

# Exploring the role of professional installers in shaping domestic space heating practices

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Paper prepared for DEMAND Centre Conference, Lancaster, 13-15 April 2016

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Wade, F., Shipworth, M. & Hitchings, R., 2016. How installers select and explain domestic heating controls, *Building Research & Information*. DOI: 10.1080/09613218.2016.1159484.

## Abstract

During the replacement and installation of domestic central heating systems, heating installers contribute to the selection of heating technologies, physically position these devices and act as an informant to householders. Indeed, these actors have been identified for their role in shaping users' understandings and use of the central heating products installed in their homes. Despite this, heating installation practices have not yet been subject to detailed academic enquiry. This paper presents the findings of an in-depth ethnographic exploration into how installation is a meeting point for professional and domestic practices. In particular, this paper uses the concept of scripting, which suggests that the assumptions made about users during the design of technologies can shape their eventual use. With this frame, it explores how, through using their own ideas of customers in the selection and explanation of central heating controls, heating installers can contribute to end users' understandings and use of their central heating systems.

## **Exploring the role of professional installers in shaping domestic space heating practices**

### **Introduction**

Buildings are responsible for approximately 40% of the energy consumed in the European Union, with space heating being particularly significant (EC, 2012). This paper focuses on the UK context, where space heating is the largest single contributor to domestic energy consumption (Palmer & Cooper, 2013), and the vast majority of households heat their properties through gas central heating (ONS, 2011).

To date, attempts to understand or influence the energy consumed through domestic central heating have focused on either behaviour change, for example encouraging end users to reduce their thermostat settings via information campaigns or technological strategies, for example setting standards via the Building Regulations. In particular, the minimum control requirements are: a programmer with independent controls for heating and hot water; a room thermostat and Thermostatic Radiator Valves (TRVs) on all radiators except in rooms with a room thermostat (Government, 2010). However, both technological strategies and information campaigns fail to account for the ways in which end users' interaction with these devices might be affected by other influences. In particular, there has to date been little consideration of the social actors who help select relevant devices and advise occupants on their use. Central heating installers<sup>1</sup> are one such group. In the UK, these actors are tasked with the design, selection, installation and commissioning of central heating systems, including central heating controls. With this in mind, the research question this paper seeks to address is: how might installers influence the use of central heating systems through the selection and explanation of controls?

The paper proceeds by detailing the existing evidence on the role of installers in influencing the types of controls installed in homes and their use. Following this, the ethnographic approach that this paper draws on is elaborated, along with the social theory of user 'scripting', which has been applied for analysis. This concept suggests that the use of technologies can be shaped by the assumptions about users made during design and development processes. The findings are presented in two sections; the first investigates installers' selection of controls, whilst the second details their explanation strategies. This paper closes with a discussion of how industry and policy makers might engage with heating installers' practices to influence the types of controls installed and the explanations that accompany them.

### **The potential role of installers in the selection and explanation of controls**

A rapid evidence review which focused on how heating controls affect energy demand in the UK context found that "installers, rather than domestic consumers frequently make decisions about which central heating controls to install and where to install them" (Munton et al., 2014, p. 7). However, the authors note that they found "very little robust empirical evidence with regard to questions of when, why and how new heating controls are installed" (Munton et al., 2014, p. 29).

Thus, despite the apparent significance of the installer in the selection of controls, their role in influencing this has not yet been investigated. If heating installers play a role in determining the controls fitted in homes, it is important to investigate whether 'usable' devices are being fitted. Usability is defined as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (BSi, 1998, p. 2). Poor usability can mean that controls are rarely adjusted, or simply not used (Caird & Roy, 2008; Rathouse & Young, 2004). If poor usability limits end users' interaction with their heating controls, it is essential to investigate what heating controls are being selected for different users and whether the products being fitted are indeed 'usable' for these individuals.

