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Exploring *Hygge* as a Desirable Design Vision for the Sustainable Smart Home

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ABSTRACT

In this paper, we present an exploratory study of *hygge* as a low-energy design vision for the smart home. *Hygge* is a Danish concept that embodies aesthetic experiences related to conviviality, often shaped by orchestrating atmospheres through low-level lighting. To explore this vision, we probe two Australian households that already live with smart home lighting technology. We report on household reflections of embedding *hygge* into everyday life. We conclude by outlining future directions for exploring desirable and sustainable smart home visions.

Author Keywords

Smart home; sustainability; design visions; aesthetics; smart lighting; hygge; energy consumption.

ACM Classification Keywords

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

INTRODUCTION

Currently, two HCI research discourses shape the design visions for the smart home. First, the *desirable* smart home, as a home that enhances people's experiences of comfort, convenience, and security through pervasive technologies [2]. This vision has been supported [9,12,38,40] and challenged [24,32,39] by HCI researchers and practitioners for decades. Second, the ongoing pursuit of the *sustainable* smart home [1,18,19,31,40]. In most smart home research these visions have been pursued separately and potentially undermine each other. For example, recent studies have shown that the pursuit of desirable smart home 'enhancements' may increase consumption and outweigh energy efficiency benefits [15,17,20].

In this paper, we approach this emerging dilemma by bringing desirability and sustainability together to explore ways of steering everyday life towards desirable, lower-energy visions. We build on past work, which identified an energy-intensive aesthetic vision of 'pleasance' [36] and householders' different desires or 'desiderata' [20] for the smart home. This research suggests that one possible approach for HCI designers is to identify desirable low-energy visions for the smart home and explore ways of embedding these into devices and households' everyday practices.

Towards this end, we turn to the popular and less energy intense concept of *hygge* emerging from Denmark. *Hygge* has taken up a desirable position in contemporary visions for everyday life in several westernised countries [27,37]. The Danish concept of *hygge* reflects a romanticised Scandinavian lifestyle featuring cosiness and companionship. While not directly marketed as 'low energy', the vision embodies ideas of low-level lighting, minimal engagement with technology, and 'traditional' ways of keeping warm, such as using blankets or drinking hot cups of tea. *Hygge* contrasts with the energy-intensive vision of pleasance currently permeating smart home marketing [36], where new smart devices, sensors and functions (e.g. mood lighting) are embedded into practices and parts of the home, potentially creating new energy demands and outweighing any energy efficiencies [20].

Focusing specifically on *hygge*'s potential relationship with smart lighting, this paper reports on a deployment of explorative *hygge* probes in two Australian households as part of a larger study on the smart home. Through the deployment, we sought to circulate different ideas about desirable ways of life within the smart home and identify how designers can embed these into devices to help steer emerging smart home practices in more sustainable directions.

WHY HYGGE?

Most HCI efforts to design for sustainable outcomes have either looked for ways to do this as efficiently and effortlessly as possible via intelligent and automated technology [1,19,33], or advocated for desirable 'Going Green' visions [25] that aim to engage people with sustainable choices, either by informing and educating [5], suggesting greener alternatives [21], or proposing alternative lifestyles e.g. 'voluntary simplicity' [13]. These approaches envision sustainability as something that is desirable by assuming that people aspire to 'do the right thing' either via optimisation or by actively pursuing a 'sustainable'

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lifestyle. In this paper, we experiment with a different approach for envisioning sustainability and desirability in the smart home. Specifically, we turn to *hygge*.

Lighting is central to *hygge* where natural daylight, candles, and electrical lighting all play important roles in orchestrating *hygge* atmospheres [4]. As Bille [4] demonstrates, *hygge* orchestrates desirable atmospheres of intimacy, informality, belonging, togetherness, equality, and secureness that shapes interior and exterior spaces of the home and relationships between people and things. In this way, *hygge* has parallels to the energy-intensive aesthetic vision of pleasance [36] that embeds desirable expectations of comfort, relaxation, and peace of mind into the smart home. Like pleasance, comfort and relaxation are central to *hygge*, but in contrast to it, creating the calm and convivial atmosphere associated with *hygge* tends to involve less use of electrical lighting and technology. As a result, *hygge* can be 'naturally' less energy intensive, but not generally promoted as such. This means *hygge* could appeal to a wide range of smart home adopters, including those for which environmental issues are of little interest and/or saving energy is not desirable.

