Practices-oriented design

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Lenneke Kuijer [a]

[a] Eindhoven University of Technology, Department of Industrial Design, Eindhoven, The Netherlands

Abstract

Practices-oriented design groups a range of design approaches that draw on practice theory – a group of social theories that take practices as their fundamental unit of analysis. This chapter offers a design tailored introduction to practice theory, a brief overview of its uptake into design literature and a description of one particular practices-oriented design approach that was developed through a series of design projects focusing on reducing domestic energy demand. By illustrating practices-oriented design with a detailed approach and an example on domestic heating, the chapter shows how practice theory offers a conceptual framework that is helpful for understanding and tackling complex societal issues such as sustainability. By paying explicit attention to history and diversity, the approach opens up avenues for more radical change, while at the same time staying close to the practicalities of making change happen. In the heating case, a variety of interventions that involve change in both domestic and professional practices contribute to a redefinition of domestic comfort that involves fresh air and warm clothes. Avenues for further research in this area lie in exploring the implications of viewing practices of design as an integral part of the 'behaviours' it is trying to change.

Keywords: practice theory, domestic heating, history, diversity, reconfiguration

Lenneke Kuijer is Assistant Professor in the Department of Industrial Design of the University of Eindhoven. In her PhD at Delft University of Technology (TU Delft) she explored the implications of practice theory for sustainable design, after which she worked at the University of Sheffield as part of the DEMAND Centre.

1. Introduction

Understanding the impact of design on human action and developing approaches to facilitate desirable behavioural change 'by design' are major challenges for the discipline of design. In efforts to address them, design draws on various other academic disciplines. The design approach presented in this chapter draws on practice theory, a form of social theory that takes practices – such as cooking, playing football, having a meeting or driving – as a unit of analysis. Following developments in other fields, such as Human Computer Interaction (Kuutti & Bannon, 2014; Pierce, Strengers, Sengers, & Bødker, 2013), environmental policy (Doyle & Davies, 2012) and consumption studies (Warde, 2005), practice theory is increasingly drawn on by design researchers.

Like in other fields, these researchers argue that drawing on practice theory offers a valuable, novel way of approaching complex societal issues such as sustainability or health. Taking practices instead of products or interactions as a unit of analysis is argued to offer a systemic approach that can help grapple with rebound effects and user acceptance issues (Scott, Quist, & Bakker, 2009), as well as gaining a deeper understanding of the relations between artefacts and their users (Shove, Watson, Hand, & Ingram, 2007).

This chapter offers a concise introduction to practices-oriented design. Building on a design tailored introduction of the theory in Section 2, Section 3 provides a categorization of the various ways in which a practice approach has been interpreted in design research after which Section 4 explains and illustrates a particular approach that was developed to tackle the challenge of reducing domestic energy demand.

2.   A design tailored introduction to practice theory

Practice theory forms a group of related theories that comprises a large and varied body of literature in the social sciences. In this section, only the part of this literature that has been repeatedly applied in design research is covered. These strands of practice theory have made their way from social theory into design theory mainly because they explicitly conceptualise the role of man-made artefacts in social stability and change. The main theorists in this section of practice theory are: Schatzki, a philosopher who considers human-made artefacts as part of material arrangements amid which practices are carried on and which they are altered by (Schatzki, 2010, p. 130); the cultural sociologist Reckwitz, who provides an overview of theoretical concepts of practice theory (2002b) and a discussion of the role of artefacts in the theory (2002a); and sociologist Shove and colleagues, who view materials as one of the elements of practices (e.g. Shove, Pantzar, and Watson (2012)). The following is a highly condensed, design tailored interpretation of a number of concepts from practice theory.

2.1. Practices as the fundamental unit of analysis

In practice theory, society is viewed as a collection of practices and all human action as the performance of one or more practices. This collection of interrelated practices is considered the site of social stability and change. Reckwitz (2002b) explains this positioning as a middle ground between foregrounding either individuals or structures. Unlike some other theories, practice theory does not offer a model that explains human action according to a set of causal relations and factors (Kuijer & Bakker, 2015). Rather, it offers a conceptual framework to give a 'general and abstract account' (Schatzki, 2001) to gain understanding of a particular topic. One of these conceptual tools is the idea of practices as configurations of elements.

2.2. Practices as configurations of elements

Shove and Pantzar (2005) describe practices as configurations of elements. These elements are grouped into three types: materials, competences and meanings. In cooking for example, materials include pots, cookers, knives, cutting boards, the food itself, a cooking book, the kitchen space and the human body. Competences are the skills and know-how applied when cooking, which are viewed as distributed between the person that does the cooking, for example skills of cutting vegetables and knowledge of baking techniques and skills embodied in the artefacts used, such as skills of cutting in a food processor, or knowledge contained in a written recipe. Meanings, finally, are rationales for engaging in the practice in its particular form, such as ideas about healthy eating or good parenting.

