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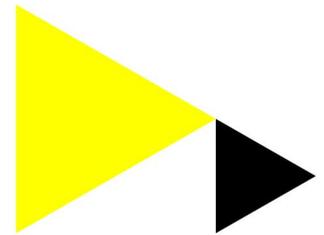
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Creating Tomorrow

Playful Interactions Stimulating Physical Activity in Public Spaces

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Abstract

In this position paper we describe our vision on designing playful interactions to persuade people to be physically active in public spaces. Social embeddedness and playful interaction are the core elements of this vision. We illustrate how our design vision is incorporated into innovative concepts that stimulate physical activity for various user groups and in various use contexts, and present some general findings on the basis of these cases. New technologies such as mobile networks and social media provide new opportunities for creating location-independent solutions that support groups of people to motivate each other to be physically active by creating challenges for each other. Designing playful solutions for public spaces asks for low-threshold solutions that support easy stepping in and stepping out solutions.

Author Keywords

Playfulness; persuasion; physical activity; interactivity; public space

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

In this position paper we describe and illustrate our vision on designing playful interactions to persuade people to be physically active in public spaces.

The ever-increasing use of Internet and other digital media (such as computer games) tends to weaken the importance and use of the urban public space. Meeting places seem to have shifted from real spaces to virtual spaces. In addition (and perhaps as a direct consequence), we see a worldwide trend that people nowadays lead less active lives than people used to. Lack of physical activity is a persistent problem for both young and older people, which may cause obesity and other health-related problems. Professionals as well as commercial and public organizations who are involved in promoting a healthy lifestyle, such as coaches at sports schools, people who organize sports events, activity consultants, etc. are constantly looking for ways to motivate people to lead an active life, in order to prevent lack of physical exercise and obesity. However, interventions that fail to address a strong intrinsic motivation are unlikely to be effective on the long term. In the SIXPAC (Social interaction to eXcite Physical ACtivity) project, an international consortium explores the power and potential of interactive technology - such as games and social media - for stimulating physical activity in public spaces.

In our research we apply two design principles: **social embeddedness** and **playful persuasion**. Social embeddedness because social interaction has been shown to be one of the prime motivators for (physical) activity: people like to take part in social activities. In their theory on intrinsic motivation, Ryan and Deci refer to Relatedness as one of the three basic psychological needs (besides Competence and Autonomy) [6]. They define relatedness as the universal want to interact, be connected to, and experience caring for others. Concrete examples of social motivations to take part in an activity are to play in a team, to make new friends or to be together with friends. Therefore, for an activity to be intrinsically motivating, it should be embedded in existing social structures and activities. In the context of *public spaces* it is interesting to examine the voluntary nature of deciding to participate in a social activity. Playful persuasion because we follow a novel approach in which we examine how we can influence people's behavior by combining subtle persuasive mechanisms with playful interactions tied to existing daily practices. The assumption is that by incorporating playful experiences, such as curiosity, exploration and nurturing [4] people will be motivated to perform certain behaviour by appealing to intrinsically motivating strategies [5]. In the context of *public spaces* it is interesting to examine how to select appropriate experiences suitable for a context and related user groups.

In sum, the aim of the SIXPAC project is develop and study innovative products and services that resonate with the lifestyle and interests of the end user: products and services that motivate people to be physically active because they are both socially embedded and fun. In particular, these two design principles are applied to products and services to be used in public space, where contextual factors largely affect how interactive products are designed and used. In this paper we illustrate how social embeddedness and playful persuasion are incorporated into the design of three innovative concepts developed by students within the SIXPAC project.

In subsequent sections we will discuss examples of related work, both commercial and scientific. We will then illustrate the design vision described above by means of three case studies and conclude by discussing a number of general findings.

Related work

A well-known example of playful persuasion in a public space is the Piano Stairs, an interactive staircase that looks and sounds like a huge piano, which motivates commuters to take the stairs instead of the escalator. Our own work in the area includes an interactive ball pit for young children [1] and an interactive video installation in a corridor for teenagers [7]. We have also designed a playful persuasive system for elderly users in a care home, called the Activator. This system provides information both about personal and group behavior of people living in a care home [5].
Other relevant examples of playful persuasion include apps for mobile devices. A good example of such an app is Figure Running [2], in which users draw a shape on a city map by walking, cycling or running around, on the basis of GPS. For some users, the act of drawing while exercising is enjoyable. For others, sharing their drawings with others or trying to recreate a peer's shape is most engaging. Two other examples of interactive products, but fixed to a specific location, are playground installations such as Icon [3] and YalpSutu [9] which create interactive areas in which several active games can be played.

Design cases

In this section we describe three examples of innovative concepts that have been designed to stimulate physical activity in public space in a playful way.

Figure 1. Photo of the sTail prototype in test setting

sTail

Description: sTail is an interactive, active game designed to be played in public spaces, such as a shopping mall or a town square. The playing field is projected on the floor. When a person enters the playing field, he or she automatically gets a virtual tail, which follows you around. Once players have a tail they can start to chase other players and steal their tail, by stepping on it. If a player steals another player's tail, his or her own tail will grow longer, while the other player's tail shrinks. The concept is fixed to a specific space, and the size of the playing field depends on the limitations of the size of the projection. The field be entered from different directions depending on how it is positioned in space. The use of sTail is characterized by incidental use of passers-by.

Social Embeddedness: The game can be played by any group of people who happen to be in a specific location. The game stimulates interaction between people who do not know each other, but it can also be played by groups of people who do know each other. As soon as a passer by enters the playing field (intentionally or unaware) they automatically become part of the game: a tail is attached to them, which can be stolen by other players. Because the game mechanics are very simple, everyone can decide to stay or leave, to join the game or create their own games.

