PhotoGrab: how probe design can discourage anti-social behavior

Exploring three theories that are meant to reduce the theft of probes and test their effectiveness.

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This study investigates three intervention methods: the gaze effect (a psychological intervention method), the use of light indicators, and the deployment of security alarms to reduce antisocial behavior towards probes placed in public open spaces. One probe representative of each intervention is deployed in a field study to measure their effectiveness as well as to see their effect on probe interaction. The methods seem overall effective in their intended form, with restraint in conducting antisocial behavior being voiced by people who decided to interact with the probes. In addition, it was noted that the lights can have, in addition to increasing security, an inviting effect while the gaze has the opposite consequence. Lastly, it can be effective to present a sense of ownership attached to the probes by giving them a less refined 'hand-made' look.

1. INTRODUCTION

Probes play a crucial role in data collection in the entire design process of Data Enabled Design (DED), which began to use on-site technical intermediaries to collect data in an early stage and explore using interactive tools, thereby engaging users in the design process (Marti, Megens, & Hummels, 2016). However, facing participants from diverse societal backgrounds, the design and deployment of probes are facing challenges. This includes the issue of probes being unable to be deployed in open spaces, as they may be stolen or destroyed. Therefore, the specific research questions this study focuses on is: how to prevent anti-social behavior against probes placed in public open spaces?

Due to the appearance of some probes indicating high value, or the economic and educational situation of some pedestrians in the probe setting area, probes in open spaces may be stolen or maliciously damaged. This can result in the loss of pre-stored data in the probe, which will have a significant negative impact on DED. In addition, anti-social behavior targeting probes will cause economic losses to the research team, leading to research stagnation. So, it is necessary to address the issue of antisocial behavior encountered by probes in open space.

The existing anti-theft measures for public facilities are mainly related to alarm systems, which mainly function in indoor scenes with nearby management personnel, monitoring facilities, or high pedestrian flow, such as cafes, libraries, or museums. However, due to the weakening of the propagation of alarm sounds in open environments, the effectiveness of alarm systems in outdoor public places still needs to be verified. Meanwhile, this project also aims to investigate the protective effects of different devices and psychological theories on probes.

This study explores the effectiveness of different measures to protect design probes from theft in an open environment by adding different attachments to probes, such as warning lights, alarms and their text warnings, watching eyes. The data produced in this study and the conclusions drawn from its analysis will provide guiding references for future probe design in open spaces, in the form of design advice.

This paper introduces the theoretical background and related work on the measures used for the design probes. Which is discussed next, explaining the design of PhotoGrab including the four types of probes and their functionality. Then, the study set-up is explained, and the findings are discussed, to come to a conclusion with design advice for future designers in the field of DED.

1.1 THEORETICAL BACKGROUND

Within the study, three existing interventions were implemented in the probe design, which has proven to reduce anti-social behavior in social settings. The effects were selected based on easy implementation in a probe design. The tested theories all use a manner to attract the attention of the user and subsequentially communicating not to take the probe away. Sensory input is the most effective way to create salience among human beings, which can be done by triggering one or multiple senses (Caduff & Timpf, 2007; Ruz & Lupiáñez, 2002).

Caduff & Trimpf (2007) defined salience as something that occurs whenever an object has features that heavily contrast with its surroundings. Living organisms, such as human beings, are warned by these kinds of features as they trigger a defensive mechanism. This causes humans to perceive an object that has a highly contrasting color compared to its surroundings, to stand out. Especially yellow and red are stimulating and cause warning signals according to a study by Elliot and Maier (2014) and prior research. To create a design probe that focuses on the sense of sight, with the purpose of warning users visually these colors are most suitable.

The second probe focused on the sense hearing. Warning sounds are an effective and widely applied method to prevent or even stop a burglary, with for example an alarm system (Buck et al., 1993). This is because a sound that is different from the sounds in its direct proximity causes people to be alarmed and pay attention. This is because a sound that is different from the sounds in its direct proximity causes people to be alarmed and pay attention. Although this sudden interruption can also influence people's activity. (Vachon et al., 2017) So, for the design probe it is suggested that a sound only occurs whenever the probe is taken too far from its original position, so that the users' activities are not hindered by the sound.

Another strategy to prevent people from showing anti-social behavior such as stealing in a public setting is the watching eyes effect (Dear et al., 2019). This theory focuses more on the psyche and affects people mentally instead of physically. To create this effect, an image of human eyes is displayed in a public space. According to Dear et al. (2019), eye cues reduce the occurrence of anti-social behavior by up to 35%. No specific research was found on the size of the image of the eyes, however, based on Dear et al. (2019) it is recommended for the design probe that the eyes are human and properly visible to the user. Another study done by Bateson et al. (2015) to prevent people from littering, suggests A4-format posters for their study but also mentions the bigger the eyes, the bigger the effect on humans.

1.2 RELATED WORKS

This chapter will focus on existing anti-theft measures and products in public places, and discuss their advantages and disadvantages, providing reference guidance for the probe design of this project.