While this idea of a practice as a configuration of elements provides an analytical tool to understand relations between people and artefacts, it doesn't do much for understanding how such relations may change 'by design'. For conceptualising change in practices, the notions of practice-as-entity and practice-as-performance are helpful.

2.3. Practices-as-entity and practices-as-performance

In practice theory, observable, situated behaviours of people are viewed and approached as *performances* of practices. More strongly put, all human behaviour can be viewed as the performance of one or more practices (Schatzki, 2001). These 'practices-as-performance' are considered to be loosely guided by the organisational dimension of practices, which Shove et al. (2012) refer to as the 'practice-as-entity'. What this notion of entity implies is that practices exist even though they are not performed at that moment, and that they can therefore travel as *entities* in space and time. Cooking, for example, has existed since the domestication of fire and cooking in Japan and cooking in the UK, although different in many respects are both recognized as forms of cooking.

Having established this distinction between entity and performance, it is important to note that they are recursively related; change in the practice-as-entity is both a consequence of and a catalyst for changes in their everyday performance. For example, the mainstream practice of personal washing in the Netherlands changed from weekly baths to daily showers when more people, in particular moments of performance, chose to take a shower instead of a bath. However, this could only happen because showering started to collectively be viewed as a pleasurable way of washing the body, and shower fixtures became common features of bathrooms.

2.4. Behavioural change as a reconfiguration of elements

In practice theory, behavioural change can be conceptualised as practice change. Shove et al. (2012) explain that 'practices change when new elements are introduced or when existing elements are combined in new ways' (p. 120). In other words, when aiming to change a practice, one way to do so is to introduce new elements into them. This is not a simple procedure. Integrating new elements into a practice requires a *reconfiguration* of elements and their links into a new configuration that works and makes sense. In practices of domestic heating for example, the introduction of natural gas infrastructure has rendered elements like coal sheds, coal scuttles, coal dust and skills of making and maintaining a coal fire obsolete, while piping, gas fires and new skills of setting thermostats and turning radiator valves became required to make the practice work. Importantly, reconfiguration of practices can only happen in performance. If a performance that integrates new elements in new ways is then repeated and spreads, this new configuration becomes part of the entity. There are more ways to conceptualise change in practices, but discussing these would be beyond the scope of this chapter. Section 4 will elaborate on the idea of behavioural change as a reconfiguration of elements by presenting a particular practices-oriented approach.

3.   Four interpretations of practices-oriented design

In this chapter, practices-oriented design is used as a term to emphasize that practice is about more than practice vs. theory, practice vs. research or practice as the realm of everyday life, because it includes the notion of practices as entities that organize and emerge from everyday performance. The origins of 'practices-oriented design' can be traced back to a collaborative research program between social scientists and design researchers in 2005-2006. One of the outputs of the program was a Practice Oriented Product Design Manifesto (Shove & Watson, 2006). Partly triggered by this pamphlet and a related publication in Design Issues (Ingram, Shove, & Watson, 2007), practice theory has been picked up in design literature in a variety of ways. This chapter distinguishes four ways in which practice theory is applied in design research. The practices-oriented approach explained in Section 4 incorporates aspects of the first three types of practices-oriented design.

3.1. Analysing situated practices

The first type uses practice theory as a conceptual framework for studying and analysing situated performances of practices. This way of applying practice theory uses methods from user research such as workbooks, interviews, observations, surveys, context mapping and so on, but distinguishes itself by taking practices, instead of products, users or interactions as a unit of analysis. Examples of publications that propose and illustrate a situated analysis of practices to obtain design insights are Prendergast and Roberts (2009), who study the internet usage and modes of learning of elderly, Korkman (2006), who analyses family cruise practices, Julier (2007) who studies iPod use in a community of teenagers, and Hielscher, Fisher, and Cooper (2007), Scott et al. (2009) and Jégou, Liberman, and Wallenborn (2009) who study hair care, bathing and domestic heating practices respectively.

3.2. Tracing practices in space and time

A second type of practices-oriented analysis for design focuses more on the practice-as-entity by tracing and comparing practices over space and time. Munnecke (2007), in his 'deep-dive' approach proposes analysing a practice's historic career in order to extrapolate its dynamics into 'an overview of future innovation opportunities'. Hielscher, Fischer, and Cooper (2008) perform a literature analysis of the history of hair care, and Scott et al. (2009) paint a culturally diverse overview of the histories of bathing. Other papers of this type focus on spatially removed alternative practices. For example Matsuhashi, Kuijer, and Jong (2009) compare bathing in India, Japan and the Netherlands, Pierce and Paulos (2011) focus on second hand consumption practices, Wakkary, Desjardins, Hauser, and Maestri (2013) on do-it-yourself and repair, and Clune (2010) on practices in developing societies. Again the methods used aren't new, but the attention for history and non-mainstream practices derives from the conceptual link between performance and entity in practice theory.

