
Social Translucence as a theoretical framework for sustainable HCI

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Abstract

Motivating sustainable behaviors is increasingly becoming an important topic in the HCI community. While a substantial body of work has focused on the role of peer-pressure through social networks, we argue that the community has largely overlooked the importance of strong social ties and specifically those of family members. Here we propose the theory of *Social Translucence* as a theoretical framework for understanding how eco-feedback interfaces can integrate with and support existing communication practices within families.

Keywords

Sustainable behavior, family dynamics, motivations, behavior change, Social Translucence

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Position paper

Introduction

Environmental sustainability is an increasingly important global issue. Quite simply, human beings,

and particularly those in the western world, use resources far faster than they can be reproduced. This behavior is arguably a consequence of the seductive vision of “wellbeing” afforded, enabled and encouraged by industrialization; a vision based on personal ownership and mass consumption. A number of disciplines (political science, sociology and psychology, etc) have taken our attention to different perspectives that are related to this kind of behavior.

Beyond concerns of public policy that may affect environmental sustainability at large, recent studies have focused on the role of citizen’s behaviors and the ways of affecting these behaviors [11]. Within HCI, we see three distinct approaches: *educating* about the consequences of individual behaviors, providing *just-in-time recommendations* that affect behavior, and employing *social* motivational techniques.

Energy consumption is considered to be invisible to millions of users, which consequently makes it a prime case of much wastage in particular for domestic consumption [2]. In order to change people’s attitudes and eventually affect their behavior, ecological awareness campaigns and the distribution of ecological information were strategies used to tackle this problem. However, providing information only did not appear to be sufficient to reduce energy consumption since few people would act on the information [15].

On the other hand, providing feedback revealed to be another selected strategy as contextualized feedback associated with more frequent reading and paying of domestic electricity consumption, had been shown to

increase user awareness and reduce consumption [1, 2, 5]. New technologies in both data acquisition and analysis (for instance NILM) and visualization provide individuals access to information about their energy consumption that is otherwise difficult to estimate. Eco-feedback, for example, provides access to behavioral cues and sustainability indicators through information visualization tools and infers the future impact of concrete behavior changes on energy consumption and costs [13].

Nevertheless, current utility billing practices greatly limit the feedback that most households receive on energy consumption [15]. Residents find it challenging to understand how specific behaviors impact energy consumption and cost [15]. It is difficult for the consumer to link activities and develop a coherent, comprehensible and concise cognitive frame of what electricity conservation could mean in everyday life [7]. And also, although eco-feedback has a great potential it doesn’t guarantee positive change or uniformly improve performance [8].

Beyond providing contextualized feedback it seems more important to present feedback at the time a specific device is being used. When using devices people tend to do it automatically without considering environmental concerns or more effective ways of taking advantage of the devices properties [14]. This increases the possibilities of acting on the information presented as the alternatives are shown in the context, in a disaggregated way and at the right moment [2, 3, 5, 8].



Figure 1. Socially translucent systems have to make socially significant information, such as one's energy consumption, visible to one's social network. Once this information is visible, people may or may not become aware of this and may act upon it. For instance, they may positively respond to a good act and thus reinforce it or may also become motivated to behave in the same manner. Thirdly, this mutual awareness of each other behaviors eventually results into people feeling more accountable for their actions.

Researchers have thirdly focused on strategies for implementing social motivational techniques in eco-feedback tools for promoting sustainable behaviors of individuals [11, 12].

The social context is one important variable being considered to understand how individuals are influenced in terms of their energy consumption. It is likely that users who share their energy usage online will similarly feel pressure to engage in energy efficient behaviour [8]. In fact visual monitoring systems have shown to be able to support sustainable behaviour if the users are motivated through social networks, and if the technology is tailored to individuals so they better self-reflect and experiment with their behaviour [10].

The research done so far has focused mostly in social networks and their influences, however, these types of social ties could be considered weaker when compared

with stronger social ties generated by family relationships [10]. Families do have regular discussions about environmental issues while they constitute our primary social space where all the society rules are first learned [9].

In the remainder of the paper we outline the Theory of Social Translucence and draw its relevance for eco-feedback interfaces.