1.2.1 The Harm of Anti-social Behavior on Probes Used in DED

When conducting a data collection activity in an open public space, antisocial behavior, such as destruction and theft of probes, causes data loss or corruption (Van Den Heuvel et al.,2020). According to Van Den Heuvel et al. (2020), stainless steel to make probes can prevent them from being damaged. However, replacing the materials of probes is not suitable for all types of probes or experiment environments. Therefore, this project will explore other measures suitable for various scenarios to prevent or reduce the negative impact of antisocial behavior towards probes.

1.2.2 Conceptual Design of Wireless Anti-Theft Alarm System

With the popularity of electronic devices such as laptops and iPads, the thefts of these items happen more frequently (Dang et al., 2015). To solve this problem, Dang and his team designed an anti-theft alarm system, which can detect stealing behaviors and assess whether they are authorized and then decide to trigger the alarm or ignore it (Dang et al., 2015). The research provides a reference for designing open space probes and verifies the feasibility of alarm effect towards anti-social behaviors. However, this system focused on the only situation where people leave their personal things in indoor public spaces such as libraries and cafes. Instead, the probes for DED are sometimes left in an outdoor space with no researcher or administrative staff near it. In different contexts, the alarm system may have different contributions or influences on antitheft, therefore it is expected to verify if the alarm would work in an unregulated outdoor environment during this project.

1.2.3 Anti-Theft Technology of Museum Cultural Relics Based on the Internet of Things

To address the theft issue in museums, an RFID anti-theft system was designed, which includes an RFID reader, an E-Tag, and an app on PC (Liu et al., 2019). The E-tag can be attached to the surface of anything to synchronize its location information in real-time and exchange the data with the RFID reader. When the location of the object exceeds the predetermined range, the RFID system will sound an alarm (Liu et al., 2019).

The RFID system provides a reference and inspiration to design a 'Tag' attached to the object for tracking it. In addition, users can also monitor the location of the object in real-time on the app, which can reduce losses when theft happens. As for the limitation, the system is only applicable to scenarios where protected objects are rarely moved. Instead, the scenarios of probes interacting with participants more frequently are more likely in public environments, and these probes are usually used at a certain distance from the original position, which may lead to a high probability of false alarms with the RFID

system. Therefore, it is necessary to adjust the predetermined range to be larger and more accurate if working with a similar system outdoors.

2. DESIGN

In order to study the effectiveness of the previously mentioned theories, it was decided to design four probes. One for each prevention method as well as a neutral control probe that served as a baseline. The shape of the probe resulted from two ideation sessions and represented a camera (see Figure 0). This shape was chosen as not only an innovative way to collect subjective data (by taking a picture of an object you like, or criticize, etcetera) but also because it encouraged users to pick the probe up to use it (an aspect present in the previous probes). In addition, a prompt was placed above the probes to encourage interaction and offer a basic explanation on their purpose (see figure 1-4).

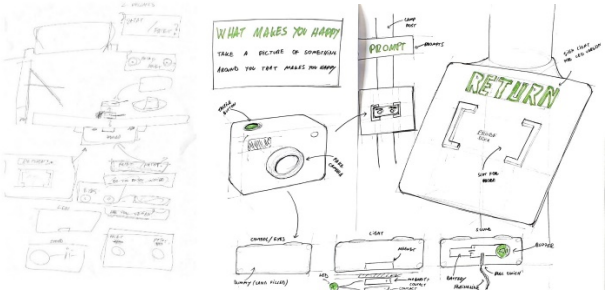

Figure 0: Ideation process and concept drawings of the PhotoGrab probe

Since the experiments would pose a significant risk of theft, the four PhotoGrab probes, while looking like cameras, had no actual photographic functionality and were designed to be as cheap as possible while still looking like a valuable object.

The bodies of the cameras were 3D printed out of PLA, fitted with a plexiglass lens and a click-button on top (see Figure 1) to offer the feeling of functionality and allow users to receive tactile feedback when "capturing" pictures. The cameras were placed on base plates, laser cut out of MDF that had "PLEASE RETURN" written on them. (See Figure 1) Depending on the functionality some of them contained basic electronics.

2.1 PhotoGrab: Control

The control probe lacked any intervention or electronics and was just represented by the 3D printed shell, acrylic lens, and tactile bush button. (See Figure 1)

Figure 1: Pictures representing the control and it's set-up.

2.2 PhotoGrab: Lights

The lights probe docking station was equipped with two colored LEDs, one red and one green. Using a pair of reed relays in the base and a magnet in the camera, when the camera was removed from the dock, the green LED would turn off and the red one on. The red light should have a warning effect as mentioned before, prompting people to return the design probe back to its initial location. When returned, the users were rewarded with the re-appearance of the green LED. (See Figure 2)

Figure 2: *Pictures representing the probe fitted with the light intervention and its set-up.*

2.3 PhotoGrab: Gaze

The gaze probe was identical to the control, except for the sign above it, that was switched with one that displayed large human eyes printed on A3 paper based on the watching eyes effect. (See Figure T3)

Figure 3: *Pictures representing the probe fitted with the gaze intervention and its set-up.*

2.4 PhotoGrab: Sound

The sound alarm probe was retrofitted with a buzzer and a switch. Pressing this switch down was a small token that was attached to the base through a cable. (See figure 4) When the token was removed the buzzer would sound an alarm until inserted back. Due to the cable having a length of around 2 meters, the probe could not be taken too far from its intended location without the alarm going off. Furthermore, warning labels were added onto the base, making the security feature clear to users and making sure the sound was not distressing to participants.