3.3. Disrupting practices

A third type of application combines a focus on practices with a 'designerly' approach (Cross, 1982) to the problem at hand. Based on the idea that designers reframe problems and solutions in an iterative way, these approaches aim to gain understanding of the focal practice by disrupting it. Jégou et al. (2009) for example mention that their design process included propositions of different ways of organizing ones domestic environment in order to question domestic practices, to take a distance from them and 'enable the families to re-invent progressively their daily ways of living' (p.33), and Scott et al. (2009) use 'practice oriented ... triggers' to 'stir up creativity in practice' (p.6) and eventually 'to help people reinvent ordinary practices' (p.5). Kuijer, De Jong, and Van Eijk (2013) argue that this type of approach moves away from the analytic social science origins of practice theory by taking practices as a *unit of design*.

3.4. Reflecting on practices of design

While every proposed new design approach contains a critique on existing approaches, the fourth type of interpretation is different from the other three in the sense that it uses practice theory primarily to reflect in on *practices of design*. Publications of this type include Kimbell (2011) on service design, Pettersen (2015) on sustainable design, Carl Disalvo and Johan Redström (Disalvo, Redström, & Watson, 2013) on design research, Scott, Bean, and Kuijer (2012) on design education and Wakkary and Maestri (2008) on everyday design. This type of interpretation uses practice theory to reflect on the organisational and professional practices that design is a part of. Moreover, by viewing practices of design as integral to the ecologies of practices, which include those studied and intervened in by designers, highlights the mutually constitutive relations *between* practices.

To summarise, practice theory has been picked up in the design research community, where its implications for design have been interpreted in a variety of ways. Analysis of these varied interpretations revealed that while practice theory forms a useful framework for broadening situated analysis of products in use away from a focus on product-user interactions, the tracing of practices in space and time capitalizes on the conceptual framework by offering a structured way of 'thinking out of the box'. As the case study below will illustrate, such analysis forms a frame of reference to relativize the status quo of a selected problem space. Moreover, taking practices as a unit of design further helps designers to step away from tinkering with individual behaviour and to work with larger scales of change. The fourth interpretation does not feature explicitly in the case but forms an important playing field for further research.

4. Reconfiguring practices by design: a case of keeping warm at home

The approach presented below was developed in a research through design process, a form of applied research in which design projects and their outcomes are used as an integral part of the research process (Zimmerman, Stolterman, & Forlizzi, 2010). The design projects through which the approach described here was developed addressed issues of domestic energy demand, using cases on personal washing and keeping warm at home in the Netherlands. The resulting approach forms a recommended way of working based on practical experiences; it is however not a blueprint or a recipe for success. The approach is illustrated with material from the keeping warm case. This section is based on Kuijer and Jong (2012) and Kuijer (2014), which contain further details on the case.

