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Original research article

Dragon-breath and snow-melt: Know-how, experience and heat flows in the home

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ABSTRACT

People manage heat flows in their homes through diverse skilful engagements, including interactions with a wide range of materials that help to generate heat, move it around, or prevent its movement. Using these strategies, we try to ensure that heat is where it is needed, when it is needed, and can also try to minimise its wastage (heat-out-of place and heat-out-of-time). However, the practical knowledge or know-how used in managing these thermal flows has received little attention to date, despite its relevance to topical debates on energy consumption. This paper explores how experience-based know-how is used in monitoring and managing heat flows in the home. I also consider three processes that stimulate the development of new know-how: changes in the life-course, in material arrangements, and in shared understandings. These themes are illustrated using quotes from various sources, such as web forums and advice sites. Finally, I consider how these ideas relate to wider theories of experience and know-how, and offer some reflections on what this approach might mean for research, policy and practice on sustainable energy use.

1. Introduction

1.1. "My house is so cold right now"

My house is so cold right now, that...
The butter left out in the kitchen is rock hard and unspreadable...
The curtains in my bedroom flap in the breeze...
I could see my breath the other morning...
The wind whistling through the catflap...
The net curtains in my bedroom window were frozen to the window pane...
I got out of the bath, touched the door handle with my wet hands and actually froze stuck to the handle...
My dad's tooth glue... was so hard he couldn't get it out of the tube...
My sister sent back some toothpaste because it was rock hard... she won't believe that it's coz her house is icy... lol.

These lines, written by four women, are taken from a thread on the Netmums website in the cold January of 2010.[1] I start with these because they illustrate how people understand temperature in their homes not simply in terms of degrees centigrade, radiator settings or kilowatt hours, but also through their own experiences. This paper explores how experience-based know-how is involved in monitoring and managing temperature, through skilful engagements with flows of heat within the home. This is a topic which has received relatively little attention to date, though there are several areas of literature that are relevant. Work on thermal comfort often discusses strategies used in heating/cooling homes, and these involve some form of know-how. However, this know-how and its development have not generally been the focus of study. Meanwhile, some relevant work focuses more directly on know-how, but not specifically on heat management; for example, know-how around using stand-by [1] and living in a zero carbon home [2]. However, few studies have explicitly looked at know-how in relation to thermal management in homes. Those that have done so, such as Vannini and Taggart [3] (regarding "off-grid" heating), and Gabriel and Watson [4] (regarding solar water heating,

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[1] http://www.netmums.com/coffeehouse/general-coffeehouse-chat-514/coffee-lounge-18/368444-my-house-so-cold-right-now-all.html [accessed 10.03.14].

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but also thermal management more generally), suggest that this is an important topic, as know-how is fundamental both to current temperature management practices and to people's responses to technological change.

In exploring this topic, this paper engages with several issues highlighted by the first volume of *Energy Research and Social Science*, and responds to the call by Sovacool [5]; Stern [6] and other contributors for deeper explorations of the human role in energy systems. Building on Stern's argument that householders' understandings of energy often differ from those of experts, it provides an in-depth investigation of these "ordinary" ways of knowing. It also engages with Wilhite and Wallenborn's [7] call for attention to the body within energy research, by exploring the role of experiences, which are often intensely physical (as the Netmums quotes show), in the development of know-how around energy consumption. However, noting the arguments that "*energy is meaningful not by being consumed itself, but because it makes certain services possible*" [5] and that "*demand is an outcome of what energy is for*" [8], I do not frame the discussion around energy, but rather one specific area of practice that uses energy: the management of temperature within homes.

I have chosen to focus on thermal management because of its large contribution to energy demand and importance to consumers. For example, questionnaires [9] have shown that thermal comfort is the most important determinant of household energy use, while concern for warmth and comfort has been found to be the strongest driver of energy efficiency improvements in New Zealand [10]. A review of literature [11] suggests that thermal comfort is seen as the most important factor in a satisfactory indoor environment. Know-how around thermal management may be especially relevant at present, because the current older generation have skills in keeping warm which could be useful in promoting sustainable energy use [12], and if these are not passed to younger people, they may be lost. Meanwhile, Wilhite and Wallenborn [7] suggest that increasing standardisation of indoor climates (with heating and air conditioning) is leading to a weakening of adaptive capacity, or decline in know-how for adapting to temperatures. These trends make this topic especially timely.