In this paper, we explore whether *hygge* can engage early adopters of smart homes in a lifestyle vision and aesthetic experiences which use less energy. We explore this in a country where *hygge* is not widely understood but is gaining some traction as 'hip' and 'cool' – or desirable.

RESEARCH DESIGN

In the first phase we drew on qualitative research (photography, semi-structured interviews, and informal home technology tours [6]) with 23 Australian households that used smart lighting and other smart home technology. The main objective was to understand how smart home technology was incorporated into the everyday lives of early smart home adopters, and the energy implications [see 20].

The purpose of the second (*hygge deployment*) phase was to probe ideas of *hygge* to encourage lower energy usage without explicitly discussing energy. We designed an exploratory probe pack (Figure 1) consisting of: a digital diary, a coffee table *hygge* book, a *hygge* quiz, and a *hygge* app for the Philips Hue smart light system. The app was built by the researchers and included possibilities to create and select *hygge* mood scenes which involved minimal and soft lighting (instead of their existing lighting arrangements of mood scenes involving multiple colours). The *hygge* book and quiz also provided information on how to create *hygge* through (smart) lighting and other materials. The diary contained open-ended questions that allowed our participants to reflect on *hygge* and to share, through text and photos, their *hygge* 'moments'.

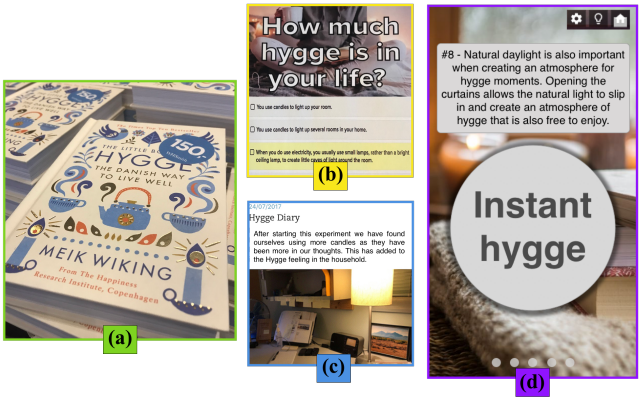

Figure 1: The explorative probes; a) *hygge* book; b) *hygge* quiz; c) snippet of a digital *hygge* diary; d) *hygge* app

As lighting infuses a range of household practices, the probe pack design was inspired by Shove et al.'s [34] theory of social practice change. Shove et al. argue that one way in which practices change is by mixing up the elements (material, meanings, and competences) of practices in different ways. Thus, the purpose of the probe pack was to circulate *hygge* practice elements that would encourage participants to experiment in playful and provocative ways. More specifically, the probe pack was intended to engage householders with new (or old): 1) materials such as new scenes of smart lighting and the use of candles and natural lighting 2) meanings about what is cosy, warm, and aesthetically pleasing, and 3) competencies on how to create atmospheres, connect with others, or calm down.

Two households interviewed in phase one used the Hue system extensively and were recruited for the *hygge deployment phase* – Adam and Natalie (a couple) and Tony. Adam was an IT specialist and keen amateur photographer, while Natalie worked as a nurse. The couple had designed the lighting for their new house to include 19 smart light bulbs, two smart lighting strips, and non-smart spot lights in the ceiling throughout the house. Tony was an academic with a keen recreational interest in design. Tony's home was equipped with seven smart bulbs and one smart lighting strip. Tony's smart bulbs were placed in decorative lamps in different rooms, while spot lights were placed throughout the home.

This part of the study was conducted over four weeks in June/July 2017 (winter) and involved two interviews with each household. In the first interview, questions were directed towards their use of smart lighting. Households were also introduced to the probe pack and given the opportunity to ask questions about the probes, *hygge* and the study. In the second interview participants were asked about their understandings of *hygge* and how they used the concept/probes in the past month. Both interviews were audio recorded and professionally transcribed. The transcriptions were subsequently analysed using an emergent coding approach [23] resulting in four themes discussed below.

FINDINGS

Aesthetically pleasing experiences and smart lighting

Prior to introducing the *hygge* probe pack, households were using their lights for functional, decorative, and aesthetic outcomes. Direct electrical lighting (particular non-smart

spot lighting) was mostly used to provide better visibility for chores such as cooking and cleaning. In contrast, colourful and dimmable smart lights were typically used to create attractive and comforting atmospheres via smart mood scenes. This finding reflects the dilemma of having competing desirability and sustainability visions for the smart home. One reason that households chose to install a smart light system was because the smart bulbs and strips were low energy LEDs. However, the smart lights also infused additional household practices for reasons other than functionality. Householders desired to aesthetically enhance practices such as reading, dining, cooking, television watching, and bathing with smart lights, which added beauty, nourishment, uniqueness, and playfulness to the experience. This often involved the use of more lights (lamps and strips) for more time (Figure 2 & 3) and therefore could undermine the energy efficiency benefits of LED technology.