Domestic heating takes up the largest single share of household resource consumption in most European countries (ENERDATA 2013). Common environmental policy and sustainable design responses to the question of how to save energy for heating homes either focus on improving the energy efficiency of heat provisioning , or on motivating people to turn down the thermostat (e.g. Lu, Ham, and Midden (2015), Chwieduk (2003), Moll and Groot-Marcus (2002)). As this example aims to illustrate, a practices-oriented approach supports the identification and fleshing out of a different kind of response.
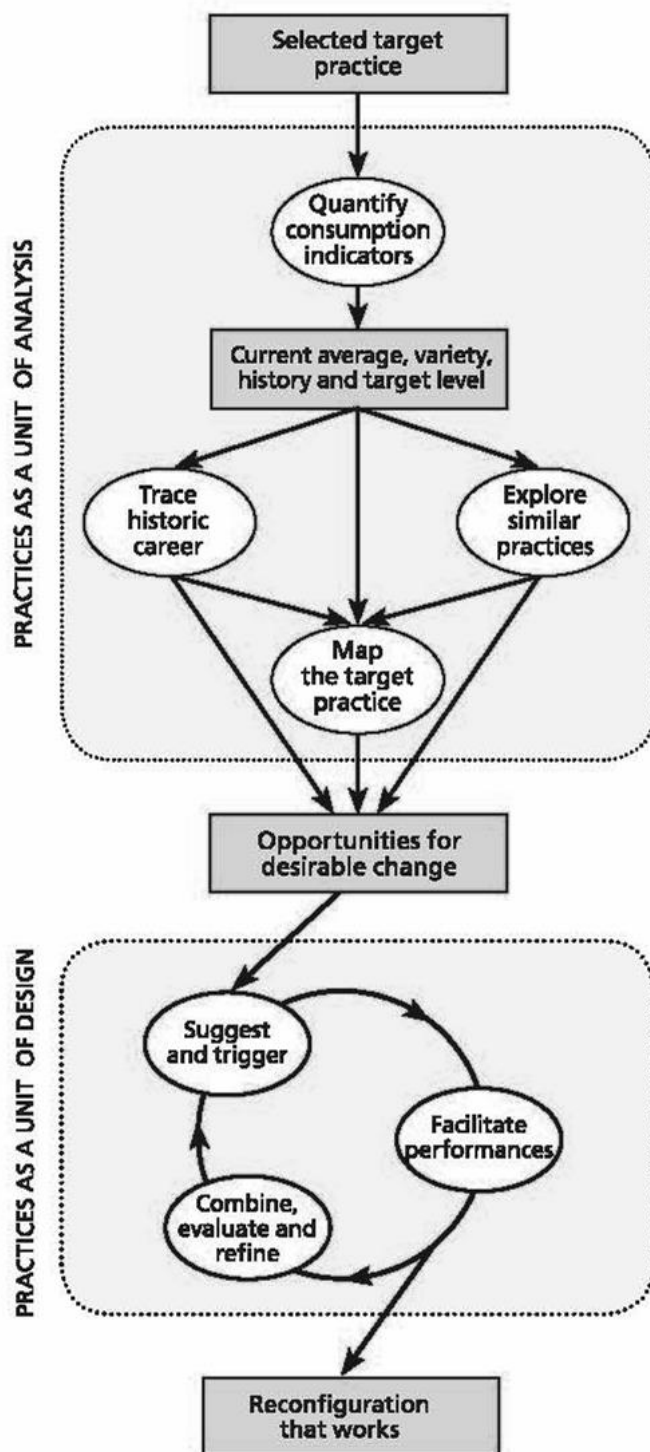
Figure 1. A practices-oriented approach to reducing domestic energy demand (Kuijer 2014, p. 167)

The approach, presented schematically in Figure 1, consists of two main parts. In the first part, practices are taken as a unit of analysis. This part works from a selected, resource intensive target practice – in this case keeping warm at home – to the identification of opportunities for desirable change. In the second part, practices are taken as units of design. Here, the opportunities identified in the first part are fleshed out into reconfigurations of the target practice that have potential to work.

4.1. Practices as a unit of analysis

A practices-oriented approach to reducing domestic energy demand implies considering energy as used for the accomplishment of everyday practices (Shove & Walker, 2014). To analyse domestic heating, the proposed approach therefore starts with the identification of a target practice, which in the domestic heating project became formulated as practices of keeping warm at home.

After selecting 'keeping warm' as target practice, the approach recommends the selection and quantification of consumption indicators. Purpose of this step is to set a target for the scale of change to aim for by looking beyond current day averages at spatial variety, and at historic change. With an idea of the range in levels of energy demand related to the practice, a challenging target to reduce towards can be set. This target is not set as something to achieve at all cost, but makes the scale of the potential for change explicit and opens the target up for discussion. In the keeping warm case, levels of energy consumption for domestic heating in Japan, and in Dutch households a century ago formed the main points of reference. A reduction in the order of 60% - from 50 GJ to 20 GJ of energy use for heating per household per year was set as a target (Kuijer & Jong, 2012). Not disregarding the fact that the target practice is in many ways different from these reference points, it highlights that keeping satisfactorily warm at home is possible with less than half of the energy required by the average Dutch household today.

The next step is to trace the practice's historic career. When tracing the target practice back in time it is recommended to go back centuries rather than years. Existing literature can be insightful for learning about the history of a practice, but sometimes lacks the type of everyday detail of elements and their relations that is useful in a practices-oriented design process. In the keeping warm case, literature study was therefore supplemented with two interviews with Dutch couples from different generations about their past. Besides offering insight into the details of how people lived with significantly lower levels of heating, it also provides a deeper understanding of contemporary practice. From analysis of the historic career of keeping warm for example, four shifts in practices of keeping warm at home in the Netherlands were identified. They were a shift from warm clothes to insulated homes, from heating one room to heating multiple rooms, from solid to liquid fuel, and a shift of decisions about space heating from people to thermostats (Kuijer & Jong, 2012).

Next to an analysis of historic change, the approach recommends the analysis of spatially removed examples of low demanding variants of the target practice, i.e. alternative ways of keeping warm in other (sub)cultures. A variety of approaches for this form of analysis can be found in the papers referred to in Section 3.2. The purpose of analysing these 'desirable' examples is not to copy them, but to find inspiration from, and to form a frame of reference for the target practice. In the case of keeping warm, Japan emerged as an interesting case with its standards of living similar to the Netherlands combined with a significantly lower energy demand for domestic heating (Dril, Gerdes, Marbus, & Boelhouwer, 2012). Analysis of Japanese ways of staying warm at home – through literature study and a small scale ethnographic study – revealed a lower level of space insulation and more locally oriented forms of heating such as the kotatsu – a low table with a heating element and a blanket (Kuijer & Jong, 2012).