Figure 4: *Pictures representing the probe fitted with the sound alarm intervention and its set-up.*

3. STUDY SET-UP

The "sound", "control" and "light" versions of PhotoGrab were placed on a lamppost at 18 Septemberplein, Eindhoven (see Figures 1, 2 and 4) while the "gaze" version was placed in Victoriapark, Eindhoven, on different days between 14:00 and 17:00 to avoid rush-hour. All for approximately an hour per probe. Two researchers observed the probes from around 30 meters away from sight in order to not influence user behavior.

The number of passersby and the number of interacting individuals were then counted using the Counter+ app by one of the researchers. The other researcher wrote keywords down about the interaction of the individuals when they interacted with one of the PhotoGrabs. When someone picked the probe up and took a picture, they were approached by both researchers and after consent, subjected to an interview.

The participants were all healthy adults. Children and elderly or other vulnerable adults were not interviewed after they interacted with PhotoGrab. However, their interaction was counted and added to the total number of passersby and the number of interacting individuals.

This study consists of structured interviews as well as observational data collected from participants who have agreed to be interviewed and debriefed after interacting with the probe. After having them sign the consent forms which is shown in Appendix 2, the interviews were conducted, which lasted between 5-10 minutes. Using the questions that can be found in Appendix 3. The answers were then written down by the experimenter with a focus on capturing certain keywords that pertain to answering the main research question. The signed consent forms are uploaded to the Surfdrive and can be found in Appendix 5.

The first 2 questions were used to prime the participants before asking them about their interaction with the probe. Priming is used to elicit more accurate and relevant information from the participants. Regarding this study priming was used to elicit focused responses in favor of factors that pertain to the probe's design and interaction (Higgins, 1996). The following is 1 of the priming questions used:

> "Can you describe your first impressions of the probe?"

Following the priming questions, the participants were asked 3 questions regarding the probe. The questions pertained to how they used the probe and the elements that contributed to them returning said probe. To help support the goal of this study in finding the key differences between the different intervention methods used. A key element that was taken into consideration was ensuring that the questions were not leading in any way. The questions were designed to be as unbiased and neutral as possible, to be able to collect answers that are as unbiased as possible. After the participants answered the questions, the experimenters thanked them for taking the time to participate.

4. FINDINGS

4.1 Quantitative data

For the observational data, Figures 5, 6, and 7 show the results. A total of 167 passersby have looked at the probes and decided they did not want to interact with them. A total of 56 passersby stopped and read the probes' invitation poster but decided not to interact with the probes. A total of 25 passersby decided to interact with the probes. All participants of the interview were above the age of 16 years old and gave consent to use their data for this study.

Looking at the data, interaction indicates how many people stopped and read the poster or used PhotoGrab but decided not to interact with the probe. While interview percentages indicate the number of people interacted with the probe. We are using interview percentage here to indicate that these passersby were the ones of legal consent age, thus indicating that they were interviewed. The interaction percentages are 24%, 47%, 11%, and 41% for control, light, gaze, and sound respectively. The interviewed percentages are 55%, 28%, 100%, and 53% for control, light, gaze, and sound respectively. The gaze numbers will be considered outliers for this study with the reasoning discussed in the limitations.