Beyond usable devices being fitted, heating installers have been identified as potentially influential in shaping users' understandings of their controls. Rathouse and Young conducted a series of focus groups with users, and reported that their participants noted asking "installers, plumbers and engineers to show them how to use their controls and sometimes to set their programmers" (2004, p. 24). Thirty years ago, Kempton noted that information about thermostats was "communicated almost entirely through folk channels" (1986, p. 77), but he does not elaborate on what these folk channels might be. Meanwhile, occupants questioning the most efficient operating strategy for their central heating system have also identified friends and heating installers as influential (Rubens & Knowles, 2013). Furthermore, 'considerable disagreement' has been identified amongst focus group participants about the most efficient way to operate a central heating system (Rathouse & Young, 2004 p.17). Some people favoured using the system intermittently, whilst others preferred to keep it on constant - under the understanding that it takes more energy to heat the home from cold than keep it at a constant temperature (Rathouse & Young, 2004). Occupants also conceptualise their room thermostats in different ways, with some recognising and using them as on/off switches (Caird et al., 2007; Rathouse & Young, 2004), or according to certain 'folk theories' (Kempton, 1986). However, the messages that installers might provide during the installation of heating controls, and how these might influence user understandings, have not yet been investigated.

## **Method**

### **Data collection**

The following empirical insights are derived from ethnographic fieldwork exploring the installation practices of heating installers in the UK, conducted between September 2012 and December 2013. An open approach to data collection resulted in conducting 20 semi-structured interviews with heating installers, shadowing them approximately 30 times as they fitted systems in domestic properties, observing 9 training sessions hosted by boiler and controls manufacturers, and spending 1 week in plumbers' merchants. Data collection relied on a 'snowball' approach in which key informants recommended additional participants as the study gained momentum. This included building rapport with existing contacts and asking them to act as gatekeepers by providing connections and recommendations for subsequent research. This approach resulted in a sample of those who regard themselves, and are regarded by others, as performing high quality work, the majority of whom had been operating in the industry for many years.

The sample included both self-employed installers working in private homes and those working with medium-sized organisations, many of which performed work with Registered Social Landlords (RSLs). These participants were all male, and aged between 25 and 65 years old. They had a variety of backgrounds, qualifications and routes into the industry, but the majority had been working as heating installers for over 10 years. Whilst not statistically representative of the approximate 135,000 (Gas Safe, pers. comm., 2013<sup>ii</sup>) heating installers operating in the UK, this sample does reflect the diversity of this group. The anonymity of all research participants has been protected by the use of pseudonyms.

### **Data analysis**

The empirical material was analysed through a systematic process of identifying and coding data, and aligning it with relevant themes. The themes elaborated in this paper draw on the concept of scripting to investigate how installers might influence the use of heating controls.

Scripting suggests that the design and development of a technology involves a process of “defining the identity of putative users, and setting constraints upon their likely future actions” (Woolgar, 1991, p. 59). Through this concept, attention is drawn to how the writing of a technology ‘script’ relies on the designer having an idea of the product’s intended user, including, for example, their identity and characteristics. These user representations encompass “specific tastes, competences, motives, aspirations, political prejudices, and the rest” (Akrich, 1992, p. 208). This paper explores the idea that, in the case of domestic heating controls, the process of scripting the user is not confined to design and development, but extends into the deployment and installation of these technologies. Thus whilst the notion of ‘scripting’ has traditionally been examined in terms of the assumptions that become embedded in technology design, this paper extends it with regard to how installers also draw on certain scripts when deciding what to supply and how these technologies should be talked about.

## **Results**

### **Heating installers’ perceived usability of heating controls**

The following empirical material investigates the characterisations of end users that heating installers use in order to make decisions about the room thermostats and programmers that are installed as controls for the central heating system<sup>iii</sup>. The heating installers involved in this study generally distinguished between three different types of heating control; mechanical, digital and smart with regard to their suitability for different user types; these characterisations are detailed in the following section.

#### **Mechanical devices**

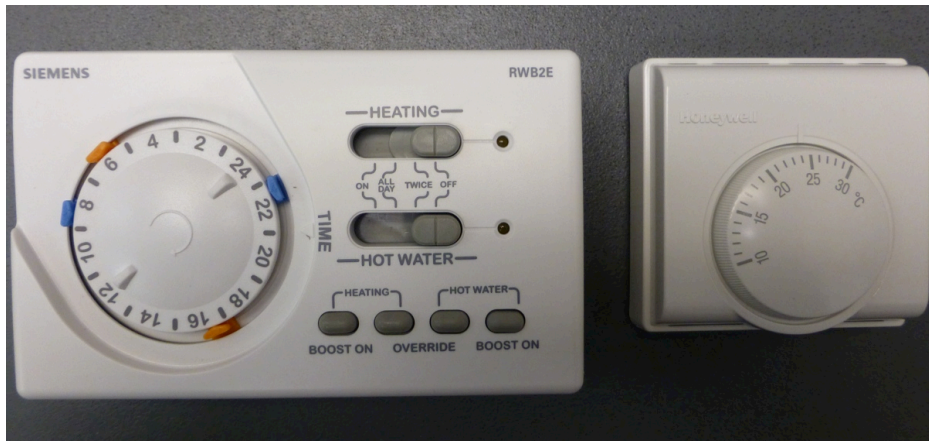


Figure 1: Example mechanical thermostat and programmer.