While the steps so far are best performed iteratively and intertwined, it is recommended to postpone analysis of the target practice until analysis of historic career and spatial variety are well underway. Reason for this is that - as Hockey puts it - 'that which is closest may well be what is most difficult to see' (1993, p. 221). 'Stepping out' of what we take for granted everyday helps reveal the temporality and locality of the target practice, and thus makes it easier to identify opportunities for

change. As illustrated in Section 3.1., the target practice can be studied using a variety of 'user research' methods. When applied in an energy demand context, focus in this step is on unravelling the relation between the elements of the practice (images, skills and stuff) and levels of demand, and on the identification of tensions in the practice. In the keeping warm case, indoor temperature settings became central in making the link between practices of keeping warm at home and their levels of resource consumption. Tensions were found between uniform indoor temperatures and a high inter and intra personal diversity in situated comfort needs (Kuijer & Jong, 2012).

All these forms of analysis together provide a source of inspiration for the identification of opportunities for change. There is little guidance to offer on how exactly such opportunities can be identified, because they are highly project specific. In the example projects through which the approach was developed, opportunities combined tensions between elements in the target practice with aspects of desirable alternatives, either contemporary or historic. In the keeping warm case, the tension between increasingly uniform indoor climates and high diversity in situated needs for heat were combined with the identification of more person-oriented forms of heating and insulation that were found in Japan and Dutch history. The opportunity selected was to supplement space heating with more person oriented alternatives (Kuijer & Jong, 2012), which was taken into the next phase.

4.2.   Practices as a unit of design

As argued in Kuijer et al. (2013), taking practices as a unit of design implies disrupting existing practices and generating, through acting out, a variety of reconfigurations of the target practice that work. The second phase of the design process involves these elements and integrates them into an iterative, cyclic process in which acting out is central (see Figure 1). The process starts by shaping the opportunities identified in the previous phase into suggested 'proto-practices'. The proto-practice contains materials (prototypes and settings), competences (instructions) and meanings (suggestions) and steers towards a certain type of reconfiguration, but, especially in earlier cycles, remains open when it comes to the details of the performance. It is meant to trigger participants to creatively integrate these elements with others, available or imagined, into ways of doing that work for them.

The keeping warm at home project involved two main iterations, both integrated into student projects at Delft University of Technology. The first iteration entailed the development of person oriented heat sources as part of the courses Interactive Technology Design and Sustainable Design, which resulted in a heated breakfast table, blanket, sweater and pillow. The second iteration involved a masters' graduation project that focused on a proto-practice around warm clothing. In the first design iteration, one of the proto-practices was the MANGO concept, which involved a heated pillow, new skills of hugging the pillow when feeling cold instead of turning up the thermostat, and new meanings of enjoying the direct heat source instead of a distant radiator. The idea included a variety of uses as illustrated in Figure 2.
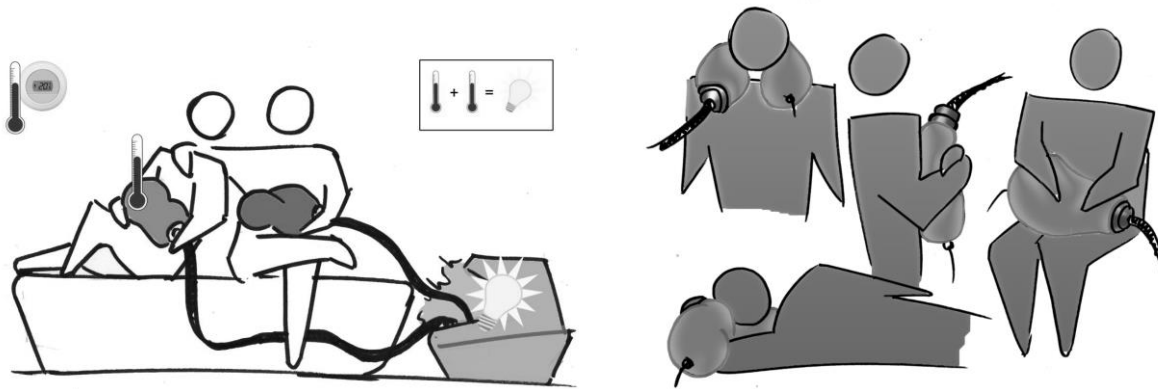
Figure 2. The MANGO concept and a variety of ways to use the pillow (by Nina Boorsma, Barbara Denissen, Bas Lammers and Tom van de Water, Minor Sustainable Design, TU Delft).

