Urban Proxemics for Public Guidance

Katrin Wolf, Lars Lischke
University of Stuttgart
katrin.wolf@vis.uni-stuttgart.de, lars.lischke@vis.uni-stuttgart.de

ABSTRACT
In this position paper, we propose to apply proxemics for public guidance in urban spaces. We show that the proxemics dimensions already are parts of public guidance systems, and we argue that a common language for urban proxemics already exists.

Author Keywords
Proxemic interaction; public guidance.

ACM Classification Keywords
H.5.2 Information Interfaces and presentation: User Interfaces

INTRODUCTION
Visual signs are commonly used in analogue guidance systems, such as in traditional traffic signs or for guiding through public buildings. These signs are commonly known and understood independently from people's language and cultural background. They are usually drawn on streets, floors, and walls. If such signs would be controlled by a computer, guidance systems would offer the opportunity to adapt to different situations. For instance, if an exhibition is crowded, the guidance system could guide entering visitors to exhibits where less people are standing. Moreover, the distance line drawn on the floor to indicate the distance between an museum exhibit and visitors could extend if many people are in a room. Then more people could see the exhibit at the same time. Furthermore, if for instance a catastroph happens in a crowded concert, interactive emergency signs could show the people the best way to get out of the building.

Greenberg et al. [3] explain how proxemics can beneficially add to human-computer interaction and described five proxemics dimensions for ubicomp: distance, orientation, movement, identity, and location. So far, proxemics have just started to be used in ubicomp, for example for orientation-aware large display interaction Ballendat et al. [1] or for passengers' movement behavior change [5].

In this paper, we show (by describing analogue guidance systems in urban environments) that urban proxemics is a topic that would beneficially add to the research body of ubicomp.

RELATED WORK
Inspired by Hall's theory of social proximity Greenberg et al. postulate the need for proximity for interacting with ubiquitous computer systems [3]. Marquardt et al. build a toolkit to use users distance, orientation, movement, identity and location in ubicomp systems [4]. As an example Ballendat et al. build a media player which reacts on viewers distance and viewing direction. They raise also the need for mediating between the interests of different people. Multiple people in one room might have different proximic distances to the interactive system. In such cases the system should handle such conflicts [1].

Rogers et al. designed a system which makes use of peoples movement, position and orientation in a building to influence the decision to use the staircases or an elevator. By walking on the floor multiple LEDs in the carpet light up in the direction to the stairwell. The authors describe this design as follow-the-lights. In an in-situ they figured out that users could not identify the aim of the lights. However with the installation people used more often the stairwells in comparison to the elevator [5]. The installation cannot only be used to motivate people to be more active and walk the stairs, it could also be used to guide people to different exits. Thereby queuing time at public transport stations or at entrances for large events can be reduced. Beside ambient guidance also building signage with interactive text messages on the floor offers great possibilities. Dalton showed in a user study that users can easily detect text messages on the floor. Furthermore users expect intuitively interaction by tapping on words with their foot [2].

Wozniak et al. explored social guidance by using an ambient display. The authors visualized the nose level in a student room at a university by showing different pictures [6]. Students can be motivated to move physically or mentally by the visualization. They ether can leave the room or can work more concentrated on their tasks again. In a fist study the authors identified a high potential of the system.

PROXEMICS DIMENSIONS IN PUBLIC GUIDANCE
In this section, we transfer the five proxemics dimensions for ubicomp: distance, orientation, movement, identity, and location [3] to traditional analogue guidance systems in urban environments and public spaces.

Figure 1. Examples for the five proxemic dimensions (distance, orientation, movement, identity, and location) in urban guidance.

Distance

Distance in urban guidance is often a safety issue. For instance, people should keep distance to driving trains (fig. 1) for not causing an accident. Other examples for the need of a distance in the public are situations of exchanging private information, e.g. at a bank counter. Then distance ensures that people waiting in a cue do not see or hear privat information that later may be mis-used. Signs that tell people to keep a distance are usually lines on the floor. These can also be built in the floor by using two different materials. Sometimes such lines are even built a bit higher than the rest of the floor for enabling to feel them, e.g. for guiding blind people. If areas are permitted to be accessed, these lines are sometimes drawn in 'signal' colors, like red or yellow-black striped.

