

# Ambient Persuasion towards Simple, Sustainable Living

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## ABSTRACT

In this position paper, we present Ambient Persuasion as a promising paradigm to support simple, sustainable living. Ambient Persuasion combines ambient intelligence and persuasive technologies to influence users to make better decisions for themselves and for society as a whole. We first give a theoretical overview of this paradigm and present the results of a case study of an Ambient Persuasion prototype for sustainable mobility. Furthermore, we give an outlook about future research directions for the design of technologies for simplicity and a second wave of persuasion based on sustainable change.

## Author Keywords

Ambient Intelligence, persuasion, persuasive technologies, simplicity, sustainability, behaviour change

## ACM Classification Keywords

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

## General Terms

Human Factors; Design;

## INTRODUCTION

Ambient Persuasion is a paradigm for ambient intelligence (AmI) towards fostering sustainability and simplicity in a wide range of contexts. It blends AmI technologies with the appropriate persuasive strategies in order to empower users to make better decisions and behavioural changes which benefit them individually as well as society as a whole.

The resulting Societal Interfaces can be defined as “advanced interaction approaches that are explicitly designed to solve or improve specific societal problems, by utilizing HCI to create a more socially and ecologically sustainable society and support the quality of life” [1]. This approach continues HCI research in the spirit of Engelbart and Nelson, who respectively wanted to bootstrap human intelligence to address the growing complexity and urgency of the problems that society faces on an increasingly global level [2] and saw the potential of computers to make people happier and smarter and help

them deal with their problems [3].

The Ambient Persuasion paradigm aims to inform the design and evaluation of interfaces that address the pressing problems our world currently faces. These interfaces could constitute an important element on the road towards simpler and more sustainable living.

In the following sections we give an overview of Ambient Persuasion and present a case study in which this paradigm was successfully applied.

## AMBIENT PERUSASION

The notion of Ambient Persuasion indicates the use of persuasive technologies that rely on context sensing and a network infrastructure, to enable the delivery of applying context sensitive system behaviour and persuasive content, personalized for the user, at the right time and at the right place [4]. This opportune moment is also referred to as *kairos* [5]. A persuasive intervention which takes place at this opportune moment has an increased persuasive potential, i.e. a persuasive technology is more likely to change a user’s attitude or behaviour when the principle of *kairos* is taken into account. Ambient Persuasion constitutes a synthesis of the paradigms of AmI and persuasion. The AmI system uses implicit and explicit input to infer the state of the user and the environment and thus enables the delivery of a contextually adequate persuasive message or cue.

In order to give guidelines for the design of Ambient Persuasion applications we have developed *perCues*, a theoretical framework for persuasive Cues in Ambient Intelligence environments [6]. The framework focuses on providing implicit and peripheral cues in the users’ environment to raise their awareness for certain aspects, which are relevant for their group. These cues give additional information about the users’ environment that would otherwise remain hidden from the user. More generally speaking, these cues act as indicators about the state of a particular group and its context.

The notion of *situated* (and persuasive) *cues* which is informed by Suchmans’s work about „Plans and Situated Actions“ [7], and how these cues relate to human cognition, behaviour and specifically interaction with their environment is an important basic concept on which the *perCues* framework is built. The next section will present the practical application of this framework to support sustainable mobility.

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## **SUSTAINABLE MOBILITY**

The application presented in this section [6] utilizes perCues as indicators about the environmental pollution state in a city. It is aimed at reducing emissions by fostering sustainable mobility behaviour. This choice is based on the insight that a change in individual and collective attitude towards the environment and a resulting behavioural change is necessary to reach the goal of environmental sustainability. The use of Ambient Persuasion provides the opportunity to foster such changes in the users' behaviour.

The complexity of the environmental issues that humanity is facing, makes it difficult for individuals to comprehend them in their entirety and to come up with feasible solutions and strategies on their own. Thus, the approach presented in this section is based on utilizing the collective intelligence of groups of citizens and intends to foster it by informing the individual about the other group members and their context. The aim is to reduce the complexity by providing simple cues with contextually relevant information to the users. Based on this information, the user is able to make informed decisions that are beneficial for the individual as well as for the group and the environment.

We designed this application using a mobile platform as ambient display. The prototype displays personalized bus and pollution information, such as the departure time of the next relevant bus and the decrease in emissions caused by taking the bus instead of using the car. Users of the application also see the impact that the actions of other users have on the environment.

