‘Sometimes it’s the Weather’s Fault’ – Sustainable HCI & Political Activism

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Abstract
This paper presents empirical evidence that design for political activism that goes beyond the individual user is crucial for sustainable HCI. The analysis of a series of qualitative interviews conducted during a field trial evaluating a persuasive technology for transport behaviour resulted in 20 factors that influence such behaviour. Factors were ordered and grouped by the potential of a person to influence a factor individually. Concluding, four approaches for HCI, namely, *entertainment, education, community support, and political activism* are identified that can together address the full continuum of influence factors.

Author Keywords
Sustainable HCI; activism; persuasion

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

Introduction
In the recent years a lively debate about persuasive technologies for ecological sustainability has arisen in the HCI community [1,3,4,9]. The main criticism is that the used approaches focus too narrowly on individuals as a rational actors and ignore the social and cultural system around them [1,3]. *HCI for activism* has been

Design of the PEACOX trip planner app

The app included the persuasive strategies of *feedback, tailoring, tunneling, suggestion,* and *rewards*.

Feedback: The app included feedback on CO_2 emissions of past and planned future trips.

Tailoring: Trip recommendations were balanced based on user preferences and CO_2 emissions.

Tunneling: Users were guided through the route search with a bias towards ecologically friendly routes.

Suggestion: Environmentally friendly route options were placed more prominently in the interface.

Rewards: A virtual tree on the home screen was growing leaves if users behaved environmentally friendly.

proposed as a more appropriate approach to deal with the complex problem of (un)sustainability [2,8,13].

The aim of this work-in-progress is to support the claim for political activism in HCI by giving empirical evidence on how a limited approach to persuasive technology for sustainable transport choices severely reduces its effects. It is based on an on-going analysis of qualitative interviews conducted during a field trial of a "conventional" persuasive technology that uses five popular persuasive strategies (see box to the left) to motivate users to choose sustainable transport options.

Results show that despite positive environmental attitudes, our participants are tied to a social and structural system that prevents effective change. Based on the results, we develop a typology of HCI products that address these ties.

Related Work

In the last decade HCI has seen a surge of technologies trying to motivate or persuade people to change unsustainable behaviours [1,3,6]. However, only limited effectiveness of the applied strategies could be reported so far [1].

Recently, criticism of "conventional" persuasive sustainability has been expressed. The concept is limited, as it is understood as a modernist enterprise targeting efficiency and optimisation [1], treats unsustainable behaviour as a matter of individual moral or rational choice [4], and ignores how individuals are embedded in social and cultural systems [3].

In short, unsustainable behaviour is often not just a matter of a person's free decision. It is tied to social and cultural circumstances that are beyond individual control. Therefore, in many instances, activism has been proposed as an approach to reframe persuasion and sustainable HCI [2,3,7,8,10,12,13]. Activism here is understood not only as 'real-world' protest, but also as the use of technology to empower discontent individuals to become agents of larger social change.

This stance on activism forms the base of the work presented in this paper. Going beyond advocacy for activism, it explores specific aspects of unsustainable transport behaviour that need to be addressed in an activist manner.

The Case: PEACOX Trip Planner App

The presented work is based on a field trial of the PEACOX persuasive trip planner app that allows planning of multimodal routes across the city of Vienna, Austria. It includes feedback on CO_2 emissions of past and planned trips. The design of the app followed a persuasive, personalised, and context-aware approach [14] using five popular strategies (see box to the left).

Study Design

During the field trial, 23 study participants used the PEACOX app for 8 weeks. The aim was to evaluate if users increase their usage of sustainable transport options and to explore their reasons for doing so. During the trial users were asked three times to fill in online questionnaires asking for attitudes towards eco-friendly traffic [15] and different modes of transport [17]. Additionally, two qualitative, semi-structured interviews, one face-to-face and one via telephone, were conducted with each user exploring motivations and reasons for (not) changing their behaviour. The app also continuously tracked GPS positions of the users' smartphones to measure actual change.

An intermediary analysis of questionnaire responses and GPS tracks suggested, however, little actual behaviour change. We explored the reasons for this in the second round of interviews.

For the purpose of this work-in-progress, we report the results of 7 interviews that showed extreme values (high or low) in three aspects: their attitude towards eco-friendly transport modes, their attitude towards car usage, and their share of car trips among all trips. The interviewees will be referenced as I1 to I7.

