are less suitable as indicators of a website’s overall usability.

Since the shopping experience varied with individual users, different shopping personalities emerged. However, the data analyzed did not allow for classification into patterns that typify either sex. There were, however, differences between the sexes regarding the prices of the products purchased and the overall assessment.

EEG measurements should always be combined with other methods, which is the only way the data can be interpreted. With regard to the EEG method, a few things should be taken into consideration:

Users should be allowed to shop online without being disturbed. Sudden physical movements, conversations and comments interfere with data collection and prevent the EEG from being interpreted in conjunction with the interaction or stimulus events of interest. For this reason, the moderator should leave the room. “Thinking Aloud” cannot be used here in real time. Interviews should always take place after EEG data are collected.

It is also crucial to provide enough time and comfort for adapting the EEG measuring system to the user. Any user should wear the device for at least 10 minutes before the actual data recording begins. Beyond that, user experience has been very positive; users indicated no problems with the EEG device, and some were even fascinated by the technology.

The EEG measures partial data that can also be collected with other neurological methods such as skin conductance or pupillometry. Skin conductance measures the arousal state of the subject using the electrical conductivity of the skin, whereas pupillometry studies the dilation of the pupil as an indicator of increased interest. Among the three measured dimensions, excitement was the most informative. However, this interpretation must be taken in context, since excitement can be found in frustration as well as joy.

Follow-up studies using larger sample sizes and different web sites would facilitate substantive investigations of differences. Due to its small sample size, the present study represents a more qualitative, exploratory study. Studies of this kind using a more open approach often lend themselves to very interesting findings. Due to the amount of evaluation effort these studies entail, the sample size must be limited.

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AUTHOR'S SHORT BIOGRAPHY

Sabrina Duda has been active in user experience research since 1998, having studied psychology with a minor in engineering psychology at Humboldt Universität in Berlin.

In 1999, Sabrina Duda founded the user and branding research agency "eye square," and has owned "users' delight," a user experience agency specializing in emotional usability, since 2012.

She is part of the organizing team "World Usability Day Berlin".



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