Social Translucence as a theoretical framework for sustainable HCI

The Theory of Social Translucence [6] argues that motivating desired behavior requires more than making one's behavior visible to his or her social network. It identifies three properties – *visibility*, *awareness*, and *accountability* – of socially translucent systems, systems that support coherent behavior in groups and

communities by making participants and their activities visible to one another.

Motivations	HLC/LLC	Quotes from transcripts
Parenting	HLC	<i>(...) as we have a young child if we tell her to turn off the light when she's not using the room and we do this, she will also do it"</i>
Reduce costs	LLC	<i>(...) after seeing how much using the dryer during the day I am more aware and I will avoid using it (...), I am aware of how much it is spending and these times are not for excessive expenses "</i>
Self-identity	HLC	<i>(...) my wife doesn't care about this, I'm the one doing this (laughs) I measure it not only because I want to save but because I'm curious to know how much do I save if I turn off the devices from the stand-by mode "</i>

Table 1. Motivations for sustainable behavior classified as high-level (HLC) or low-level construals (LLC)

Communication practices	Actions	Examples
Verbal	Positive Negative Neutral	Complements Mention what are the flaws and not value positive actions Talk about the consumption and show it in the system
Non-verbal	Actions that give an indirect message	Place tape on the switches so they couldn't use it

Table 2. Communication practices in the family

Socially translucent systems first have to make socially significant information, such as one's energy consumption or transport behavior, visible to one's social network. Once this information is visible, people may or may not become aware of this and may act upon it. For instance, they may positively respond to a good act and thus reinforce it or may also become motivated to behave in the same manner. Thirdly, this mutual awareness of each other behaviors eventually results into people feeling more accountable for their actions.

Visibility refers to making one's behavior (e.g. energy consumption) visible to others. We understand visibility in a broad sense, reflecting eco-feedback interfaces' ability to make not only family behaviors visible among all members of the family, but also the impact of those behaviors. In other words, eco-feedback interfaces need to visualize consumption behaviors within a house but also challenge family misbeliefs about what actions may result to energy savings.

According to ST Theory, however, visibility does not guarantee *awareness* of the information. We propose that in designing eco-feedback interfaces we need to take awareness into account, through the analysis of variables such as the location of eco-feedback interface, the relative location of family members, and the activities they do together. First, is the eco-feedback interface accessible to all members of the family, or does the family use one or some of its members as a proxy to the information? We have experiences that aspects such the location of the eco-feedback interface within the house, its height (prohibiting access to children), as well as the social structure of the family to be factors that affect the

accessibility of the information. Second, mutual awareness of each other's consumption behaviors exists even in the absence of eco-feedback interfaces; eco-feedback interfaces need to take this into account and integrate with existing communication practices of the family.

Accountability of one's behaviors is built up through a mutual awareness of each other's actions. In our work we are attempting to understand the social strategies that families use in making all members accountable for their behavior. The question at hand is not how eco-feedback interfaces may replace these but instead, how they can support and integrate with existing communication and coordination practices. Table 2 outlines a adapted framework from [4] of different communication strategies used within families.

Next, in our interviews with families we have seen that people are often driven by very different motivations for sustainable behaviors (see Table 1). While much of current work on sustainable HCI is focused on cost-reduction as a primary motive for sustainable behaviors [8], we have experienced that families and individuals are often driven by ideals such as being a good role model for their children (parenting), and identifying themselves as a green-citizen (self-identity). Crucial to understand here is the very different nature of low-level (such as cost) and high-level (such as ideals) motives.

Construal-Level Theory (CLT) [16] argues that low-level and high-level motives – or construals – behave very differently if one projects them into the future. CLT proposes that that “temporal distance shifts the overall attractiveness of an outcome closer to its high-level

construal value than to its low-level construal value”. In other words, while low-level construals such as cost-reduction may be powerful persuasive stimuli if projected in the near future, they become less attractive if projected in wider temporal distances. Instead, temporal distance makes high-level construals such as aspects of self-identity and parenting more attractive and thus more persuasive stimuli.

Ongoing work

We are currently analyzing the data of a qualitative study with 20 families using a combination of diary studies and interviews, trying to understand the motivations for sustainable behaviors and the communication practices used in making everyone accountable about his/her consumption behavior.

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