Orientation

Orientation in urban guidance is usually given in the context of way finding in terms of movement direction. Most commonly arrows are used to indicate directions. They are mainly used on traffic signs to show allowed driving directions as well as to point at a certain destiny, such as tourist informations or towns the road will lead one to. Furthermore, arrows are used on emergency exit signs to show the exit that is recommended in any dangerous situation. Moreover, more iconic signs, such as feet drawn on the floor, can be used as traces metaphor.

Movements

Information about movements given beyond directions are velocity. That can be a speed limitations for cars as well as a sign that indicates to stop at certain traffic points, such as shown in Fig. 1. Actually in urban guidance, guidance for orientation and movements are often combined. For instance, the stop sign in Fig. 1 is just visible if a car is approaching the sign from one sight. In general in way finding, the movement desteny is understood as the same as the orientation. In public guidance, signs statically recommend movements. Situation-aware recommendation may be given for people with certain attributes, which is explained in the next section.

Identity

Identity matters in public guidance if some ways or facilities shall not be accessed by everybody. For instance, certain vehicles, such as bicycles, are not allowed on highways. Moreover, public restrooms are mostly used by a specific gender (Fig. 1). Identity in human-computer interaction usually involves to detect a specific user or user group. In public guidance, it is communicated who has certain accessibility rights and then it is up to the person to decide whether or not he/she has permissions or not.

Location

Traditional public guidance is limited to static physical information mediums, such as traffic signs. The information is usually given according the location of the signs. In human-computer interaction, the location of a user can be detected (using GPS or optical systems). In contrast to that, in traditional guidance systems, people are rather told where they should be, where they should go to or what locations are not allowed to be, e.g. in parking permissions. Other examples to indicate locations are information about where places are located or where facilities are stored (Fig. 1).

CONCLUSION: TOWARDS URBAN PROXEMICS

We showed that the proxemics dimensions proposed by Greenberg et al. can be transferred to public guidance systems. We state that a huge commonly known sign language exists that is worldwide understood. It is expected that in future (using embedded sensors) we will understand the situational states in urban environments much better than today. Thus, we propose to investigate the emerging design opportunities of urban proxemics for public guidance.

REFERENCES

1. Ballendat, T., Marquardt, N., and Greenberg, S. Proxemic interaction: Designing for a Proximity and Orientation-Aware Environment. In *ACM International Conference on Interactive Tabletops and Surfaces - ITS '10*, ACM Press (New York, New York, USA, Nov. 2010), 121.
2. Dalton, N. S. TapTiles. In *Proceedings of the 2013 ACM international conference on Interactive tabletops and surfaces - ITS '13*, ACM Press (New York, New York, USA, Oct. 2013), 165–174.
3. Greenberg, S., Marquardt, N., Ballendat, T., Diaz-Marino, R., and Wang, M. Proxemic interactions. *interactions 18*, 1 (Jan. 2011), 42.
4. Marquardt, N., Diaz-Marino, R., Boring, S., and Greenberg, S. The proximity toolkit. In *Proceedings of the 24th annual ACM symposium on User interface software and technology - UIST '11*, ACM Press (New York, New York, USA, Oct. 2011), 315.
5. Rogers, Y., Hazlewood, W. R., Marshall, P., Dalton, N., and Hertrich, S. Ambient influence: Can Twinkly Lights Lure and Abstract Representations Trigger Behavioral Change? In *Proceedings of the 12th ACM international conference on Ubiquitous computing - Ubicomp '10*, ACM Press (New York, New York, USA, Sept. 2010), 261.
6. Wozniak, P., Romanowski, A., Proborszcz, F., Borkowska, M., Stozek, D., and Koczorowicz, B. Maintaining proper conditions in quiet study rooms with ambient influence. In *Proceedings of the 7th Nordic Conference on Human-Computer Interaction Making Sense Through Design - NordiCHI '12*, ACM Press (New York, New York, USA, Oct. 2012), 787.