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Published in:
Time and Society

DOI (link to publication from Publisher):
[10.1177/0961463X18820749](https://doi.org/10.1177/0961463X18820749)

Publication date:
2020

Document Version
Accepted author manuscript, peer reviewed version

[Link to publication from Aalborg University](#)

Citation for published version (APA):
Gram-Hanssen, K., Christensen, T. H., Madsen, L. V., & do Carmo, C. (2020). Sequence of practices in personal and societal rhythms – Showering as a case. *Time and Society*, 29(1), 256-281.
<https://doi.org/10.1177/0961463X18820749>

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This is the authors' final version of the accepted manuscript for the paper:

Gram-Hanssen, K., Christensen, T. H., Madsen, L. V., & do Carmo, C. (2020). Sequence of practices in personal and societal rhythms – showering as a case. *Time and Society*, 29(1), 256-281.
Doi:10.1177/0961463X18820749

Sequence of practices in personal and societal rhythms – showering as a case

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Abstract

This paper explores methodologically and theoretically how to understand variations in the temporal performances of showering as a practice-as-entity. Time-based data on domestic hot water consumption in 134 Danish households show distinctly different patterns, where some households exhibit highest consumption in the morning and others in the evening. This temporal pattern of showering is analysed based on an innovative combination of statistical cluster analysis and qualitative interviews. Focus is on the timing of showering related to sequences of other everyday practices, and to the rules, meanings and dispositions guiding this practice. From a sustainability perspective, the consumption of water and energy entailed by showering is problematic, and with increasingly intermittent renewable energy production, the timing of showering also becomes an issue. The study demonstrates that the time of showering is closely related to sequences of different practices, that dispositions and socio-demographics influence the order of sequences, and that meanings of showering may vary accordingly. However, there are also common meanings and rules related to showering across these variations, which contribute to the formation of showering as a practice-as-entity.

Introduction

Mundane activities of everyday life are based on routines and repetition (Southerton, 2013) giving the everyday life of households a certain rhythm which combined across households shows different forms of synchronicity in society (Walker, 2014). In recent years, theories of practice have been focused on understanding and explaining the relations between time and practices related to these mundane activities (Shove et al., 2009). Elisabeth Shove has described how the relation between time and practices is mutual, as practices *consume* and *constitute* time (Shove, 2009). In formulating these theses, Shove uses two types of aggregated representations of use of time, one based on time diaries and another based on water consumption - just as examples. She also states that this type of data can be used to analyse who does what at what time, and how it varies, though she notes that, in her opinion, this type of analysis is of little interest when being interested in how practice develops over time or disappears (Shove, 2009, p. 18). However, other researchers interested in how practices and time are connected show more interest in

developing a vocabulary for how to interpret variations in the timing of mundane practices. Especially the work by Dale Southerton represents such an example (Southerton, 2013). Southerton shows how dispositions, linking to social classes, affect both the allocation of practices in time and contribute to shaping the temporal demand on practices.

As noted by Southerton and co-authors, the study of variations in the performance of practices, and the use of quantitative data and methods, is not widespread among researchers relying on theories of practices (Southerton et al., 2012). Recent years have seen some examples where quantitative surveys on performance of specific practices are analysed within theories of practice (Browne et al., 2014; Hansen et al., 2018) or studies using register-based data to analyse energy consumption or appliance ownership which interpret results within theories of practices (Hansen, 2016; Jacobsen, 2016). To our knowledge, the only quantitative study that includes social variation in time of use is, the study by Southerton and co-authors using time dairies in a cross cultural study on reading practices (Southerton et al., 2012). In that study, Southerton and co-authors argue that more quantitative studies within understandings from theories of practice are needed, to provide a systematic account of the broad trajectories of changes in practices over time and across space and socio-demographic groups. In an increasingly digitalised society, time-series data on consumption of different types of resources will become available for research. Thus the intent of this paper is also to contribute methodologically with ideas for different forms of mixed-methods approaches where this type of time-based consumption data, combined with qualitative interviews, can be utilised to further develop theoretical understandings of relations between time and practices.