Heating installers often regarded mechanical devices, like the round mechanical thermostat, a device with a dial that is twisted to indicate the desired temperature setpoint, and a ‘push-pin’ programmer where pins are pushed in to set the on-off times for the heating (see Figure 1), as the simplest control option. Gary and Dale noted that although these are “archaic”, they are often still sold because “everyone knows” them and “they’re just easy to work” (sales representatives, interview)<sup>iv</sup>. Thus, the ubiquity of mechanical devices made them a straightforward option to install. However, these devices were also particularly noted for their suitability for older people, who just want ‘on or off’ (Martin, self employed, interview). Phil, a course instructor at one training session, nicknamed the mechanical thermostat “the granny stat”, highlighting that it was “idiot proof” and “if you can’t use this product, then you shouldn’t be left on your own” (manufacturer training, fieldnotes). In restricting the devices selected for certain groups, these heating installers were scripting them as users who are provided with limited functionality and flexibility because that is what they were assumed to need.

### Digital devices



Figure 2: Example digital programmable controls.

Digital devices, like those depicted in Figure 2, tend to use digital screens, and buttons labelled with symbols. With the capacity to store data, these devices have greater flexibility than their mechanical counterparts, including the ability to have different temperature settings at different times and on different days of the week. Heating installers suggested that this programming capacity makes these suitable for working people and families who may have particular routines. For example, Roy noted that working users are likely to be “out the house at certain times of the day” and have different weekday and weekend schedules, that can be accommodated with digital controls (self employed, interview). Further, the perceived complexity of these devices led them to be compared to computers, with “younger people who come from the laptop days” being most able to understand them (Carl, self employed, interview). It is in part their relation to computers that led these digital devices to be regarded as unsuitable for older users. For example, some participants highlighted the limitations that might be placed on older people by the visual and dexterity requirements of digital controls (Carl, self employed, interview; Ben, organisation, interview).

### Smart devices

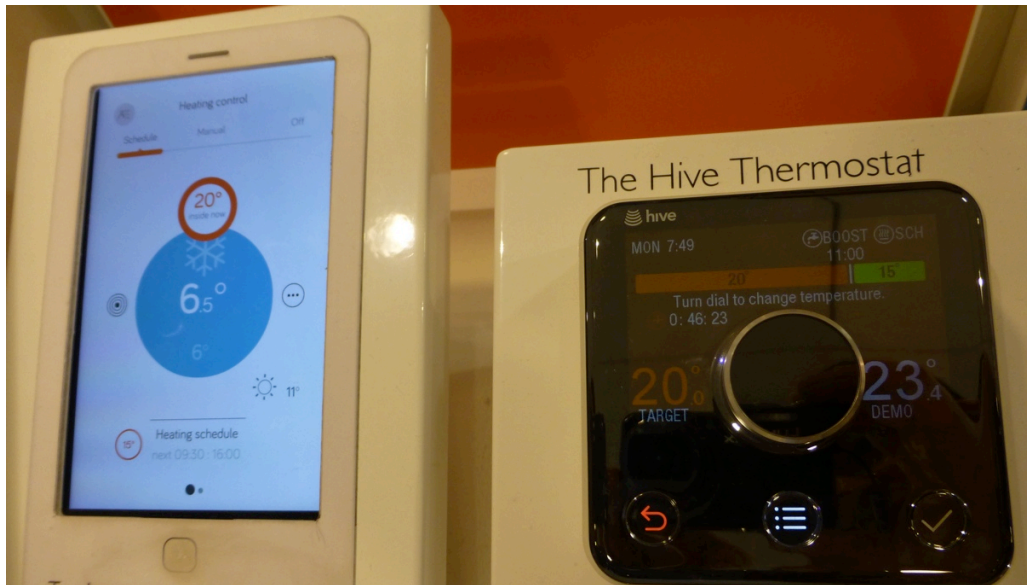


Figure 3: Example smart heating controls.

