

Assessment of an Unobtrusive Persuasive System for Behavior Change in Home Environments

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ABSTRACT

Systems for behavior change often use additional amplifying factors, e.g. gamification, competition with friends and progress bars. Related work has looked into persuasive systems using these amplifying factors to motivate users to be more active or to drink more. We investigated an unobtrusive persuasive behavior change system without amplifying factors by displaying motivating pictures on a central display. We conducted an in-situ study with 6 participants over the course of three weeks. Participants placed a tablet computer in their homes. On the always-on display, motivating pictures of the categories sports, reading and drinking were shown for one week each. Participants found the system useful to drink more and preferred personalized pictures.

ACM Classification Keywords

H.5.m. Information Interfaces and Presentation (e.g. HCI): Miscellaneous

Author Keywords

Persuasive Display; Behavior Change, Home Environment

INTRODUCTION AND BACKGROUND

A body of related work investigated systems for behavior change. In order to motivate users to be more active or drink more, these systems often use amplifying factors like gamification, competition with friends and progress bars. For example, Consolvo et al. developed an application, where the users' physical activity leads to a more beautiful and growing garden [1]. Other pervasive systems for behavior change present the current progress of the users' activities in an ambient way. Fortmann et al. used a bracelet with embedded LEDs to improve the drinking behavior of users [2]. Small LEDs represented number of water the participants were drinking during the day and one larger LED displayed the passed time since the last glass of water using a color-coding from green to red. Jafarinaimi et al. used an ambient display to encourage people who sit for a long period of time to do more breaks



Figure 1. Location of the displays as they were placed by participants in their homes.

with physical activities [4]. They used a figure which position changes continuously in a slouched position the more time passes. After a break the figure returns to an upright position. Fortmann et al. used an ambient light display to encourage the users to more physical activity [3]. They mounted a stationary lamp next to the desks of their participants which represented the previous physical activity during the day mapped to a color encoding from green to red. Lin et al. measured steps for every participant and mapped the count of steps to a fish's size and mood [5]. They displayed the fish together with all other fishes of all participants on public displays in the offices.

By using amplifying factors, not only the user but also people in the surroundings are able to see the user's activities or progresses. In this paper, we investigate an unobtrusive and persuasive behavior change system without any additional amplifying factors. Our behavior change system displays motivating pictures for activities on a picture frame placed at an accessible location in the periphery of the user. We evaluated our concept in an in-situ user study with 6 participants over the course of three weeks. While the system did not show any changes in the users' behavior, it provided insights for future studies. For example, participants found the system useful to drink more and preferred personalized pictures.

STUDY

The goal of the study was to evaluate an unobtrusive persuasive system for home environments without using amplifying factors. Instead of introducing new behavior, participants should be motivated to do some tasks more often. The research question was if we can achieve behavior change using a system with minor influence. In the following, we explain the design, apparatus, participants and findings of the study.

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Design and Apparatus

The total duration of the study was three weeks for every participant. Using a persuasive display, pictures of three categories were shown. The categories were sports, reading and drinking. Pictures for each category were shown for one week each. The order was chosen randomly for every participant. We used six 13-inch tablet computers for the study. The tablets were preloaded with motivating pictures about sports, reading and drinking. Participants contributed some of the pictures themselves, as shown in Figure 2. Each picture was shown for 20 minutes before changing to the next one. To track participants' activity, we used a Jawbone UP2 fitness tracker. It records the number of participants' steps with a battery life of approximately one week. Reading time and drinking was tracked by end-of-day questionnaires.

Procedure and Participants

We first invited participants to sign consent forms and asked them to take motivating pictures about sports, reading and drinking. In the next session, we handed out the fitness trackers, tablet computers and tablet stands. Participants were then asked to fill out a self-assessment questionnaire about their sports, reading and drinking behavior and willingness to change their behavior. Participants were then asked to take the tablet with them and place it visible in their homes for three weeks. At the end of every day we reminded them to fill out the end-of-day questionnaire by sending out emails. Every week we asked them to charge and sync data from the fitness trackers. After the three weeks we invited the participants again to retrieve the devices and asked participants to fill out another questionnaire for self-assessment. We asked the participants if the system was motivating and whether they noticed any change in their behavior. Finally, participants were able to freely comment on the system and their experience. All participants were rewarded with EUR 20 for the participation. In total 6 persons (1 female) participated in the study. They were between 23 and 28 years old ($M = 25.2, SD = 1.8$). The participants consisted of four students and two employees.

RESULTS

According to the first self-assessment questionnaire, only one participant wanted to improve his or her sports behavior. The willingness to change the reading behavior was mixed (3×agreement, 3×disagreement). Three participants reported to be willing to change their drinking behavior, two were neutral and one disagreed.

Participants did not find the pictures for sports and reading motivating. For drinking, four participants found the pictures motivating while two others did not. Analyzing the end-of-day questionnaires and steps taken did not show any change in participants' behavior in the study duration. Accordingly, all participants disagreed in the second self-assessment questionnaire when asked if the system helped them to be more active. For reading only one participant reported a change in his or her behavior. However, for drinking four participants reported a positive change in behavior and two did not. Participants mentioned that the system should provide more images, as after some time images were repeated. Also, more personal pictures should be used. Especially for the sports category,

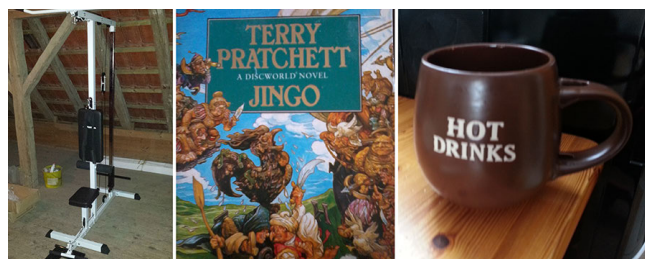


Figure 2. Participants contributed their own images that were shown on the persuasive display.

participants mentioned that they would like to see pictures related to the sport they care about. For reading this was the same, e.g. showing the book that is currently being read. One participant stated that she liked being reminded to drink by the system and as a result of the study used motivating pictures as desktop background on her computer. Another participant mentioned that while he was not more motivated from the system, it reminded him to adhere his sports schedule. One limitation mentioned by the participants was that some only saw the display in the morning and the evening.

CONCLUSION AND FUTURE WORK

In this paper we assessed an unobtrusive persuasive system for behavior change in home environments. For three weeks, six participants placed a display in their homes with motivating pictures of sport, reading and drinking. While the system itself did not result in significant behavior changes, conducting the study provided us with valuable insights for future studies. Participants found the system useful to drink more and preferred personalized pictures. In the future we envision another user study with more participants over a longer time span and multiple display locations.

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