One of the reasons for being interested in time and practices relates to a sustainability perspective, as vast amounts of natural resources of energy and water are consumed while performing various everyday practices (Gram-Hanssen, 2015; Shove, 2003). From a sustainability perspective at least two questions are relevant when dealing with time and practices. The first is the question of how practices develop over time. As shown by Shove and co-authors in various works, questions of how norms and conventions develop over time are at the centre of understanding the growing resource consumption in contemporary Western societies (Hand et al., 2005; Shove, 2003; Shove et al., 2012). The second is that time and practices become interesting when intermittent renewable energy sources such as solar and wind power become prevalent in energy systems (Christensen et al., 2013). Solar and wind power is dependent on daily and seasonal cycles and on local weather conditions, and as energy storage is wasteful and expensive, the supply side becomes interested in regulating the time of use. This attracts attention to an interest in the understanding of the time aspects related to the performance of various everyday practices.

Showering is one of many resource-intensive practices in Western everyday life, with profound environmental consequences, and previous research into the habits of bathing and showering has also taken practice theoretical approaches (Browne et al., 2014; Gram-Hanssen, 2007; Hand et al., 2005; Hitchings et al., 2018). Hand et al. were interested in understanding why showering has become so popular compared with bathing over the last decades and approach this through a material, a cultural and a temporal perspective (Hand et al., 2005). The material perspective describes how infrastructures and technologies have changed since ancient times and similarly how meanings of bathing have changed from being a communal activity to becoming a private habit, and from relating to mental wellbeing over physical hygiene to a discipline for the late-modern body. The temporal approach associates showering, as compared with bathing, with speed and convenience, and argues that showering fits better into a harried everyday life as compared with the weekly bath.

Another study focusing on showering and practices takes an interesting mixed-methods approach (Browne et al., 2014). Analysis of survey questions about frequencies of showering and other cleanliness practices reveals different patterns, and include how the frequency of the different cleanliness practices relate to

each other. By far the biggest cluster consists of people showering each day at home and represents 40% of the respondents in this survey, whereas the other clusters consist of people showering either more or less often. Qualitative interviews are used to indicate how the performance of practices may change over a life course. This includes changing occupational and leisure practices, including changing mobility patterns, changing ideas of when and how to be “presentable” as well as changes in time demand from other practices at home.

Thirdly, Gram-Hanssen focuses explicitly on how young teenagers learn and are enrolled into norms and practices of cleanliness at the stage between being a child and an adult (Gram-Hanssen, 2007). It includes understandings of collective norms of cleanliness as well as a variation of norms and practices, and it uses habitus as a way of understanding how norms and practices are handed over from one generation to the next. In addition, the role of peer pressure from friends and schoolmates is seen as part of how teenagers learned the rules of cleanliness, such as the daily showering, especially related to the norm of not smelling of sweat (Gram-Hanssen, 2007). Finally, a fourth study investigates how, during summer music festivals, temporarily new cultures of cleanliness evolves, as young people who usually shower daily may accept several days without performing this cleanliness practice (Hitchings et al., 2018). This paper poses the question: if these music festivals may contribute to a broader sustainability agenda, the festivals can also contribute to raising questions about the normal, resource-intensive cleanliness regime. However, analysis shows how this temporary shift in cleanliness regime, have a rather small impact on the young people questioning their normal resource-intensive showering practice.

Together these studies highlight how practices of showering change with the life course together with changes in the performance of other practices, although these practices can also be temporarily disrupted in specific socio-material settings. It also shows how practices of showering are learned during young teenage years, where habitus and related dispositions take part in linking between social upbringing and the performance of the practice. Meanings, as well as materiality, related to cleanliness practices have changed over historic time, and it may also change with a temporary event.

With these interests in practices of showering, the theoretical understanding of time-based relations between different practices in everyday life are central together with understandings of how habitus takes part in mediating between individual performances of practices and the collective structures of meanings and knowledge in the practice-as-entity. These theoretical interests are further developed in the following theory section.

The ambition of this paper is thus trifold: Empirically we want to contribute with knowledge about time of use of energy and water for better environmental policy formulation. Methodologically we want to contribute with mixed-methods approaches for practice theoretical studies of temporality and social variation. Theoretically we want to elaborate on how the practice-as-entity is reproduced even when it is done in ways that varies across social groups.

