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Honeypot - A Socializing App to Promote Train Commuters' Wellbeing

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ABSTRACT
The number of commuters has been increasing for many years and the negative effects on wellbeing are therefore affecting more and more people. Following a user centered design process that focuses on known wellbeing determinants, such as relatedness and empathy, we developed the *Honeypot socializing app*. The app allows commuters to find other travelers to chat with and meet in person to enhance their wellbeing through fostering meaningful and contextual social interactions. First, we describe the development of the idea and the design of the app. Then, we report on a field study with 16 participants, which we carried out on trains. The study results show that the app helps to get in contact with fellow travelers and that it has the potential to promote the wellbeing of commuters in the long term.

CCS Concepts
•Human-centered computing → Human computer interaction (HCI);

Author Keywords
Commuting, Positive Computing, Wellbeing

INTRODUCTION AND BACKGROUND
In many countries the number of commuters among employees is high and continues to rise. For example, the number was around 18 million ($\sim$ 60% of employees) in 2015 in Germany [4, 13]. Multiple authors have claimed that commuting is stress-inducing [6, 21, 26], including commuting by train [11]. Stutzer and Frey [27] showed that better living or working conditions are not enough to compensate for the stress of long commuting hours and that the wellbeing of commuters decreases as commuting time increases. A study from the German health company AOK showed that long distance commuting increases the probability of contracting a mental illness [8]. Despite the negative effects on psychological wellbeing, many people have to accept long commute times in order to find suitable jobs or affordable housing.

Previous work argued that today's ubiquitous computing technologies, such as smartphones, open up a variety of possibilities for future employees. However, most of them have focused on increasing productivity by, for example enabling users to work on the go (e.g., [22, 19, 2, 17]). Instead of using ubiquitous technology to solely improve productivity, we decided to design for psychological wellbeing by following the *Positive Computing* approach, which was introduced by Calvo and Peters [5] and applied in some commuting projects (e.g., [20, 23]. They describe an approach of developing technology to improve the psychological wellbeing of users by focusing throughout the user-centered design process on well-known wellbeing determinants (i.e., positive computing factors), such as relatedness, empathy, and positive emotions.

Since humans are social beings, natural interactions between humans foster empathy, create a feeling of connectedness and may lead to new relationships. Relatedness can be described as the connection people feel for one another. Pinquart and Sörensen [24] found that a larger number of social contacts has a larger positive impact on wellbeing and a long-term study at Harvard Medical School [28] showed that people's wellbeing and general happiness in life is highly determined by the number of social connections to other human beings and the quality of those relationships. Also, talking to a stranger can bring joy and other positive emotions. Ettema et al. analyzed multiple activities on the train and concluded that talking to other travelers had the largest positive effect on satisfaction while traveling [10]. However, Christian provided empirical evidence that the amount of time spent socializing and communicating is decreasing with increasing time spent commuting [7] and a study carried out by Cantwell et al. showed that 54% of the participants agreed or strongly agreed that commuting decreases the time and energy they have for socializing and recreation [6].

In this paper, we present a socializing app called *Honeypot* and describe in detail its design process, which was guided by the wellbeing determinants relatedness, empathy, and positive emotions. The app aims to help train commuters to find other commuters for conversations during their train ride in order to create new social connections and consequently to

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promote commuters' wellbeing. In the following section, we first describe the ideation and design process of the app. Then, we report on a field study with 16 participants, which we conducted on trains to investigate whether the application helps to connect people while commuting and whether the resulting conversations have a positive influence on wellbeing. Afterwards, we present and discuss the results.

IDEATION AND DESIGN OF THE HONEYPOT APP

The user-centered design approach consisted of subsequent phases of observation & ideation, design, and implementation, which we separately describe in the following.

Observation & Ideation

In a first step and to inform our design we followed the methodology of *Contextual Inquiries*, a data gathering technique by Holtzblatt and Beyer [14]. Our aim was to improve our understanding of commuters' concerns and needs. The idea of contextual inquiries is that participants cannot describe what they do or desire in detail when asked out of context, and thus interviewed 15 participants during their train commute. We asked questions to examine the general behavior of commuters; e.g., how often and how long they commute, whether there are any stress factors, what they usually do while commuting, and whether they prefer traveling on their own or in company. We asked mainly open questions the gather a lot of qualitative data in discussions with the participants.