In the next step of facilitating performances, various triggers are used as the basis for acting out ways in which the proto-practice might work as a coherent reconfiguration of elements. These performances can take place in a lab (Kuijer et al., 2013), or in people's own homes, and should aim to include a wide diversity of participants to generate a variety of reconfigurations. Forming a very small scale version of this step, the MANGO, together with its use instructions and suggestions was tried out in two different households for two days and three weeks respectively. It was held on the lap while sitting on the couch watching TV as well as when working at a computer sitting in a chair, and it was used in the neck while reading on the couch lying down.

In the third step of the cycle, documented performances are compared, dimensions of variety – e.g. the range of situations and ways in which person-oriented heating is performed – are distilled, levels of energy demand are assessed and eventually, redesigns of the proto-practice are made. The redesign then forms the starting point for another round of performances. By repeating the process in subsequent iterations, the proto-practice is fleshed out and its configuration of elements becomes more 'high-fidelity'. Particularly in earlier stages, this redesign can be very different from the initial proto-practice.
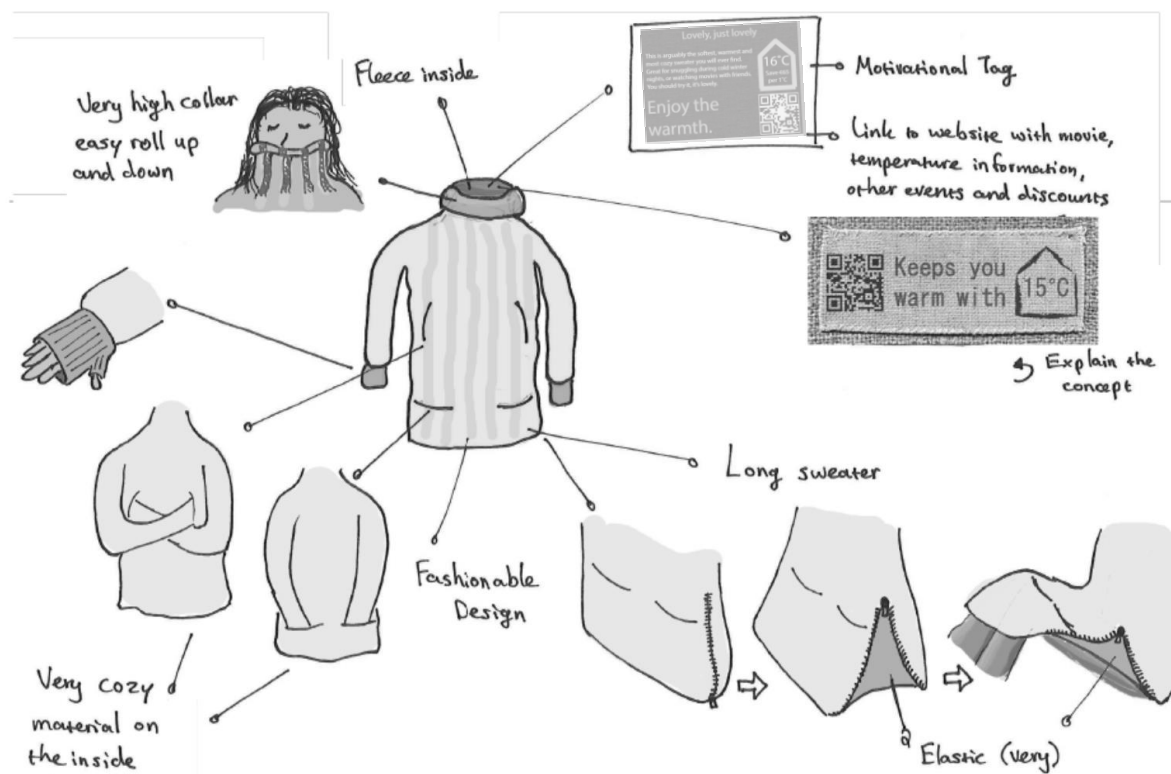
Figure 3. A visualisation of the Home Wear concept (TU Delft graduation project by Sjoerd Vonk for SusLab NWE)

The field studies with the MANGO and other personal heat sources revealed that in spite of their positioning as a partial replacement of space heating, they were used in addition to it, leading to increased rather than decreased energy demand. On top of this, there were indications that their relative immobility may invoke sedentary activity and therefore increase the need for heat. These findings, together with the initial analysis, formed the starting point for the second iteration, which changed direction away from person heating towards a focus on enlarging the role of warm clothing in practices of keeping warm. While putting on a sweater is a common sense low-energy alternative to turning up the thermostat, it currently does not form a mainstream, acceptable way of keeping warm at home in the Netherlands. The proto-practice developed in this iteration embeds warm clothing in a coherent reconfiguration of practices of keeping warm (see Figure 3), including recommendations for the design and marketing of a range of warm sweaters called Home Wear, a website and launch campaign including connections with an existing Dutch campaign initiative, and a thermostat interface. Importantly, this revised proto-practice explicitly integrates lower than average indoor temperatures (15-17°C). It therefore promotes a different idea of comfort that involves warm clothes and fresh air rather than warm spaces.