To evaluate the application, we conducted two successive paratype studies. The findings of these studies indicate that the situation has a significant impact on the acceptance and the persuasive effect of the perCues application. This conforms with the principle of kairos [5]. This principle emphasizes that intervening at an opportune moment increases the persuasive power of an interactive computing system. Based on its awareness of the individual context of the user, an Ambient Persuasion system could infer whether a particular situation provides the possibility for a successful intervention. The capability of Aml systems to be context aware thus has great potential for persuasion.

These studies already provide some insights about particular opportune moments for a perCues intervention. Such moments include moments at home in the morning, on the way to the bus or when leaving the office. What these moments have in common is that they allow the users to take action immediately since they are shortly before their next trip.

The participants reported a high acceptance of the perCues mobility application. It was found that the application has to provide an individual benefit for the user. In the study the personalized bus information service on the users' mobile phones was preferred over the environmental pollution information service. Thus, the individual benefit (timetable

information, mobile ticket) can be used as a "Trojan Horse" for conveying the collective benefit (decrease of environmental pollution) to the users. By only providing a service that promises a collective or societal benefit, the proposed perCues application would have been less accepted by the users.

Moreover, the participants liked the perCues service. They recognized its simplicity which we found essential for the user acceptance of the application. Also important for the user acceptance is the fact that the service only comes into focus in opportune moments. These moments are referred to as the right time for persuasive intervention. In this case this applies primarily to the pollution information, since the goal is to persuade people to behave in an ecologically sustainable way. The inference of the opportune moment has to take the personalized service (timetable information, mobile ticket) into account as well. In order to make it an unobtrusive and useful application, the user must be able to utilize the individual benefit of increased mobility related simplicity which is provided by the perCues service.

## **CONCLUSION AND FUTURE WORK**

In this position paper we showed how research in the intersection of Ambient Intelligence and Persuasion can foster the design of interfaces that support simpler, more sustainable ways of living.

A promising opportunity for future research towards the design of simple technologies that do not add further to the clutter and complexity of the users' everyday life could be to further investigate the potential and limitations of kairos i.e. presenting the right information at the right time and place. This includes research into the contextually adequate way of displaying such information and finding the opportune moments for different user groups and contexts. This would ideally lead to interfaces that do not add an additional burden to the user by e.g. displaying too much or the wrong kind information at times when the user is already busy, but rather bring forward calm technologies. Such technologies would fit in with the users routines and practices and empower them to deal with the complexity of modern life, reflect their behaviours and make better decisions leading to an increase in sustainability.

One could envision a second wave of behaviour change systems that do not only aim to influence our behaviour on a superficial level, not only helping us to act in a more desirable way, but positively influencing the way we are. Such systems could help us to become more mindful by supporting awareness and reflection. Users of such systems would not be conditioned to display certain behaviours, e.g. deemed more ecological, here and there, but rather become more sustainable in a holistic sense, being empowered with the skills to autonomously create positive changes throughout their lives.

## REFERENCES

1. Tscheligi, M. and Reitberger, W. Persuasion as an ingredient of societal interfaces. *interactions*, 14, 5 (2007), 41-43.
2. Engelbart, D. C. *AUGMENTING HUMAN INTELLECT: A Conceptual Framework*. Stanford Research Institute, 1962.
3. Nelson, T. H. *Computer Lib / Dream Machines*. The MIT Press, City, 1974.
4. Reitberger, W., Tscheligi, M., de Ruyter, B. E. R. and Markopoulos, P. Surrounded by ambient persuasion. In *Proceedings of the CHI 2008: Extended abstracts on Human factors in computing systems* (Florence, Italy, April, 2008). ACM.
5. [Fogg, B. J. *Persuasive Technology: Using Computers to Change What We Think and Do*. Morgan Kaufmann Publishers Inc., 2003.
6. Reitberger, W., Ploderer, B., Obermair, C. and Tscheligi, M. The perCues Framework and its Application for Sustainable Mobility. In *Proceedings of the PERSUASIVE 2007* (Palo Alto, California, USA, April, 2007). Springer
7. Suchman, L. A. *Plans and situated actions : the problem of human-machine communication*. Cambridge University Press, Cambridge ; New York, 1987.