Based on the data we gathered during the interviews (and analyzed with affinity diagrams), we created several ideas during a brainstorming workshop, such as a socializing app or a GPS-based alarm clock. We developed our ideas with a focus on positive computing and at that time considered all (13) possible positive computing factors as potential factors to guide our subsequent design process. In order to find out which idea is most popular with potential users, we conducted a second round of interviews asking people in trains questions such as *"How often do you talk to strangers when commuting?"* or *"Do you usually sleep on the train and how do you make sure to wake up on time?"*. In the end of the ideation phase, it was clear that most commuters seem to be interested in talking to other people.

Thus, we decided to develop a socializing app that enables commuters to communicate with each other and helps them to meet in person. Furthermore, we decided that the app's design should be guided by the three factors relatedness, empathy, and positive emotions. While we think that a good conversation with a person creates positive emotions, our goal was to bring commuters together who often commute with the same train, and in doing so, increase the relatedness and empathy of these persons possibly in the long term.

Design

User Interface

The app's theme is "bees and honey". Honey bees are an important part of the global ecosphere and an animal living in complex social structures—values that we want to elicit in the commuters who interact with our app and each other. The consistent theme also aims to enhance ease of use which in turn makes using *Honeypot* more enjoyable. Instead of using digitally created assets, we relied on hand-drawn assets almost exclusively, using bright, warm colors (see Figure 1). This is supposed to give the app a friendly and inviting look. App navigation and interaction also follow best practices from Apple and Google (see [1] and [9] respectively). For example, we use device-native navigation, toasters to display ad-hoc messages or user-friendly error messages, and responsive layout techniques to provide a modern user experience (UX). Complicated or outlandish interaction schemes might confuse some users and lead to negative emotional user reactions such as annoyance or confusion.

Figure 1. Asset Creation Workshop

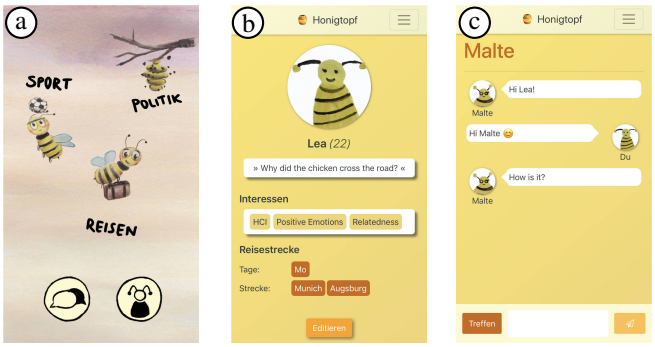

Figure 2. Screens of the *Honeypot* App

Structure

After starting the app, only the user's name has to be entered to reach the overview (Figure 2 a). There, users can find people or groups with the same interests. In groups one can talk about topics such as sports, politics and travel. Alternatively, one can search for people for a private chat, by filtering possible candidates by interests. In the profile section (Figure 2 b) one can set one's interests and commuting schedule in order to make it easier to be found by others. Once the user has found a suitable chat partner, they can chat with each other. If they are interested in getting to know each other personally, they can suggest a meeting by pressing a button (Figure 2 c).

Implementation

The *Honeypot* app was developed as a Progressive Web App (PWA), a relatively new concept introduced by Google [12]. PWAs enhance UX by complementing traditional web applications with mobile native app features. The user does not have to download the PWA from an app store. Instead, the

app can be opened in any browser, added to the home screen, and used like any other native app. PWAs use web service workers that allow to deliver updates in the background and cache the application to work offline. For our app, we used the *Typescript*-based front-end web application framework *Angular 6*. The backend was built to provide a real-time chat experience. We used a *NodeJS* and *Socket.IO* engine to enable real-time, bi-directional communication between web clients and server. Due to the absence of a stable Internet connection in trains, we decided to host our PWA on a local server on the train.

FIELD STUDY

The aim of the study was to find out whether the use of *Honeypot* has a positive influence on the wellbeing of users. For this purpose, it was investigated whether (a) the app helps users to connect with other travelers and (b) the resulting conversations have a positive influence on their wellbeing.

To answer the first question (a), we investigated how often participants start a conversation using the app and how many participants then meet in person.