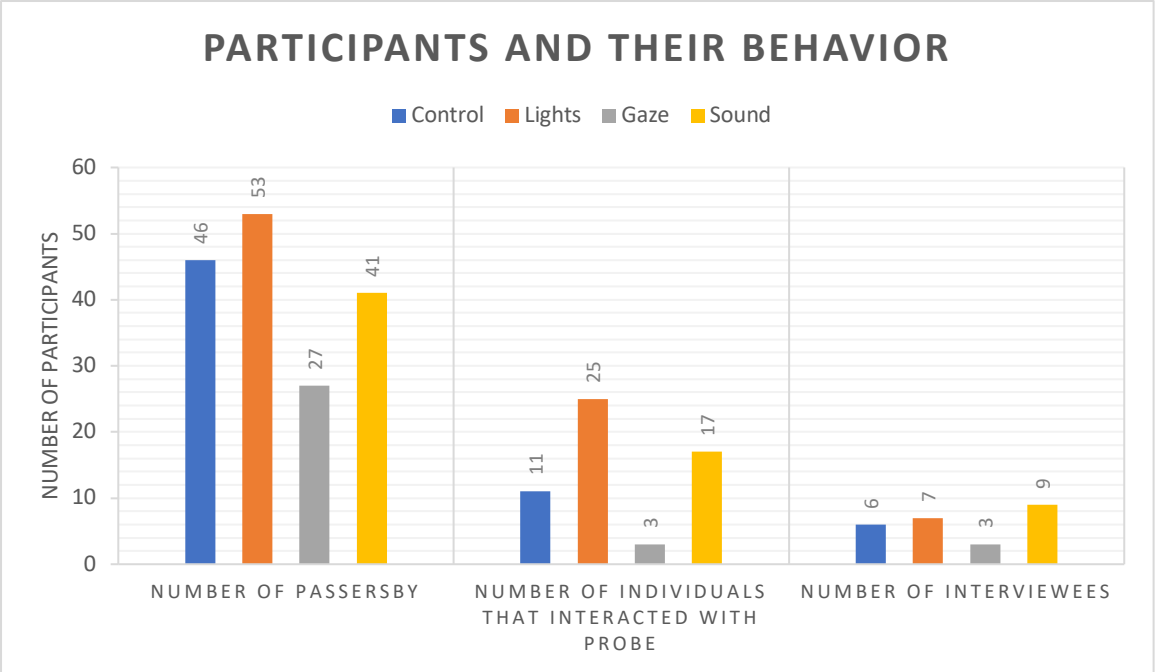

Figure 5: Quantitative observational data

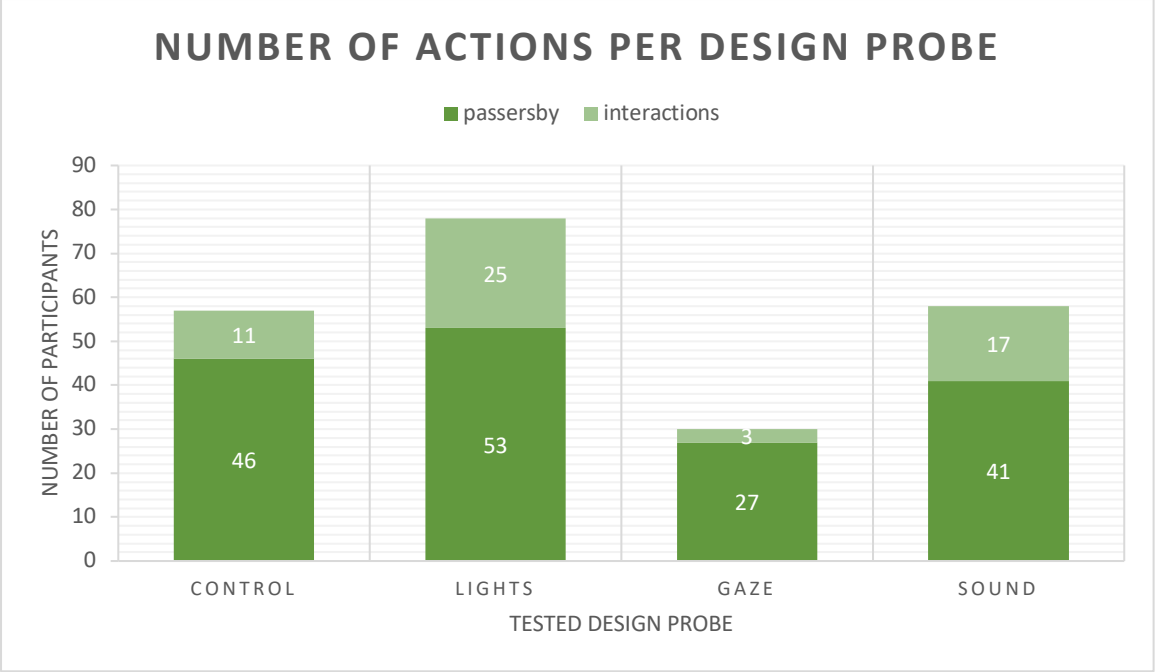

Figure 6: Number of passersby and their level of interaction with the probe

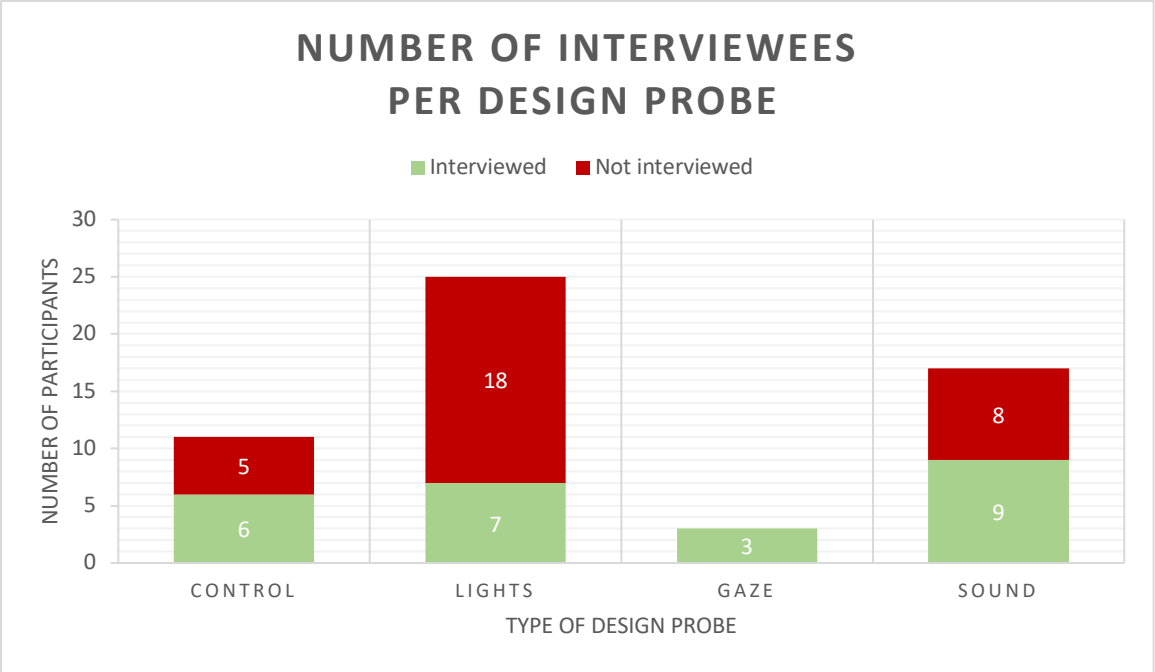

Figure 7: Number of interviewed passersby

4.2 Qualitative data

Following data collection, the data analysis is the next step. In the interviews conducted during the study (available in Appendix 6), qualitative data was generated consisting of participants to the questions made in advance. For analysis, a thematic analysis as defined by Braun & Clarke (2006) was used to generate overarching themes from the data gathered during these interviews. The interviews for all the experiments were collected and combined on a Miro board Appendix 4. This allowed multiple team members to collaborate to ensure that a consensus could be achieved on the grouping of the data collected. The following four themes were extrapolated from the data:

1. The intervention method
2. Feeling of ownership and appealing to kindness
3. The perceived value of the probe
4. The probe's form factor

A clear message was extrapolated when viewing the data regarding the intervention methods. That was a clear understanding of the presence of some form of security measure protecting the probes. There were multiple instances where the participants voiced their recognition of a security system in place. Such as:

"The red and green lights. It looked like some kind of security system" and "Attention to alarm warnings deterred me."

The feeling of ownership and appealing to kindness theme incorporates data that shows 2 different aspects. The first is the lack of perceived ownership of the probe. The data supports this notion as a lot of the participants had a reason as to why they felt a lack of ownership towards the probe. The second is the "please return" message written on the dock. Participants mentioned that this message contributed to their decision to return the probe. The following quotes are some supporting data points collected for the aforementioned theme:

"I returned it because the probe felt "homemade" rather than manufactured so I thought it would be not nice to ruin someone's work" and "it said 'please return".

The perceived value of the probe was also mentioned multiple times as a factor as to why the participants returned the probes. They mentioned that they perceived it as valueless, as a result of how "cheap" the probe looked. Indicating that the perceived value of an item is incorporated into the decision process to steal it. Some examples include:

"The camera is very light, like a toy" and "This thing is not worth money."

Finally, the probe's form factor was mentioned multiple times during the interviews. From how fun it was to use, to how it intrigued the participants and how it made the participants curious about the location and people around them. This shows