Playful Persuasion: sTail incorporates the following playful experiences: Control (the players can jointly influence the speed of the game, and create their own games), sensation (this includes experiencing how the tail follows you through space) and competition (players will try and get the longest tail and steal the

tail of another player). The mechanics of the game are simple, and there are no specific rules or goals except for growing your tail by stealing another player's tail. This makes it very easy to enter the game and play. Also, it allows the players to make up their own games, which ensures that the game is also fun for 'experienced' users.

Photo Quest
Description: Photo Quest is a casual game, designed to be played on a mobile phone. It is intended for moments when people have to wait, e.g. for the train or for an appointment with a friend. The Photo Quest app shows a photo of an object or location close to you. The challenge is to find the location of the photo and the location where the photo is taken from, and then reproduce the photo. In first instance, the photo will be shown blurred, but over time more and more details are revealed, until it is completely recognizable. The faster you are with recognizing and 'scanning' the right spot, the more points you get. Photo Quest is a game that can be used by everyone who uses a mobile phone with a camera. The app is flexible in use. It can be used both indoor and outdoor, in private as well as public spaces.

Social Embeddedness: The game can be played by single players or a group of players. Photo's can be selected from a standard collection on the basis of a player's location. This can appeal to people in the form of joining a community, similar like joining a geo-caching community. Alternatively, friends can generate quests for each other by taking a photograph and sharing it. Players will then pick up the challenge and try to find the photo. This appeals to a more personal form of social embeddedness. The challenge can be

shared by multiple people, and comparisons can be made based on who found the location the fastest. People who create the quest, can be creative. For instance they can leave hidden messages to be discovered by finding the right location.

Playful Persuasion: The design incorporates the following playful experiences: challenge (players have to try and find the photo within a limited time frame), exploration/discovery (users will have to explore the area around them to find the location where the photo was taken), and expression. Depending on the kind of photos that are taken the game can be a medium to make other people look at the world around them, for example by taking photos from unexpected angles. We have also seen people incorporating messages in the photo. Because the manner in which the photos are chosen and used can be varied, the type of experience can also be adapted to specific user groups interest. The app uses the property of flexibility, in that it can be played anywhere, and has a low threshold to participate. The app seduces people to explore a public space, which could be done by multiple people at the same time, to also allow face-to-face interaction when trying to solve the challenge.

WaterDraw
Description: Waterdraw is an active game to be played in a swimming pool which is equipped with a large screen. Swimmers move around in the water with colored foam blocks. Their aim is to conquer parts of the screen (which is positioned either on the wall or in the water) by painting it in the color of their foam block. Whoever colours the largest part of the screen, within a limited time frame, wins. To make the game more challenging, there are randomly placed bombs

Figure 3. Screenshot and photo of the WaterDraw game.

and balloons on the screen, which when triggered either help or sabotage the player. In the creative mode players can draw whatever they want using the two coloured foam blocks. The context of use is limited to a specific space. It can be used in the water as well as outside the water.

Social Embeddedness: WaterDraw has been designed to be used in a swimming pool, a semi-public space where people usually go with friends or family for recreation, or individually when sporting. WaterDraw is played by two or more co-located players at the same time. They can either play against each other in the game mode or work together to draw a piece of art in creative mode. Depending on the available space this game can also be played with groups of people. Characteristics like play sessions that are defined by time, getting hold of the foam and creating groups could increase the intention to participate in the game. This game can be played by people that already know each other, or teams might be formed facilitated by the location's staff. It can also be used in the context of other arranged activities in the pool location, such as school classes visiting for swimming activities.

Playful Persuasion: The following playful experiences were incorporated in the design: challenge (a challenge is presented by the limited time available for finishing the task in the default mode), competition (when players compete for colouring the biggest space), and expression (in the creative mode players can express themselves by making any kind of drawing using the sponges) and sensation (the fact that the game is played in the water and that physical exertion is required to play, provides for a meaningful sensory experience). The concept allows multiple uses in a

specific public space. It can be switched on and off, as time requires and thus allows incidental use.

Discussion and conclusion

Technologies such as mobile networks and social media provide new opportunities for creating location-independent solutions that support groups of people to motivate each other to be physically active by creating challenges for each other. We have shown how a variety of **playful experiences** can be applied to elicit physical activity in public spaces, ranging from expression to challenge, depending on what is appropriate for the user group and the context. Because of our interest in eliciting physical activity, two design cases incorporate full-body interaction as main interaction style. However, the Photo Quest design cases incorporates a more global form of GPS-based interaction with the system.

We conclude that designing playful solutions for public spaces asks for requires fluid shifts between different forms of social embeddedness. It is important to provide low-threshold solutions that support easy stepping in and stepping out solutions. It. For example, shifting between the role of being a participant or being a spectator. Being a spectator and providing advice can also be part of the fun. The game design rule: easy to use and hard to master is especially important for walk up and use like solutions for public spaces. The voluntariness of participation is another important aspect to take into account when designing for public space. Of course, selecting the right playful experiences can motivate people to join in. Also, flexibility in the number of players participating in the interaction will increase the applicability in diverse public contexts of use.

Secondly, because of the nature of public spaces and the variety of citizens in public spaces, play solutions should offer game experiences that offer 'something for everyone'. In future this could lead to adaptive game scenarios. The intertwining of the virtual and reality space in intelligent public playgrounds is an interesting topic for future research.

Acknowledgements

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