



Understanding families' motivations for sustainable behaviors



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ABSTRACT

While interest in eco-feedback technologies has peaked over the last decade, research increasingly highlights that simply providing information to individuals regarding their consumption behaviors does not guarantee behavior change. This has led to an increasing body of work that attempts to characterize individuals' latent motivations that drive sustainable behaviors. With this paper we aim at expanding this body of work by analyzing such motivations in the context of families. We report findings from interviews with 15 families who used an eco-feedback interface over a period of 2 years. Our study reveals that motivations for sustainable behavior were not only rooted in individuals' environmental concerns and need for expense management but they also regarded: (i) individuals' and families' need for a *sense of control and security*, (ii) parents' *self-perceived responsibility* of their role as parents and (iii) the perception of *individual as well as family identity*. We argue that in order for eco-feedback technologies to attain long-lasting behavioral changes in the domestic environment they need to address basic family needs that go beyond individual ideals of pro-environmental behavior.

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1. Introduction

Environmental threats and climate change have affected populations across the planet causing an impact on their health, access to resources and compromising the future generations (Abrahamse, Steg, Vlek, & Rothengatter, 2005; Elias, Dekoninck, & Culley, 2007; Froehlich, Findlater, & Landay, 2010; Watterson & Fernandez, 2012). The impact of these threats has brought together researchers and governments in the design and implementation of possible solutions towards sustainability. Researchers from the fields of sociology, psychology and economics have suggested that providing relevant information that facilitates awareness of consumption behaviors is likely to influence pro-environmental practices (Riche, Dodge, & Metoyer, 2010). As a result campaigns evolved around the premise to promote environment-friendly behaviors within contexts involving domestic consumption, work related behaviors, public spaces and local communities (Froehlich et al., 2010, 2012). In this trait, most research domains centered on an individual as a decision maker (Wilson & Dowlatabadi,

2007). Despite this general trend some sociologists questioned the relevance of the individually framed decision models and emphasized the social and technological construction of behavior (Wilson & Dowlatabadi, 2007).

Research within the field of Human–Computer Interaction has focused on the so-called eco-feedback technologies, ones that sense and visualize energy consumption with the goal of promoting behavior change (Dillahunt, Mankoff, Paulos, & Fussel, 2009; Elias et al., 2007; Froehlich et al., 2010). Research in eco-feedback technologies, up until now, has largely focused on changing individual behavior through psychologically grounded principles derived from theories of motivation and behavior change (e.g. (Abrahamse et al., 2005; Froehlich et al., 2010; He, Greenberg, & Huang, 2010; Petkov, Goswami, Kobler, & Kremar, 2012; Petkov, Köbler, Foth, & Krcmar, 2011)). However, concerns regarding the long-term impact of persuasive designs are increasing (Broms et al., 2010; Pierce, Schiano, & Paulos, 2010; Strengers, 2011) and researchers call for an emphasis on how eco-feedback technologies should integrate with the cultural and social practices (Horn et al., 2011; Strengers, 2011).

Particularly, domestic practices have attracted an increased interest, both due to the uniqueness and complexity of such an environment, but also because of its substantial contribution to CO₂ emissions (Davidoff, Lee, Yiu, Zimmerman, & Dey, 2006; Watterson & Fernandez, 2012). As such, households have been

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characterized as an ideal target for the design and evaluation of new eco-feedback technologies (Strengers, 2011; Watterson & Fernandez, 2012). Still, the implemented interventions have so far failed to endure in the long term, calling researchers' attention into the ways in which eco-feedback technologies integrate with domestic activities and social norms (Strengers, 2011; Woodruff, Hasbrouck, & Augustin, 2008).

As a result, a number of researchers have started studying individuals' motivations for pro-environmental behaviors in the domestic place. The most frequent motivations have been found to relate to individuals' need for cost management, to environmental concerns or values (Dillahunty et al., 2009; Pierce, Schiano, et al., 2010; Strengers, 2011). However, it is crucial to realize that families often experience difficulties when implementing eco-friendly practices due to the diversity regarding its members, in particular, in terms of age, needs, daily habits, schedules and comfort levels (Froehlich et al., 2010; Horn et al., 2011; Odom, Pierce, Stolterman, & Blevis, 2009; Pierce, Fan, Lomas, Marcus, & Paulos, 2010; Strengers, 2011). Such an observation indicates that eco-friendly practices are negotiated within the household rather than imposed (Horn et al., 2011; Pierce, Schiano, et al., 2010; Strengers, 2011). Researchers found that some practices are non-negotiable once a family believes to be doing everything in their power to reduce their energy consumption (Pierce, Fan, et al., 2010; Strengers, 2011). In other cases, however, having access to eco-feedback fails to challenge the existing practices, or even becomes used as a guideline to keep the consumption levels stable throughout time although such levels are neither low nor efficient (Pierce, Fan, et al., 2010; Strengers, 2011).

Based on the related work we argue that getting a better understanding of the complex structure of families' motivations for pro-environmental behaviors can provide a useful guide for the design of more effective technological solutions. We report interviews with 15 families who used an eco-feedback interface for 2 years. Our goal is to understand how latent motivations of the different family members shaped and regulated their sustainable practices.