that the camera form factor attracted the participants' attention. This factor can either be viewed as a positive or negative depending on the intended use of the probe. Since targeting peoples' curiosities or intrigue could defeat the purpose of preventing anti-social behavior toward the probes. As unwanted users can also get attracted to the probes. Here are some examples:

"It was fun", "The camera was placed in a strange position" and "Looked interesting. We had an adventure day today so we thought it could be part of the adventure."

Following the creation of the themes, a graphical representation of the data is required to articulate its content. Thus, for the content analysis, a word cloud was used to showcase the main keywords that contributed to the themes. The word cloud is used to highlight the frequency of the words. Thus, it can be used to highlight the importance of the words depending on how many times that word was mentioned (Atenstaedt, 2012).

Figure 8 shows the resulting output of the word cloud. The words in the same color showcase that they were mentioned an equal number of times. While the size of the words indicates their relevance as the more a keyword was mentioned, the bigger it is in the word cloud.

Figure 8: Word cloud - size indicates occurrence during interviews, colors indicate the theme they belong to: form (red), ownership (blue), perceived value (green), intervention (yellow).

5. DISCUSSION

The design of the probe PhotoGrab used during the study was based on the photo camera because it is an item all of us have had in our hands and know how to operate. By limiting the interaction possibilities to point-and-shoot by simply clicking one button, the aim was to create a recognizable, but simplified version of an existing expensive item. The intention was to encourage passersby to interact with the probes. Participants interacted, but none of the probes were stolen during the study, including the control test probe. These findings from the quantitative data, at first glance suggest that the designed probe itself was not valuable enough to take or the set-up of the study did not allow people to take the probe away.

Feeling of ownership

Looking into the qualitative data an overall theme that reoccurred during the test with all the probes was the feeling of ownership and appealing to kindness. Keywords that were mentioned for this category in the word cloud were 'hand-made', 'stealing', and 'not-mine'. It was recognized that the look and feel of the design of the probes had a strong influence on the decision of people to show anti-social behavior, such as stealing. A probe that shows that it is hand-made or is not a perfectly manufactured item, asks for a more emphatic reaction from the user which prevented the participants in this study from taking the probe with them as many participants mentioned that it did not feel right.