Figure 2: Colourful LED strips in the dining room

Figure 3: Smart LED used when watching television

After circulating ideas of *hygge* through the probes, participants approached their smart lighting system differently to create atmospheres that emphasised happiness, cosiness, relaxation, and warmth. In particular, Adam and Natalie engaged extensively with the probes and aspired towards *hygge* as a way of creating aesthetically pleasing experiences through lighting.

> Adam: I have actually played with the setting of the lights more than I normally do… Just thinking about it [hygge] has actually made quite a big difference in terms of my desire, real drive to create atmosphere even more.

Interestingly, these *hygge* atmospheres were mostly created by exploring scenes in their smart lighting system that dimmed or turned off electric lights. This echoes Bille's [4] finding that soft and minimal *hygge* light shapes aesthetic, ambient, and emotional experiences. These findings are encouraging because they suggest that circulating alternative design visions for the smart home can help lower electricity consumption.

Hygge and non-electrical materials

Participants also associated *hygge* with the use of non-electrical and 'dumb' materials. Tony, for example, associated light from his fireplaces as a source of *hygge*.

> Tony: Really hygge, it's also when you've got light from the fire.

Candles were also associated with *hygge* and used in both households as a decorative light source to create *hygge* atmospheres. Candles were used as a supplement to dimmed electric smart lights as seen in Tony's home (Figure 4), while Adam and Natalie explored using candles as the only light source in some practices, e.g. bathing (Figure 5).

Figure 4: Mood setting with different lighting sources

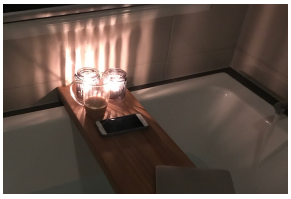

Figure 5: Candles used during bathing time

The *hygge* probe pack also made Natalie consider using natural light for situations she thought embodied *hygge*:

> Natalie: I looked outside for a while, knitted for a bit, and then looked outside, and I was just so happy, and warm, and cosy. I like the natural light, so all the blinds were up… I think it's, for me it leads to that whole feeling of hygge. Because I tend to have a blanket and I have a drink.

This shows how participants started to use or associate different materials (e.g. light, drinks, blankets) with aesthetically pleasing experiences in existing practices (e.g. knitting, cooking, entertaining). These findings demonstrate promise for the idea that non-electric materials can be used to either reduce or replace use of smart technologies, while still maintaining expectations of experiencing the smart home as a pleasurable and nourishing space. These expectations have strong parallels with the desirable vision of pleasance [36] but without the same energy-intensive implications. Moreover, these findings open up new possibilities to design smart technology that takes advantage of these (or other) new meanings of aesthetically pleasing *hygge* experiences (e.g. blinds that automatically go up when natural light is available, heating turning down when people are cooking or snuggling up underneath a blanket).

Slowing down in the smart home

Because *hygge* promotes minimal engagement with technology, interacting with smart home technologies (e.g. smart lighting) to create *hygge* atmospheres might be understood as counterintuitive. This aspect was picked up by Tony, who felt distracted by smart phone notifications when changing light settings. Natalie and Adam, on the other hand, found it easier and more convenient to change light scenes from their smart phones when immersed in *hygge* moments because they did not have to get up from the *hygge* 'nest'. Participants also associated pursuing *hygge* with slowing down daily routines to allow oneself to be 'in the moment', suggesting that *hygge* competences were infusing several practices.

> Natalie: Just do you chores, maybe in a slow way, rather than in a frantic [way]… Mindful, present, happiness, and just relaxed enjoyment, of where you are at that moment.

These qualities reflect related ideas of slow technology [14] and slow energy [28] that Katzeff et al. [21] have explored as a positive framing for 'shifting' intensive energy activities in time [29]. Our findings suggest *hygge* could

also be explored as productive and desirable design vision for framing slow energy.