The following further develops, first the theoretical background for understanding time and practices, especially related to sequences of practice and the role of habitus and dispositions across social groups. Then follows a section on methodological approaches, including the introduction of the qualitative interviews and cluster analysis of time-of-use data. This is followed by a presentation of the different clusters of time of use of domestic hot water. The analysis in the succeeding section includes detailed analysis of qualitative interviews, especially related to sequences and dispositions, and finally the conclusion sums up the findings related to three different perspectives: What can be learned from a sustainability perspective? What can be learned from a time and practice-theoretical perspective? And what can be learned methodologically from applying a mix-methods approach?

Theory

In the study of mundane everyday consumption of resources like energy and water, theories of practices have gained much ground in recent years (see e.g. (Browne et al., 2014; Christensen and Røpke, 2010; Gram-Hanssen, 2014, 2011; Kuijer and Watson, 2017; Røpke et al., 2010; Shove et al., 2012; Strengers, 2011)). These approaches apply theories of practice as formulated notably by Schatzki and emphasise that to study the social we should focus on the practices rather than e.g. individuals, ideas or structures (Schatzki, 2002, 1996). Practices are nexuses of doings and sayings held together by elements such as meanings, know-how and rules, and they are strongly related to the material structures as well. Practices are performed or carried (Reckwitz, 2002) by the individual practitioner, and practices-as-entities are then the collective entity across time and space of these performances (Schatzki, 1996). As Watson puts it:

“It is through performance that the “pattern” provided by the practice-as entity is filled out and reproduced. Only through the cumulative moments of performance are the interdependencies between those elements which comprise the practice sustained over time.” (Watson, 2012, p. 489)

According to Røpke, to identify and delimit what can be seen as a practice is an empirical question of what makes sense to people performing these practices (Røpke, 2009). This way to delimit thus focuses on the practice-as-performance. For Warde on the other hand, ways of recognising a practice include whether it might be possible to write an instruction manual on how to perform the practices, whether it is possible to include it as an activity in a questionnaire of a time-use study, whether there may be disputes about the standards of the performance of the practice, and finally whether there is specialised equipment related to the practice (Warde, 2014). This way to delimit thus focuses on the practice-as-entity. Examples of everyday practices are cooking and showering, which are meaningful entities of doings and sayings performed routinely by a majority of people in Western societies, which follow certain social rules.

Relations between time and practices have been in focus in several studies. A fundamental relation between time and practices is that practices-as-entities need a continuous and recurrent performance over time to continue to exist, even though practices also change over time (Shove et al., 2012; Southerton, 2013; Walker, 2014). Furthermore there is the mutual relation between time and practices, as on one hand time is a resource for which practices compete as there are only 24 hours a day, and on the other hand practices create time as we experience time through the performance of different practices. An example of the latter is how weekends are different from weekdays because of differences in the performed practices (Shove, 2009; Shove et al., 2012; Southerton, 2013). When practices compete with each other for time, and when different constellations of practices together constitute different times, it also becomes apparent that the relation between different practices is important when analysing time and practices. Practices can be tied together in loose connections where one practice is dependent on the other, but practices can also be competitors for the same resources and thus be mutually exclusive (Pantzar and Shove, 2010; Shove et al., 2012). The competitor relationship between practices may be relevant for understanding changes in practices over time, where some practices die out and others emerge, e.g. showering gradually replacing bathing (Hand et al., 2005). In describing relations between practices, it may however also be relevant to include sequences of practices (Shove, 2009; Southerton, 2013), where certain practices are linked to each other in a chronology, as e.g. some practices have to be performed before or after other practices, e.g. cooking has to be performed before eating. When practices are joined together in sequences with one practice following the other during a day, certain rhythms in the performance of practices in the individual everyday life emerges (Southerton, 2006) and when the combination of these individual performances of practices is seen at a societal level, we find collective rhythms of days, weeks and years (Walker, 2014). Collective rhythms may have material manifestations such as rush hours in traffic, peak consumption of electricity in the afternoon or higher prices for vacations during school holidays. However, these collective rhythms seem to be eroding (Shove, 2009; Southerton, 2003). This can either be the result of deliberate politics e.g. differentiated public holidays in different parts of a country or by people with flexible working

hours adjusting timing in their everyday life to commute just before or after rush hour, with the result that rush hours are spread over more hours with fewer high peaks.