Additionally, the base of the probe said, ‘Please return’, which was also mentioned by multiple participants as a reason for returning the probe to its base. So, it is apparent that awareness of having to return an item which can be created by a sign can influence the response of participants.

Perceived value

Counter to the previous finding about the hand-made look and feel, the value of the probe was one of the reasons participants returned the probes. They mentioned keywords like ‘worthless’ and ‘fake’ when describing PhotoGrab. Others went further into detail and called it a ‘toy’. Indicating that the perception of the design probe in terms of monetary value influences the decision-making process of showing anti-social behavior towards a probe.

Intervention method

The PhotoGrab Lights used indication lights to warn users to put the probe back in its original position. Participants were attracted to the lights and interacting with this probe voiced recognition of a security measure of the probe, calling it an ‘alarm-warning’ and a ‘security light’. In this case, no alarm system or additional security measure was actually added, there were just the indication lights even if someone had taken the probe with them. Based on this data the presence of lights is enough to avert anti-social behavior, as it allows the users to perceive the existence of a security system, regardless of its existence.

The PhotoGrab Gaze had an unintended effect on people. Instead of being aware of the set of eyes watching them, people said the eyes ‘attracted’ them to interact with the probe. Some other passersby might have been scared away from the probe. Therefore, the gaze effect as part of a probe design has not been properly tested in this set-up. Although prior research used the A4-format and suggested the bigger setup of the eyes the better. Using A3-format sized posters in this study, diverged the attention from the interaction and focused on the poster with the eyes. Even though this might have an effect on people’s behavior, in this study set-up the effect cannot be measured.

Form factor

Finally, the perception of PhotoGrab and the interaction with this particular probe was something mentioned by numerous participants, indicated by the word ‘fun’ and ‘interesting’. This shows that the design of a photo camera attracted the participants' attention. Triggering people’s curiosity or intriguing them could defeat the purpose of the study which focuses on preventing anti-social behavior and perhaps attract the wrong type of participants to interact with the probe.

5.1 Limitations

5.1.1 Excessive variables

The first limitation of the study is the excessive presence of variables in the experiment, resulting in bias in the experimental data. There were initially two planned testing locations, and their traffic and crowd profiles were different. Four types of probes will take turns testing at two locations, at the same period during different days. Due to the time limitation, the probe experiment did not achieve complete control of variables. The schedule for experiments was shortened to two days, and two experiments were conducted for a day, so that every probe was tested only once. Besides, one of the experiments (gaze effect) was conducted at a different location, since the traffic at this location is lower than expected. This means that both the model of the probe and the testing location may have an impact on the experimental results.

5.1.2 Weather issue

For the weather factors during the experiment, there were significant differences between the two days of the experiment, which possibly made an impact on the collection of quantitative data. The first day of the experiment experienced thunderstorm weather towards the end of the experiment, while the second day of the experiment was conducted in a sunny and cozy environment. The weather might affect the desire of passersby to interact with the probe. Therefore, it may be necessary to plan the experiment under similar weather conditions, and weather factors should also be included in the list of considerations for designing a probe in open environments.

5.1.3 Limited sample size

Due to the time limitation caused by different schedules for researchers, each probe experiment was only conducted for one hour, which led to possible insufficiency in the sample size and reduced the feasibility and effectiveness of quantitative data analysis. Besides, for the interview stage, each group of experiments was conducted by only two researchers, with one researcher responsible for the interview and the other responsible for recording. Due to the insufficient number of researchers, it was not possible to interview every passerby who interacted with the probe because it happened during an ongoing interview, which also led to a decrease in the number of effective samples. For similar social experiments that require interviews and recording, increasing the number of experimental personnel is a necessary consideration option.

5.1.4 Limited scale and budget

For probes, due to the small scale and low budget of the experiment, the 'camera' probe is considered low value and not worth stealing by some interviewees due to its simple appearance, which may indirectly lead to a decrease in the probability of potential antisocial behavior, thereby affecting the experimental results. Therefore, a more realistic probe model may play a crucial role in experiments serving probe design.

6. CONCLUSION

For the probe design there are a few elements found in this study that can be useful for future studies, especially in the field of DED, that use design probes in public open spaces. Therefore, we summarize our findings within this study in design advice for the future work of other designers. Finally answering our research questions: how to prevent anti-social behavior against open space probes?

6.1 Design advice

First of all, presenting a sense of ownership connected to the probe can reduce anti-social behavior towards it. This can be achieved by giving the probe a less refined and more 'handmade' look, that makes probes feel less valuable in a monetary sense to a potential thief. This handmade look will, however, add value to the probe by speaking to people from a more empathic perspective and making it feel bad to take the probe away. Furthermore, the sign of 'please return' is found to be effective to appeal to the kindness and normative beliefs of users.