Preliminary Results

A grounded theory approach was taken for analysis of the interview data to answer the question, why participants did not change behaviour. In a first step, we performed open coding to derive *factors* from the data that influence travel behaviour. This process resulted in 20 factors as listed in Figure 1. We then sorted these factors roughly by how much they are under an individual's personal control. Additionally, we grouped factors and labelled them as *spheres of influence*, suggesting they should not be seen as distinct categories, but rather as markers on a continuum. We defined 4 spheres: *personal, social values, societal,* and *structural*. In a last step, we developed broad *approaches* how sustainable HCI can address these factors.

Personal Sphere

The personal sphere contains factors an individual can directly change and where it is comparably easy to support such change with technology. For example, one user stated that he does not want to stop driving "mainly because it is fun. This is a very important point" (I1). Besides fun, "pure convenience" (I4), the

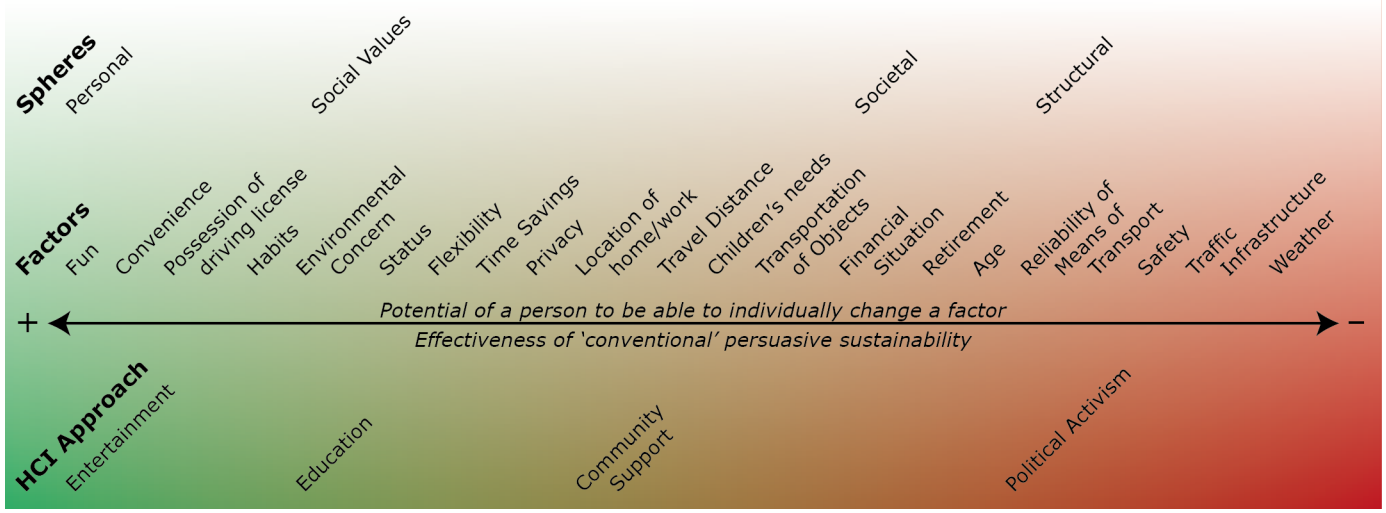

Figure 1. The factors influencing travel behaviour ordered by potential of a person to be able to individually change a factor (from green = easy to red = hard). On top *spheres of influence* that serve as group labels for the factors. Below HCI approaches of how to address the identified factors.

acquisition of a driving license and habits are influential factors.

Social Values Sphere
This sphere contains social values that guide individual behaviour. Obvious values include environmental concern and status. One user put this bluntly: "I mean, excuse me, as a businessman, you drive a car. You just don't take the subway" (I3). Privacy is another value. One user for example, prefers the privacy of his car, because "when you get on a tram with a dog, people just look at you funny." (I2). We also consider flexibility and saving time as social values, as the need for being flexible and time effective is not naturally given but culturally shaped.

Many drivers reported the need of the car to travel between work and home, and more generally to travel longer distances: "I work in [the outskirts of Vienna], and since I've moved to the inner city I have been driving much more often than before" (I6). A second, very common answer was to transport children and/or items: "As you know, when the kids are little there are many things to take with you, […] diapers, […], toys, clothing, and so on" (I4). Again, cultural values shape where one finds it desirable to live and work, e.g. influenced by where social peers live. Also the desire to transport children by car, be it out of convenience or out of safety concerns, is not inherent to humans.