This paper explores the core question: How is experience-based know-how used in the thermal management of homes? I first provide an overview of relevant literature on thermal management, and the home as a system within which energy flows between diverse material objects (Section 2). I then explore two broad themes around experience-based know-how: monitoring heat flows and managing them (Section 3). In Section 4 I consider how experience-based know-how is shaped by changing social, material and biographical contexts. The discussions in Sections 3 and 4 were developed by reviewing literature, drawing out key ideas and linking them within themes. Alongside quotes from the literature, I also draw on text from non-academic sources to provide richer and more experience-based illustrations.[2] Finally, in Section 5, I reflect on how these ideas relate to theories and concepts of know-how, and the directions this discussion suggests for research, policy and practice.

My focus is predominantly on the UK and North American contexts, because these are regions with high per capita energy consumption, and so particular significance in terms of global energy issues. Also, these are largely temperate/cold climates where thermal management of homes contributes a significant proportion of energy demand. I focus on keeping warm and not on keeping cool, to ensure a manageable scope. However, there is some evidence that similar themes emerge in other contexts where cooling is in question; for example, Strengers and Maller's [13] work on Australia. Many ideas suggested here about the role of know-how in thermal management are likely to have relevance across diverse contexts, albeit shaped by specific social, material and climatic conditions. Also, I am concerned predominantly with space heating and not person heating [14]. This distinction is not clear-cut, as thermal management involves diverse relations between clothing, housing, environments and bodies [15], however, it is helpful in delimiting this discussion. Use of person and space heating varies between cultures, and in some contexts there may be an ongoing shift away from managing bodies' comfort and towards managing indoor environments [14]. Given this, it seems particularly relevant to explore know-how that is involved in managing the temperature of spaces within homes.

2. Thermal management in a system of flows

Thermal management, or controlling temperatures, is a fundamental part of many people's daily routines. For most, the goal is thermal comfort; the feeling of being at the right temperature. However, this is not the only possible goal; others might include saving money, minimising environmental impact or maintaining the right temperature for another person, animal or object. Managing temperature means people have a constant and active engagement in practices including "*observing, controlling, recalling, regulating, and leaving traces (like carbon footprints), of their warming and cooling activities*" [3] (p68). Jalas and Rinkinen [15] recognise the active and skilful nature of these practices when they use the term "heating work" to describe things that people do to keep warm. Similarly, Vannini and Taggart suggest that, "*To heat... means to take part in practices through which heating skills are applied and developed, insightful observations are made, and understandings are refined*" [3] (p68).

As well as recognising these active and skilful engagements, the approach taken here draws on Shove et al.'s [16] novel understanding of indoor climate and energy demand, which focuses on thermal exchanges and flows. "*Another way to think about energy demand is to see the individual, their routines, their home, and all the objects within it, as making up a system. Energy flows through this system in the form of heat and power*" [17]. The work of thermal management involves governing these flows to ensure that heat is where it is needed, at the time it is needed. Doing this efficiently also means minimising unwanted heat flows: what we could call heat-out-of-place and heat-out-of-time. Drawing on this understanding means that I consider a wide range of heat flows; so while much past research has focussed on heat-generation, I am also concerned with how heat is transmitted or stored, and how it is lost from the home. This recognises that people do not wish to "heat" *per se*, but rather to feel warm (and/or achieve other outcomes), which can be achieved through managing flows in various ways. In particular, heat loss and the efficiency of building fabric have received relatively little attention so far within sociological studies of temperature management. However, these are especially important in the UK context, where cold winters and an old and inefficient housing stock [18] mean the efficiency of homes is a key public and political concern.

Taking this approach also means paying attention to arrangements of material objects, which play a crucial part in the system of heat flows. For example, Vannini and Taggart [3] argue that "*Insulation, thermo-mass, efficient windows and wood stoves are*

[2] My approach was to use search keywords associated with each idea (*e.g.* learn; experience; central heating). I then looked in particular for people's accounts of their own experiences, which were often to be found on weblogs and discussion forums. The content used is publicly available at time of writing and the web links are also provided. Where direct quotes from these sources are used, I have sometimes altered spelling and grammar for clarity.