Moreover, while the gaze effect was effective in reducing theft in this study, it also has a direct effect on engagement with the probe overall. This could possibly appeal to some and discourage other potential users from approaching the probe. Either adding to or reducing the data points it can collect, depending on your audience. The probe that uses lights had the strongest appealing effect, working effectively as a security measure as well as enthusing users to interact with it. So, it is recommended to be used in probes in open public spaces as they attract people to interact as well as function as a security measure. Lastly, the perceived security of probes, without an actual security measure having to be triggered (present through alarm stickers for example), was enough to affect participants and is therefore also suggested to be implemented in other open space probe design.

ACKNOWLEDGEMENTS

The authors would like to thank Sujithra Raviselvam for valuable discussions and suggestions. The authors would also like to thank Eindhoven University of Technology for providing the possibility of making the design probes, and providing the course, Constructive Design Research.

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APPENDIX

Appendix 1. Background of authors

Name: Kuankuan Chen

Background: Industrial Design BSc at XJTLU, Industrial Design MSc in TU/e. I used to focus on traditional product design and be interested in tangible interactions. Now I am looking forward to learning more knowledge about car design in the aspect of automotive interior design and user driving experience design.

Main role: Researcher, Conducting the experiment of eyes, sound, and control , Data transcriber, Wrote part of the paper.

Name: Liuyiyi Yang

Background: Industrial Design BSc at XJTLU, Industrial Design MSc in TU/e, focusing on users and market, worked for a tangible product design y, but looking forward to designing products not limited in tangible things for current or near-future society.

Main role: Researcher, Conducting the experiment of eyes, sound, and control, Data transcriber, Wrote part of the paper.

Name: Tudor Grecu

Background: Industrial Design Engineering BSc at THUAS, Industrial Design MSc at TU/e, I also work for a company that makes smart city sensors. I like to be on the more practical and technical side of design, while still taking users into account.

Main role: Designing Probes, Making the probes, Conducting part of the field study, Qualitative data analysis, Wrote part of the final article

Name: Ahmed Gamal Mohamed Sayed Ahmed Ibrahim

Background: Psychology and Technology BSc at TU/e, Human-Technology Interaction MSc at TU/e. I am currently focused on UX research with a focus on warm technologies, for people suffering from mild cognitive impairments (MCI) or dementia.

Main role: I conducted research on the light aspect of our probe as well as the theoretical background. I set up the quantitative and qualitative experimental procedures for data collection. As well as collecting data in the field for the light probe. I also set up the data analysis procedure while conducting the analysis of all the data collected. I then wrote the study setup and findings for the report while also acting as the team manager.

Name: Charlotte Bronwasser

Background: Industrial Design BSc at Eindhoven University of Technology (TU/e) and bachelor student Law at Leiden University (L.L.B.), currently first year Master student Industrial Design at TU/e. I like to use psychology and inclusion of all kinds of people in my design. I use my design strategies within my law studies and legal strategies within my industrial design education, which makes me a good with words and visuals. I am interested in designs that change or alter behaviors of people.

Main role: researching and theoretical background, proposition of the research direction, creation of consent form, visualizing the data, co-creating the study set-up, basic layout of the paper and the discussion.

Appendix 2. Consent form

Information sheet for research project
"Prevention measures for antisocial behavior in data-enabled-design (DED)"

1. Introduction

You have been invited to take part in the research project prevention measures for antisocial behavior in data-enabled-design (DED), because you interacted with the research probe placed at the supermarket Jumbo Victoriapark.

Participation in this research project is voluntary: the decision to take part is up to you. Before you decide to participate, we would like to ask you to read the following information, so that you know what the research project is about, what we expect from you and how we deal with processing your personal data. Based on this information you can indicate via the consent declaration whether you consent to take part in this research project and the processing of your personal data.

You may of course always contact Ahmed Ibrahim via a.ibrahim@student.tue.nl, if you have any questions, or you can discuss this information with people you know.

2. Purpose of the research

This research project will be managed by Suji Raviselvam. The purpose of this research project is to gather data related to anti-social behavior (such as stealing and vandalizing), which can be used to redesign future probes accordingly and give designers advice on probe designs for public spaces.

3. What will taking part in the research project involve?

You will be taking part in a research project in which we will gather information by observing your interaction with the probe. After your interaction, you will be approached by one of the researchers from the research team who will ask you to sign this consent form, so that our team can ask you some questions (short interview of about 5-10 minutes) about your interaction with the probe and use the data gathered during the whole research for analysis later. Your answers during the interview will be audio-recorded and the recording will be deleted after it is transcribed. We will not be asking for personal data, so that the data cannot be linked back to you. For your participation in this research project, you will not be compensated.

7. Potential risks and inconveniences

Your participation in this research project does not involve any physical, legal or economic risks. You do not have to answer questions which you do not wish to answer. Your participation is voluntary. This means that you may end your participation at any moment you choose by letting the researcher know this. You do not have to explain why you decided to end your participation in the research project. Ending your participation will have no disadvantageous consequences for you.

If you decide to end your participation during the research, the data which you already provided up to the moment of withdrawal of your consent will be used in the research. Do you wish to end the research, or do you have any questions and/or complaints? Then please contact Suji Raviselvam via s.raviselvam@tue.nl.