Fieldwork for this paper was conducted in 2013, when smart heating controls were far less prevalent than they are now; however, they did sometimes feature in heating installers’ conversations. These devices, illustrated in Figure 3, usually include a digital user interface (a touchscreen, for example) and may encompass the use of multiple technologies, for example allowing remote operation of the central heating via a laptop or mobile phone. It was suggested that these advanced devices might be suitable for “somebody that’s clearly intelligent, clued up, maybe an engineer or something like that”, who will want the “fanciest thing going” (Gary & Dale, interview). During his interview, Roy referred to a particular brand of smart programmable room thermostat that you could “turn on from your laptop in Tokyo”, suggesting that this was most suited to “upwardly mobile office people” (Roy, SE, interview). In another example, Chris told the story of a ‘techy guy’ who had ‘found this new control from America’. Chris had not installed this control before, and had to spend some time understanding the new technology before he could install it (install - organisation, fieldnotes). Thus,

smart controls can elicit the need for additional learning from the heating installer, and may also be scripted towards those that heating installers deem to be the most technologically aware.

### **Installer explanations scripting the use of controls**

The following section explores the way in which heating installers' ideas might influence the setting and explanation of central heating controls, and as such, the understandings that they provide end users with. It considers heating installers' ways of engaging with end users in general, but also how these varied for specific types of identified user, and how these strategies might script the subsequent use of these devices.

### **Suggested settings**

When discussing how to help end users arrive at an appropriate temperature setting, Shane, a manufacturer training course instructor, offered the following strategy:

"I suggest for the first two days, run it at 22 degrees, for the next two days, turn it down, each after two days and go down to 21 degrees, turn it down again, if you still feel comfortable, turn it down. Turn it down until you feel too cold and then you go back up one degree and you know you're there"

(Shane, manufacturer training, audio)

By encouraging users to start at 22°C and incrementally reduce the thermostat setting, it might be that they settle at a higher temperature than they perhaps would if starting from a lower temperature. Meanwhile, some participants said that they advised end users to keep the heating on constant, but at a lower temperature, based on the understanding that it is better to retain the heat in the fabric of the building, and that the boiler operating at a lower output, but more regularly, will consume less energy. The energy consumed through the central heating system depends on the fabric of the building, and its capacity to retain heat; however, leaving the system on constant is likely to consume more energy than intermittent heating in homes of standard construction (EST, 2008).

Beyond suggested temperatures, it was observed how some heating installers would also physically set programmes for their customers at the time of installation. For example, Brian explained that he enters the settings into the digital programmable thermostat that he installs, according to a series of questions that he asks his customers:

"I would say, 'what time is, what time d[o] you get up? What time d[o] you go to bed? Are you in during the day? or are you out and about?' And explain that keeping your house warm is cheaper than cooling it down and heating it up again."

(Brian, self employed, interview)

In this way, Brian can ensure that the end user's settings are appropriate for them. However, some heating installers also noted that they would provide settings based on their assumptions about particular user types. For a family scenario, one training instructor suggested that cooler settings might be used during the early evenings, "sort of 16 degrees", whilst "the kids are coming in from school, they're running around frantic". Meanwhile, later in the evening, "when you've, er, put them upstairs to do their homework and you just wanna sort of settle down" you might "up the temperature accordingly" (Steve, training, audio). By physically setting the device based on these questions and assumptions, heating installers might be scripting the way that these customers might come to use their heating. Alternatively, heating installers might offer simplified explanations of controls to accommodate the limited understandings that they perceive end users to have of these devices.

### **Simple explanations**

Repeatedly evidenced in the routine talk of heating installers was the perception that end users generally did not understand their heating controls. For example, James noted that the technology "baffle[s] them" (organisation, interview), whilst Jack said: "the more complicated they are, it's almost like you're gonna frighten them and they don't wanna know" (self employed, interview). Roy's description was more extreme again, he noted that his older customers were "panic stricken" by a particular device that was specified by the organisation he worked for. Roy adopted a simple explanation strategy in order to overcome the complexity of this device:

"What I do say to [them] is that I'll put it on manual for you, treat the plus and minus as an on off switch, if you want the heating on, press the plus button, keep your finger on it, it goes up to 30, don't go up any more. If you want the boiler off, press the minus button, it goes down to 5, it is off."