Since it is difficult to measure wellbeing directly [15] for answering the second question (b), we measured the impact on the three factors (i.e., relatedness, positive emotions, empathy). To measure positive emotions, we used the validated questionnaire PANAS [29], which measures Positive Affect Score (PAS) and Negative Affect Score (NAS). The questionnaire is suitable for measuring short-term mood changes. We used the German version of the questionnaire [3]. Since factors such as relatedness and empathy develop over a long period of time, it is difficult to measure them in such a short time.

We therefore had three statements for both factors to get an impression of how the use of *Honeypot* may impact these factors. To get an impression of the influence on relatedness, we utilized the statements "*I felt related to my conversation partner.*", "*I would like to meet my conversation partner again.*" and "*I would like to have conversations like these on the train more often.*" and for empathy "*I was able to understand my conversation partner's emotions.*", "*I was able to understand my conversation partner's notions and rationales.*" and "*I am willing to help my conversation partner more than before this conversation, e.g. with carrying baggage or saving a seat for him or her.*". Users were given a 6-point Likert scale [18] (ranging from "*I strongly agree*" to "*I strongly disagree*") to express their agreement with each statement.

In addition to measuring how our app influences users' wellbeing, we applied the validated User Experience Questionnaire (UEQ) [16] to get feedback about the general user experience associated with our app.

Procedure

The study was carried out in the field (i.e., in trains filled with commuters) in which users would actually use the app in everyday life. Each participant completed the study in about 20 to 30 minutes.

First, we installed a WiFi hotspot on the train and launched the *Honeypot* app server. Second, we looked for potential candidates to evaluate our app and told them that we built an app which allows users to establish contact with fellow travelers and asked them if they were willing to participate in our experiment. People who wanted to participate then received from us the first part of the questionnaire in which we asked demographic data and determined their current mood using the PANAS scale.

Afterwards, the participants were asked to use the *Honeypot socializing app*. They could either log into our network and use their own smartphone, or we provided them with a smartphone. While a participant was testing *Honeypot*, one of the researchers was also logged in as a potential chat partner so that the participant believed they were talking to a random person. Our team member acted either passive or active in starting conversations or suggesting to meet the other person. This enabled us to examine whether participants not only propose meetings on their own initiative, but also whether they respond to such proposals. If the participant decided to meet with the conversation partner, we let them talk for a few minutes before ending their conversation.

After we ended their conversation or they stopped using the app, we handed the participant the rest of our questionnaire. We asked why they did/did not chat/meet and then determined their current mood with the help of the PANAS again. They then rated the user experience of the app with the help of the UEQ. If the participant decided to meet our conversation partner, we also asked them the six further questions regarding empathy and relatedness.

Results

We evaluated the app with 16 participants (7f, 9m), which we randomly recruited in short-distance trains. We interviewed participants from all age groups, but the majority of them were younger than 25. In the following, we report the data collected, identify general trends with the help of graphical representations, and report results of the statistical analyses we performed.

Conversations

During the 16 sessions, a conversation via the app always took place between the participant and our chat partner and they resulted in a meeting in seven out of the 16 cases. Whether our chat partner was active or passive had an effect on how often they met. With the chat partner being active, a meeting was arranged in six out of nine cases, whereas only in one out of seven cases a meeting was arranged when the chat partner behaved passively. The participants gave various reasons for not meeting their chat partners: *"I did not spend enough time texting with my conversation partner."* or *"I am too afraid to meet a random stranger."*. People who met each other said for example *"I just wanted to meet my conversation partner."* or simply *"The other person suggested the meeting."*.

Effect on Positive Computing Factors

Figure 3 shows the average positive and negative affect of the participants before and after using *Honeypot*. While hardly any difference is visible for negative affect, the participants rated their positive affect after using the app higher than before. We conducted a paired-samples t-test (1-tailed) and found a

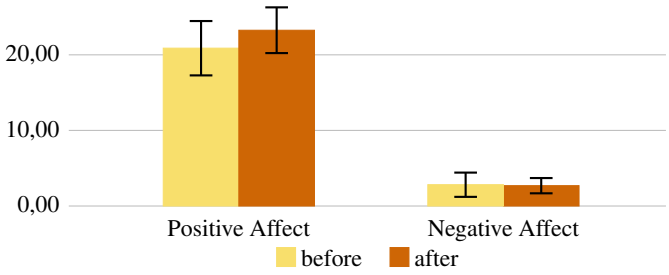

Figure 3. Overview of mean values of positive and negative affect, before and after using *Honeypot* measured by the PANAS questionnaire. Error bars denote 95% confidence intervals. The scale ranges from 0 to 40.

significant effect on the positive affect before and after using the app $t(15) = 3.158$, $p < 0.005$. However, no significant effect was found for the negative affect $t(15) = -0.180$, $p = 0.420$.