Studying practices is to study the collective entities of what people do, although the empirical approach to doing this may be through the study of individual performances of practices. Rhythms and sequences of practices may thus be understood and researched both at the individual practice-as-performance level and at the collective practice-as-entity level, and the recursive relation between the two is interesting when studying both reproduction (stability) and change (innovation) in practices (Southerton, 2013, p. 339). As described in the introduction to this paper, our interest includes studying socio-demographic variations in the performance of practices, including variation in the temporal aspects of the performance of practices. In understanding routines and temporalities of consumption, Southerton introduces dispositions, based on the work of Bourdieu, to study the temporal patterns both *when* we are performing certain practices and *how much time* is devoted to a practice (Southerton, 2013). Dispositions relate to Bourdieu's notion of habitus (Bourdieu, 1986), and include how people who share similar conditions related to social space, understood as economic, social and cultural capital, also share dispositions towards the performance of various practices. Across these social spaces, we might all take part in the same practices, though the way, including its temporalities, we perform these practices may vary with our dispositions (Southerton, 2013). Also, routinised performances of practices draw on tacit knowledge, which includes prescriptions (rules) on the temporality of performing these practices (both the individual performance of a practice and how this practice relates in time to other practices). Southerton (2013) calls this temporal procedures, which entails that certain practices are performed before or after each other, that they are performed at a certain time of the day, that they are supposed to have a certain duration and, finally, that practices typically have a certain rate of recurrence (e.g. brushing teeth twice a day). If linking temporal procedures to dispositions, this implies that tacit knowledge, including its temporalities, varies with different social groups, though there may also be cultural conventions shared across these groups. Besides linking temporalities of practices to social space and cultural conventions, Southerton also links it to technological and material aspects, such as sequences of actions scripted by technologies, e.g. washing machine cycles or the spatial layout of cities and communities. It can be added that possession of various technologies as well as location in cities have relations to dispositions and social class in the understanding of Bourdieu.

There may be a general understanding that we are living in an ever more harried society. Though, as Southerton documents in several of his studies, this does not necessarily relate to more hours spent working, whether paid or unpaid, but rather (also) the temporality of the activities performed, which may add to a feeling of harriedness (Southerton, 2003; Southerton and Tomlinson, 2005). Continuous coordination in time and space of various practices in a society with increasingly interrelated collective rhythms may be part of the context behind feelings of harriedness. Ways of dealing with this include creating hot and cold spots in everyday life. Hot spots are times when many practices are squeezed together, whereas cold spots refer to times of the day with a lower intensity of activities (practices) and which are often devoted to relaxed time together with others (Southerton, 2003). Cold spots can have longer duration (e.g. watching a movie on the TV together with the family), but can also appear as brief moments, "pockets of time", of meaningful and sacred time within otherwise activity-dense hours of the day, like parents cherishing the time together with their children around the breakfast table in the morning which is generally filled with activities (Friis and Christensen, 2016).

Methods and data

In this paper, quantitative data were analysed statistically to show general patterns of temporal variation in consumption and qualitative interviews were used to explore the details and context of these patterns.

The quantitative data on time of use of domestic hot water come from a trial conducted in Denmark with 300 households volunteering for a project on remote control of heat pumps. The project was initiated by actors within the electricity sector and aimed at developing an IT infrastructure for remote control of heat pumps in privately-owned detached homes. As part of the project, detailed time-based data of energy consumption for respectively domestic hot water and space heating were collected. As a statistical analysis of the use of energy for space heating has already been published (Do Carmo and Christensen, 2016), this paper focuses only on the analysis of domestic hot water consumption. Metering of domestic hot water is not common, as invoicing is most often done on the basis of the total consumption of energy and of water, thus implying that hot and cold water are metered together and energy for heating water is measured together with either energy for space heating (e.g. gas or district heating) or with electricity for appliances. Except that domestic hot water is assumed to account for between 14-26% of the total energy consumption for heating in households (Pérez-Lombard et al., 2008), little is known about households' consumption of domestic hot water, especially with regard to the variations between different types of households (Fuentes et al., 2018). The availability of a larger time-series sample of domestic hot water used in households thus prompted us to dig further into this, and combine quantitative data with qualitative interviews.