(Roy, organisation, interview)

Instead of detailing the operation of this digital device, Roy sets the system up so it is on 'constant', and is controlled simply by requesting a higher or lower temperature at the thermostat. Similarly, Ibrahim explained that he would ask the end user what they want to do with the heating, if they just want to turn it on and off then he 'sets the timer' and 'tells them to just operate it by the thermostat'; more specifically, he tells them to 'just turn the dial up or down' (Ibrahim, manufacturer training, fieldnotes). The heating installer's advice can be informed by their perceptions of end users' limited understandings, fear, or their own desire not to receive call backs (where the installer is called back to the property because the end user perceives there to be a problem with the system). Whilst installers might offer more complex explanations to those customers deemed to be more capable, the simplified explanations discussed here were both related to specific types of end user, for example older people, but also users in more general terms.



## **Discussion: the implications of heating installers' scripting**

This fieldwork revealed the variety of strategies applied by heating installers in the selection and explanation of domestic heating controls. This decision making process might be shaped by the installer's familiarity with particular products, the time and costs associated with learning different devices, along with the preferences and budget of the end user. However, installers also select particular devices for particular users and talk about them in certain ways. Through this process, installers might limit the level of control, functionality and flexibility available to users. Furthermore, through suggesting temperatures, physically setting control devices on behalf of them, and providing simplified explanations, heating installers can script the subsequent use of these devices, and not always in ways that promote reductions in space heating energy consumption.

### **Heating installers influence usability through the selection of controls**

Heating installers distinguish between the suitability of mechanical, digital and smart controls for different types of user. In keeping with previous studies that have identified the difficulties that older people might have in using digital heating controls (Caird & Roy, 2008; Combe et al., 2011; Combe et al., 2012; Combe et al., 2013; Sauer et al., 2009), heating installers sometimes reserve these more complex devices for those perceived to be more technologically competent. The participants of this research also compared digital heating controls to computers, reflecting Peffer et al.'s (2011) assertion that heating controls are increasingly borrowing buttons and conventions from the computing domain. It was, in part, this similarity that led heating installers to suggest that those more familiar with computers, or from 'the digital age' may be more comfortable using digital heating controls. Meanwhile smart controls were reserved by heating installers for the most 'tech savvy' users. Thus, it could be important to explore how to work with the ideas that heating installers have about end users, especially when seeking to promote certain types of device. This is particularly true if the realisation of energy savings rests upon the installation of advanced and smart heating controls, which may not be installed in homes because of the current user scripts employed by installers.

### **Heating installers script use through the provision of advice**

It is not only the controls themselves but also any accompanying advice that might script users' subsequent interaction with them. One proven strategy that heating installers use for minimising call backs due to limited end user understandings is to provide simplified explanations of the controls, for example the suggestion to leave the system on constant and simply operate it via the thermostat. These limited explanations can reinforce limited understandings, restricting users' subsequent interaction with their heating controls (Caird & Roy, 2008; Rathouse & Young, 2004). If customers are advised to only interact with the thermostat, it is unsurprising that they do not always recognise, or use, their other heating controls, such as programmers (Rathouse & Young, 2004; Revell & Stanton, 2014; Peffer et al., 2011). Furthermore, these simplified explanations might result in simplified control strategies that may lead to higher than necessary energy consumption. In order to achieve

desired savings, these findings indicate that requirements to install controls should be supplemented with robust guidelines for how these devices are to be set up and explained.

## Conclusion

Heating controls are promoted for their potential to reduce the energy consumed in domestic buildings, and heating installers are at the frontline of how people become acquainted with them. Drawing on a programme of ethnographic work and theories of scripting, this paper has demonstrated that heating installers can script the types of devices that end users receive and the ways in which they might be used thereafter. Thus, it is essential that heating installers are more fully considered in future research and policy making that seeks to understand and influence the energy consumed through domestic space heating.

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<sup>i</sup> Within this paper, the term ‘heating installer’ is used to identify the individuals tasked with the design, selection, installation and commissioning of gas central heating systems. The specific skill set and qualifications that these individuals possess is also recognised by the term ‘heating engineer’ by those in the UK heating industry.

<sup>ii</sup> Gas Safe Register, personal communication – email with the Head of Communications at Gas Safe Register, dated 4<sup>th</sup> December 2013, subject: ‘research into central heating installation – request for information’.

<sup>iii</sup> The selection and installation of a third control component, Thermostatic Radiator Valves (TRVs), was not discussed at length by the participants of this research, and so does not feature in the analysis presented.

<sup>iv</sup> The data presented in this paper is denoted according to how it was collected (through observation or interview), along with the type of participant (whether they were self employed or working for an organisation).