This paper organizes as follows; first we present the related work introducing how the literature review has analyzed motivations for sustainable behaviors, then the research motivation and the techniques used to collect the data about family's motivations within this study. The findings are then explained in terms of previous literature but also, group differences. Finally, the discussion and conclusions reflect on the current results and how can these be integrated to address family's specific needs.

2. Related work

Pro-environmental behaviors are driven by a wide range of latent needs and motivations. Within HCI, researchers have found such motivations to tap into individual needs for managing life costs (Chetty, Tran, & Grinter, 2008; Davidoff, Ziebart, Zimmerman, & Dey, 2011; Miller & Buys, 2010; Steg, 2008; Tan, 2009), achieving and maintaining comfort levels (Chetty et al., 2008), and acting according to environmental concerns (Schäfer & Bamberg, 2008). Eco-friendly behaviors are further driven by established habits and routines (Gram-Hassen, 2007; Hazas, Friday, & Scott, 2010; Steg, 2008; Strengers, 2011), social influences (Petkov et al., 2011; Thieme et al., 2012) and through an attempt to display conformance to one's own self-identity (Black & Cherrier, 2010; Gronhoj, 2006).

Financial motivations are often the most salient ones in initial interactions with eco-feedback technologies. As such, many eco-feedback interfaces have been designed with the goal of providing ways to control households' energy costs (Chetty et al., 2008; Kjeldskov, Skov, Paay, & Pathmanathan, 2012; Tan, 2009). Such motivations are understood as basic since they tap to individuals'

concerns over their economic sustainability (Dillahunty et al., 2009). Information on energy consumption has often proven useful in challenging individuals' misconceptions on the long-term energy costs of devices and established ill habits (Chetty et al., 2008; Kjeldskov et al., 2012; Tan, 2009). However, research has also showed that increasing awareness about energy costs does not necessarily imply a change in people's behavior (Pierce, Schiano, et al., 2010; Shove, 2010). Moreover, not all family members share financial motivations to the same extent, as, habitually, only one or a subset of them is responsible, or even aware, of a need to control energy costs (Chetty et al., 2008).

Another motivation regarding eco-friendly behaviors is the *level of comfort* families desire regardless of its environmental impact (Chetty et al., 2008; Dillahunty et al., 2009; Hazas et al., 2010; Kappel & Grechenig, 2009; Steg, 2008). Families who referred to this motivation, wanted, for instance, to control the thermostat to be able to maintain comfortable temperature at all times. They also tended to maintain their meat consumption without considering other food alternative and, preferred to have access to transportation at all times, either through owning two cars or buying a larger one to drive all family members regardless of fuel efficiency.

Yet another motivation for sustainable behaviors regarded the need to *maintain daily routines and habits* (Dillahunty et al., 2009; Gronhoj, 2006; Pierce, Schiano, et al., 2010). According to Schafer et al. (Schäfer & Bamberg, 2008) habits are responsible for the establishment of repeated behaviors and work as conservative forces where new information about alternative behaviors is considered. Habits, therefore, seem to restrict behaviors and render some modifications as non-negotiable by constraining individual flexibility to change (Pierce, Fan, et al., 2010; Pierce, Schiano, et al., 2010; Strengers, 2011). For instance, habits learned from previous generations, which found them convenient, efficient and useful, such as e.g. doing laundry at 60 deg, which can be seen as essential to guarantee 100% clean clothes, are difficult to give up (Gram-Hassen, 2007; Hazas, Brush, & Scott, 2012; Strengers, 2011).

Sustainable behaviors can also be driven by *environmental concerns*. It has been shown that people are concerned about future generations' access to resources, and, for that reason, are willing to modify their lifestyles and surroundings to address these concerns (Chetty et al., 2008; Dillahunty et al., 2009). Individuals driven by such a motivation are more likely to be mindful about their consumption behaviors and change their daily routines (Gilg, Barr, & Ford, 2005; Miller & Buys, 2010; Woodruff et al., 2008). For example, they may repair old appliances, attempt to reduce electricity usage through engaging in outdoor activities, replace plastic with cloth bags, shop in local markets, reuse water from the shower to water plants or use an extra sweater in the house instead of increasing the heating temperature (Chetty et al., 2008; Gilg et al., 2005). As seen in Fransson and Garling (1999) these individuals possess a considerable level of knowledge about environmental problems, are willing to discuss alternative solutions and develop skills to achieve intended behaviors.

It has been further found that individuals' *social network* exert influence on their energy consumption. For instance, individuals are more willing to modify behaviors when the impact of these behaviors becomes visible to their social network (Froehlich et al., 2010; Petkov et al., 2011; Pierce, Fan, et al., 2010; Thieme et al., 2012). While social influences take place in a number of ways such as peer pressure, public accountability and competition (Froehlich et al., 2010; Pierce, Fan, et al., 2010), central to all these is the notion of *self-identity* (Belk, 1988; Zimmerman, 2009) For instance, some people are driven by anti-consumption practices (i.e., reducing, reusing and rejecting the purchase of new products whenever possible) (Black & Cherrier, 2010). Within these anti-consumption contexts, individual values and self-perception are driving individual acts which often tap to one's social responsibil-

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