5. Confidentiality of data

The raw and processed research data will be retained for a period of 4 months. Ultimately after expiration of this time period the data will be either deleted or anonymized so that it can no longer be connected to an individual person. The research data will, if necessary (e.g. for a check on scientific integrity) and only in anonymous form be made available to people outside the research group.

This research project was assessed and approved on the 9th of October 2023 by the ethical review committee of Eindhoven University of Technology.

Consent form for participation by an adult

By signing this consent form I acknowledge the following:

1. I am sufficiently informed about the research project through a separate information sheet. I have read the information sheet and have had the opportunity to ask questions. These questions have been answered satisfactorily.

2. I take part in this research project voluntarily. There is no explicit or implicit pressure for me to take part in this research project. It is clear to me that I can end participation in this research project at any moment, without giving any reason. I do not have to answer a question if I do not wish to do so.

Name of Participant:

Signature:

Date:

Name of researcher:

Signature:

Date:

Appendix 3. Questions asked to participants

1. Informed consent? YES/NO

2. Can you describe your first impressions of the probe?

3. Can you explain what this experiment is for?

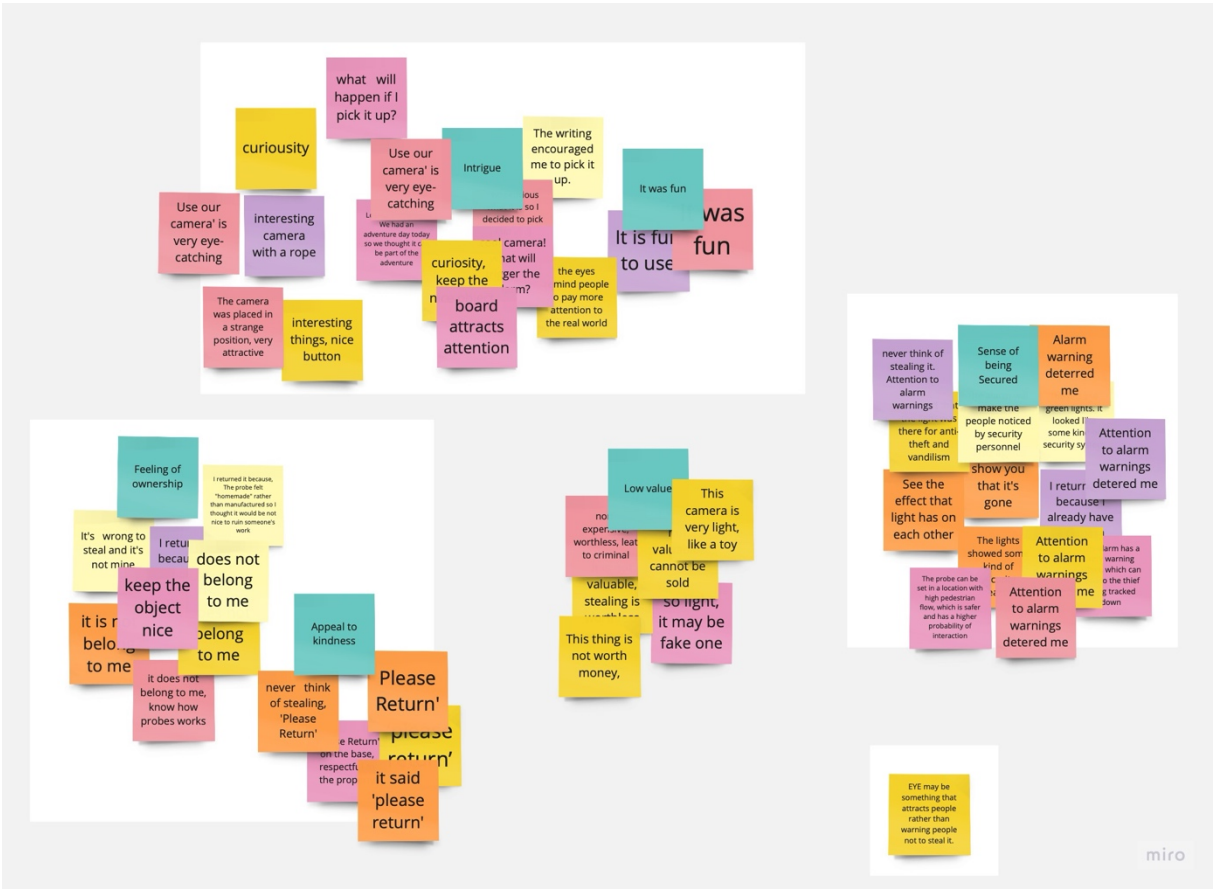
4. What was the first thought that came to mind regarding the use of the probe?

5. Why did you return the probe?

6. Think about your interaction with the probe, can you imagine people not returning it?
   (1) If yes, why would they not return it?
   (2) If not, why not?

Do you have any recommendations for us?

Appendix 4. Miro board



Appendix 5. Signed consent forms

https://surfdrive.surf.nl/files/index.php/s/bezU75X3vVbK5Ci

Appendix 6. All collected data

CDR data from experiments.xlsx