5. Conclusions

This chapter offers a brief introduction to practices-oriented design that aims to make its methods and underlying theories accessible to a wider audience. Inspired by similar developments in other fields, practices-oriented design has emerged in design research over the past decade. Its literature contains a variety of interpretations of the implications of taking practices as a unit of analysis and design. The practices-oriented design approach introduced in this chapter focuses on reconfiguring a target practice. The example shows that analysing how practices change over time and vary across space reveals the relativity of the mundane everyday in practical terms. Within this contextualised

awareness, a space opens up for design interventions that steer towards a future that is not only different in terms of technologies and behaviours, but also in terms of taken for granted needs, such as the need for heated spaces (of at least 18°C) to achieve indoor comfort. At the same time, a practice approach acknowledges that what people do has to work and make sense for them, which implies close engagement with everyday life contexts as integral to the design process. While the approach was developed in the context of domestic energy demand, these basic characteristics make it suitable for the identification and fleshing out of opportunities for tackling other types of societal challenges as well. A main challenge for design practice when taking practices instead of product-user interactions as the unit of analysis and design is managing the expanded problem and solution spaces. Further work is required into implications for practices of designing, and the webs of practices they form part of for incorporating this paradigm shift.

Acknowledgements

References

Chwieduk, D. (2003). Towards sustainable-energy buildings. *Applied energy, 76*(1), 211-217.

Clune, S. (2010). Inverting the Solution into the Problem: Design, Prac-tice theory and Behavioural Change for Sustainability. *ShangHai*, 26.

Cross, N. (1982). Designerly Ways of Knowing. *Design as a Discipline, 3*(4), 221-227.

Disalvo, C., Redström, J., & Watson, M. (2013). Commentaries on the special issue on practice-oriented approaches to sustainable HCI. *ACM Transactions on Computer-Human Interaction (TOCHI), 20*(4), 26.

Doyle, R., & Davies, A. R. (2012). Towards sustainable household consumption: exploring a practice oriented, participatory backcasting approach for sustainable home heating practices in Ireland. *Journal of Cleaner Production*, 260-271.

Dril, T. v., Gerdes, J., Marbus, S., & Boelhouwer, M. (2012). *Energie Trends 2012*. Retrieved from

Hielscher, S., Fischer, T., & Cooper, T. (2008). *The Return of the Beehives, Brylcreem and Botanical! An Historical Review of Hair Care Practices with a view to Opportunities for Sustainable Design*. Paper presented at the Undisciplined! Design Research Society Conference 2008, Sheffield Hallam University, Sheffield, UK. http://shura.shu.ac.uk/549/

Hielscher, S., Fisher, T., & Cooper, T. (2007). *How often do you wash your hair? Design as disordering: everyday routines, human object theories, probes and sustainability*. Paper presented at the 7th European Academy of Design Conference (EAD07): Dancing with disorder: design, discourse and disorder, Izmir, Turkey.

Hockey, J. (1993). Research methods ‐ ‐ researching peers and familiar settings. *Research Papers in Education, 8*(2), 199-225.

Ingram, J., Shove, E., & Watson, M. (2007). Products and Practices: Selected Concepts from Science and Technology Studies and from Social Theories of Consumption and Practice. *Design Issues, 23*(2), 3-16.

Jégou, F., Liberman, J., & Wallenborn, G. (2009). *Collaborative design sessions of objects proposing energy-saving practices*. Paper presented at the Energy Efficiency & Behaviour conference, Maastricht, The Netherlands.

Julier, G. (2007). Design practice within a theory of practice. *Design Principles & Practices: An International Journal, 1*(2), 43-50.

Kimbell, L. (2011). Rethinking design thinking: Part I. *Design and Culture, 3*(3), 285-306.

Korkman, O. (2006). *Customer Value Formation in Practice: A Practice-Theoretical Approach.* (PhD), Swedish School of Economics and Business Administration, Helsinki.

Kuijer, L. (2014). Implications of Social Practice Theory for Sustainable Design.

Kuijer, L., & Bakker, C. (2015). Of chalk and cheese: behaviour change and practice theory in sustainable design. *International Journal of Sustainable Engineering*(ahead-of-print), 1-12.

Kuijer, L., De Jong, A., & Van Eijk, D. (2013). Practices as a Unit of Design: An Exploration of Theoretical Guidelines in a Study on Bathing. *Transactions on Computer-Human Interaction, 20*(4), 22.

Kuijer, L., & Jong, A. d. (2012). Identifying Design Opportunities for Reduced Household Resource Consumption: Exploring Practices of Thermal Comfort. *Journal of Design Research, 10*(1/2), 67-85.