For the three statements on relatedness and empathy to which the participants were asked to express their agreement, the average values were 3.00 (SD = 0.47) for relatedness and 3.22 (SD = 1.03) for empathy, with a maximum of 5 representing "*I strongly agree*". This was only rated by participants that had a face-to-face conversation.

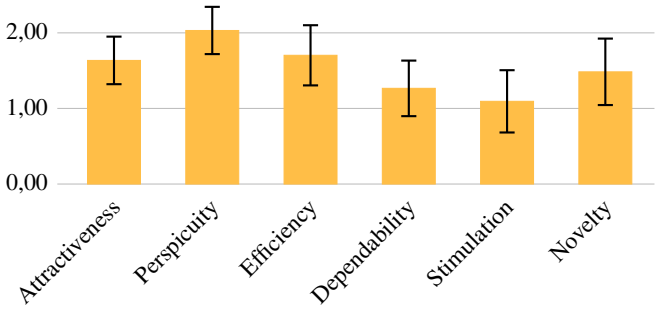

Figure 4. Overview of mean values for each dependent variable measured by the UEQ. Error bars denote 95% confidence intervals. The scale ranges from -3 to 3.

User Experience

The results of the UEQ are presented in Figure 4. According to Rauschenberger et al. [25], values greater than 0.8 represent a positive evaluation and values greater than 2.0 are "extremely unlikely" to be observed. With mean values ranging from 1.09 to 2.03, the user experience of the app was therefore rated as very good.

DISCUSSION

At the beginning we argued that commuting can often have a negative effect on (psychological) wellbeing and thus motivated our research and wellbeing-oriented design process. Using contextual inquiries, we have identified today's train commuters' needs and requirements. While we found that we could not solve the "hard" problems, such as train delays we found that we could improve the time during commuting. Many people were interested in talking to other travelers, but had problems approaching strangers. Thus, our app was developed to solve this problem and help people to talk to each other.

In the field study, we tried to answer the question (a) whether the app fulfills this purpose and the results show that many participants met after using it. However, we could observe that the users were a bit shy when it came to initiating a meeting and much more meetings took place when our researcher was playing an active role. We think that improvements in the app can address this problem, for example by suggesting meetings when two people spend some time writing to each other.

We showed that the conversations and meetings can have a positive effect on wellbeing by answering question (b). We were able to significantly increase the positive affect of the participants, while the negative affect remained unchanged. Since our participants had a very low negative affect, we unfortunately could not observe whether this could also be reduced. The questions about relatedness and empathy also showed that there is potential for people to meet their conversation partners on a regular basis if they commute with the same train and thus develop positive effects in the long term. Our results show that people can be brought together with the help of *Honeypot* and thus have a positive influence on their wellbeing. While we developed an app to bring commuters together, the idea could also be implemented in another form. For example, there could be sections in trains that are explicitly for people who want to talk to others and on the other hand also sections in which one can work in a quiet environment. Alternatively, the functionality could be included in an app of the railway providers in order to find other people during or after the booking process, with whom one then sits together in the train.

The main limitation of our research is that it was not possible to measure long-term effects, which are relevant for positive wellbeing. Another limitation could be that we used a person from our team as a default conversation partner for participants. While we had more control during the study, the experience of a conversation may strongly depend on the people involved and therefore the results are also limited by how our researcher was perceived as a conversation partner. Due to the very good results of the UEQ, a negative influence due to a poor user experience of the app can be excluded. We aim to address limitation in our future research, for example by conducting a long-term study over a period of two to three months with an improved app.

CONCLUSION

We reported on a design process and evaluation of *Honeypot*, a socializing app that helps train commuters to find fellow travelers for chatting and meeting in order to create new social connections and increase commuters' wellbeing. A field study on the train showed that commuters were able to use the app to find each other and that they were also willing to meet in person, especially when the other person suggested a meeting. Furthermore, the evaluation showed that conversations and meetings started with the help of the app caused positive emotions and that there is also potential for people meeting regularly and thus empathy and relatedness developing among the users in the long term. It has to be further evaluated whether our concept has an actual long-term impact on commuters and whether it could be applied to other areas, which we will address in future work.

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