The dark side of hygge

The above findings demonstrate how probing participants about *hygge* might be a promising design path for mixing up elements of practices in new and 'naturally' less energy intensive ways. However, given that *hygge* is also associated with meanings of cosiness and warmth, particularly in the winter period, circulating these ideas may introduce new expectations of comfort that could further increase energy demands. For example, Adam despised feeling cold and used his automatic heating system to ensure his house was always warm.

> Adam: I'm emotionally uncomfortable with being cold.

Introducing the *hygge* concept confirmed and encouraged Adam to maintain this expectation of thermal comfort. As reflected by Natalie, this expectation was not the norm in Australia – heating tended to be used on an 'ad hoc' basis instead of on a thermostat-controlled regular basis:

> Natalie: Australians try to avoid putting the heat on at all costs, so kind of cultivating that warm, cosy environment [through *hygge*], I think they'd use more heating, the general Australian.

These findings stress that designers should be wary of romanticising *hygge* as a design vision for the smart home because it could also embed new meanings and expectations of comfort that may increase energy use.

DISCUSSION AND FUTURE IMPLICATIONS

Designing desirable low-energy ways of life

A major question guiding our work is how to envision a smart home that challenges aesthetic expectations in lower energy ways, while still upholding the idea that living in a (smart) home should be desirable, pleasurable and comfortable. We are aware that (smart) lighting does not necessarily constitute a large proportion of a household's electricity usage, but this study is a step towards positioning the smart home as desirable *and* sustainable, without explicitly promoting 'Going Green' visions or invoking 'negative' connotations (e.g. 'we have to make do with less') embedded in visions like 'voluntary simplicity' [13].

Did we then succeed in probing *hygge* as a design vision for the smart home that brings desirability and sustainability together? Our findings show that the explorative *hygge* probe pack did challenge expectations of aesthetic experiences by mixing up the elements (materials, meanings, and competences) of practices related to smart lighting that could result in less energy usage. An important contribution for future designers and researchers is that interventions, which promote desirable design visions (in contrast to specific outcomes such as lower energy demand) can be useful for studies that aim to 'trigger' reconfigurations [22] of household practices, even without introducing a prototype.

Our findings also highlight the importance of understanding the different kinds of desires [26] that shape early adopters' use of smart technologies (also reported in [15,17,20]), which may be differently from the designed purpose [10,16]. The unforeseen ways that people combine elements of practice need to be considered when designing interactions that aim to steer towards sustainability [34,35]. However, we also need to be careful with the interpretation of our findings, as *hygge* may also lead to unsustainable expectations (e.g. using more lights that are dimmed or heating more) and new needs and desires (e.g. bringing more interactive energy-consuming technology into the home), which may lead to an increase in overall interactivity and electricity consumption that contradict *hygge's* 'naturally' using less approach.

Hygge, research through design, and provocation

We consider this research an initial step towards unpacking the relationship between desirability and sustainability in the design of smart technology. A suggested next phase is to attempt to 'trigger' [22], through *hygge*, everyday practices towards sustainability. For this, we draw inspiration from provocative design approaches such as critical and speculative design [3,11] to create interventions in the form of provotypes – prototypes that use provocation to explore design possibilities for the future [7]. Other research through design studies have illustrated that speculative [8] or provocative [30] designs can be used to steer practices towards sustainability.

We suggest using provotypes and provocation (on all three levels; conceptual, aesthetic and functional [3]) to further explore visions and designs for the smart home. In this study, we provoked aesthetic expectations of living in a smart home through the *hygge* probe pack. However, we also conceptually provoked, since *hygge*, to some extent, already promotes the idea of 'suppressing' the use of technology (for example, to switch off the lights and use candles to achieve *hygge* atmospheres). For future work, we suggest provoking functional aspects too, as a way forward for 'triggering' reconfigurations of household practices.

CONCLUSION

In this short paper, we have argued that HCI designers and researchers interested in pursuing sustainability through smart home technologies should pay closer attention to the visions of desirability that underpin them. We introduced the popular and lower energy aesthetic concept of *hygge* to disrupt and reorient ideas about desirability and sustainability in the smart home. Using an explorative probe pack, we selected two households from our larger smart home study to engage with *hygge* through their smart lighting system. Our findings show that *hygge* introduces new meanings, materials and competencies about comfortable and cosy atmospheres that can reconfigure everyday practices in less (and more) energy-intensive directions. These ideas provide a fruitful area of exploration for HCI designers interested in reducing energy consumption in households, and one which is ripe for provocation and experimentation.

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