Societal Sphere
Someone's financial situation is not a personal choice, in many cases it is a fact defined by society. One user reported, "As a student I was only riding the motorbike, because of financial reasons. Now I can afford both" (I1). Likewise, changing social roles that are associated with older age or retirement can be a factor for changes in travel behaviour. One participant, 68 years old, was a car driver all life long but stopped abruptly once being retired: "I think this really changes with age. Today I think this is really stupid to drive a car through Vienna" (I3).

Structural Sphere
The final sphere contains factors that are structural, and thus very difficult to change for an individual. They are concerned with the reliability, safety and availability of public transportation and cycle paths. One user thinks that "public transport is partly overcrowded, and partly it has the drawback to fail often" (I5). On the other hand the same interviewee does not cycle, "because I do not necessarily feel safe on the cycle paths" (I5). And sometimes, as one user explains, there is no alternative to the car: "One thing is clear, if you only have a bus twice a day, and you want to go somewhere, there is no other option" (I7). At the very end of the continuum, the weather can be a reason for not cycling: "Well, sometimes it's the weather's fault" (I7).

Implications for HCI

As the results show, there are a number of factors preventing sustainable behaviour. The point of grouping them into *spheres* is to show that a large number of these go well beyond the individual's influence. In fact, it can be argued that everything outside the personal sphere would require larger social or cultural changes to overcome. We therefore encourage an activist stance on dealing with the complex issue of sustainability, but do not condemn "conventional" approaches focusing on the individual. Figure 1 shows that there is space (and, as we argue, need) for a variety of ways to address the

identified factors. In particular, sustainable HCI should provide *entertainment*, *education*, *community support*, and *political activism*.

Entertainment
To entertain means to increase the fun factor of sustainable alternatives to car driving. Gamification approaches such as Greenify [11] seem promising. However, entertainment alone cannot fully cover all aspects of unsustainable practices. One important addition is to add educational aspects.

Education
Educational products have value when users should be informed about consequences of personal actions, optimisation potentials, and possible alternatives. Furthermore, they are implicitly normative by defining what is desirable behaviour and thus try to provoke self-reflection on personal values. There already exist plenty of educational products that implement this, both in research and commercially available. A famous example is UbiGreen [5], and the PEACOX prototype [16] also falls into this group.

Community Support
In addition to education, values can be addressed by social support strategies, such as social comparison, which has been a popular strategy in the field of persuasive technology [18]. Examples include various carbon emission or energy consumption meters that allow comparing your own behaviour with others. Additionally, community mechanisms that support direct communication between its members to share ideas and tips, for example in health promotion [12], allow users to take a more active role, which leads us to the last group of approaches.

Political Activism
Activism approaches have taken different shapes in HCI. Prominent examples are citizen science or citizen sensing approaches, where people use today's sensor-rich ubiquitous technology to collectively gather large amounts of data, e.g. on air quality [13]. Important here is to empower users to be active data generators rather than passive sensors [7]. For example, technology could enable them to better reach out collectively to political representatives or the media to improve situations, e.g. missing public infrastructure or unsafe cycle paths. Even the weather does not need to be a barrier. Experienced cyclists could serve as agents of change for all-weather cycling, including tips on appropriate bike equipment, clothing, and cycling style.

Conclusions & Future Work

In this paper we presented preliminary results of an analysis of qualitative interviews that explored why users did not increase use of sustainable transport alternatives despite being exposed to persuasive technology that promoted such behaviour. The results enrich the on-going debate in the HCI community on the role of activism in persuasive sustainability. The point is made that "conventional" approaches fail to recognise a number of factors that strongly influence an individual's behaviour and are therefore likely to have limited success, if any. Furthermore, it is argued that activist approaches that have been proposed before by others are a fruitful addition to overcome this limitation. HCI can empower users to become activists for their cause to create wider social or cultural change. In contrast to other, more radical positions [9], we do not dismiss conventional approaches but see *HCI for activism* in symbiosis with them to address the full continuum of influence factors pictured in this article.

Admittedly, the list of influence factors presented in this work does not claim completeness. The full analysis of interview data collected will most likely reveal additional factors to be included in the continuum, or even open up other lines of thought. Furthermore, the order and grouping of factors needs to be validated quantitatively with a larger sample size. Nevertheless, the preliminary results allow a first empirical validation of the importance of activism in HCI.

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