Kuutti, K., & Bannon, L. J. (2014). *The turn to practice in HCI: towards a research agenda*. Paper presented at the Proceedings of the 32nd annual ACM conference on Human factors in computing systems, Toronto, Ontario, Canada.

Lu, S., Ham, J., & Midden, C. (2015). Persuasive technology based on bodily comfort experiences: The effect of color temperature of room lighting on user motivation to change room temperature *Persuasive Technology* (pp. 83-94): Springer.

Matsuhashi, N., Kuijer, L., & Jong, A. d. (2009). *A Culture-Inspired Approach to Gaining Insights for Designing Sustainable Practices*. Paper presented at the EcoDesign 2009: Sixth International Symposium on Environmentally Conscious Design and Inverse Manufacturing Sapporo, Japan.

Moll, H., & Groot-Marcus, A. (2002). Households past and present, and opportunities for change. In M. Kok, W. Vermeulen, A. Faaij, & D. d. Jager (Eds.), *Global Warming and Social Innovation; the challenge of a climate neutral society* (pp. 83-106). London: Earthscan Publications Ltd.

Munnecke, M. (2007). *Future Practices: Coshaping Everyday Life*. Paper presented at the Icsid & IDSA CONNECTING '07 World Design Congress.

Pettersen, I. N. (2015). Towards practice-oriented design for sustainability: the compatibility with selected design fields. *International Journal of Sustainable Engineering*(ahead-of-print), 1-13.

Pierce, J., & Paulos, E. (2011). *Second-hand interactions: investigating reacquisition and dispossession practices around domestic objects*. Paper presented at the Proceedings of the 2011 annual conference on Human factors in computing systems, Vancouver, Canada.

Pierce, J., Strengers, Y., Sengers, P., & Bødker, S. (2013). Introduction to the special issue on practice-oriented approaches to sustainable HCI. *ACM Transactions on Computer-Human Interaction (TOCHI), 20*(4), 20.

Prendergast, D., & Roberts, S. (2009). Practice, systems and technology for elders. *Universal Access Information Society, 8*, 59-61.

Reckwitz, A. (2002a). The status of the "material" in theories of culture: From "social structure" to "artefacts". *Journal for the theory of social behaviour, 32*(2), 195-217.

Reckwitz, A. (2002b). Toward a Theory of Social Practices: A Development in Culturalist Theorizing. *European journal of social theory, 5*(2), 243-263. doi:10.1177/13684310222225432

Schatzki, T. (2001). „Introduction: Practice theory" in Theodore R. Schatzki, Karin Knorr Cetina and Eike von Savigny (eds.) The Practice Turn in Contemporary Theory: London: Routledge.

Schatzki, T. (2010). Materiality and social life. *Nature and Culture, 5*(2), 123-149.

Scott, K., Bean, J., & Kuijer, L. (2012). *Teaching practice theory and sustainability in the design studio*. Paper presented at the NCCR.

Scott, K., Quist, J., & Bakker, C. (2009). *Co-design, social practices and sustainable innovation: involving users in a living lab exploratory study on bathing*. Paper presented at the Joint actions on climate change conference, Aalborg, Denmark.

Shove, E., & Pantzar, M. (2005). Consumers, Producers and Practices: Understanding the invention and reivention of Nordic Walking. *Journal of Consumer Culture, 5*(1), 34-64. doi:10.1177/1469540505049846

Shove, E., Pantzar, M., & Watson, M. (2012). *The Dynamics of Social Practice: Everyday Life and How it Changes*. London: Sage.

Shove, E., & Walker, G. (2014). What is energy for? Social practice and energy demand. *Theory, Culture & Society, 31*(5), 41-58.

Shove, E., & Watson, M. (2006). Manifesto of Practice Oriented Product Design.   Retrieved from http://www.lancaster.ac.uk/fass/projects/dnc/papers.html

Shove, E., Watson, M., Hand, M., & Ingram, J. (2007). *The Design of Everyday Life*: Berg.

Wakkary, R., Desjardins, A., Hauser, S., & Maestri, L. (2013). A sustainable design fiction: Green practices. *ACM Transactions on Computer-Human Interaction (TOCHI), 20*(4), 23.

Wakkary, R., & Maestri, L. (2008). Aspects of everyday design: Resourcefulness, adaptation, and emergence. *Intl. Journal of Human–Computer Interaction, 24*(5), 478-491.

Warde, A. (2005). Consumption and Theories of Practice. *Journal of Consumer Culture, 5*(2), 131-153.

Zimmerman, J., Stolterman, E., & Forlizzi, J. (2010). *An Analysis and Critique of Research through Design: towards a formalization of a research approach*. Paper presented at the DIS2010, Aarhus Denmark.