The approach of utilising metered data available from another project has a few drawbacks as regards data quality, which should be mentioned. For our data, drawbacks include first that households volunteered for the trial and thus represent a sample bias of households where typically one member of the household (often a male adult) is technically interested in energy issues. Second that the associated survey questions distributed to the participating households at the beginning of the trial were more technical than socially oriented; thus, we lack proper social background information. Finally, there is a time lag of up to four years between the collection of the metered data and the time of the qualitative interviewing carried out for this paper. Thus, the metered time profile of domestic hot water consumption of the individual households does not necessarily match the time profile at the time of the interview, as households in several cases reported changes in the household composition, including children leaving home and deceased adults as well as major changes in everyday life related to e.g. retirement. Despite these drawbacks, the data material is regarded as valuable and unique, though the sample should not be interpreted as a representative sample of the Danish population and quantitative and qualitative data should not be directly linked at household level.

Cluster analysis was performed on data on energy used for heating domestic hot water at an hourly basis, divided into weekdays and weekends. Cluster analysis is a statistical method applied for grouping large amounts of data into groups with similar patterns. Previous research has applied this method on electricity consumption in more technical studies, and also on consumption for space heating where sociological analysis was included (Do Carmo and Christensen, 2016). Cluster analysis has also previously been used on survey data on practices of showering (Browne et al., 2014), though in this case not combined with metered data, and also on time use data with a focus on patterns in the temporality of everyday activities (Palm et al., 2018).

The cluster analysis performed for this paper is based on *k-means*, which is considered the most frequently applied method for clustering (Ramos et al., 2015), and “which is an iterative algorithm that divides the data set into *k* clusters by minimizing the sum of all distances to the respective cluster centres” (Do Carmo and Christensen, 2016, p. 174). Since the analysis focuses on temporal patterns, the hourly energy consumption values for domestic hot water consumption were normalised to the maximum load for each dwelling. The original data sample consisted of 280 households, but due to missing survey data (survey not completed) and errors in data acquisition (missing or anomalous consumption values), data from only 134 households were included in the final sample. An initial cluster analysis divided by seasons showed no significant seasonal differences in the profiles and, as a result, the cluster analysis presented in this paper is

based on data for an entire year (2013). However, since the initial analysis showed significant differences in profiles between weekdays and weekends, we present separate cluster analyses for weekday and weekend profiles. See also (Do Carmo and Christensen, 2016) for further details on the statistical approach and applied methods.

Even though qualitative and quantitative data should not be interpreted together at the level of individual households, the quantitative material was used in the selection of households for qualitative interviewing. Thus, based on three clusters of time of use of domestic hot water on weekdays, shown in the next section, households were contacted for qualitative interviewing on domestic hot water use. As households had already volunteered to take part in a trial, the majority of those contacted accepted, though a few had moved away or were not available for interviewing for other reasons. Interviews were conducted with five households from each cluster, making it 15 qualitative interviews in total. When recruiting households for qualitative interviewing, the choice of selection procedure is relevant as this influences the conclusions that can be made on the basis of the material (Flyvbjerg, 2006). Our approach was to ensure high variation within the practices related to the consumption of domestic hot water, and thus to have households from all three clusters represented. The interviews lasted between 20 and 45 minutes, and covered all types of hot water use, but focused primarily on showering and bathing habits and the temporalities of these. Two interviews were performed by telephone, the rest in the homes of the respondents, and all these included a tour of the home to see the bathrooms. Eleven of the fifteen interviews included only one adult of the household, and ten of these interviews were with men. Of the remaining four interviews, three were performed with both spouses and one with both spouses and a young adult daughter. For an overview, see Table 1. Interviews were recorded and verbally transcribed for analysis. Since all interviews were in Danish, quotes for this paper have been translated by the authors. Throughout the paper, M and F in quotes indicate male and female interviewees (respectively), while an I indicates interviewer.

Tabel 1: Overview of 15 interviewed households and of the interview

Cluster	Our ID reference	Inhabitants in 2013 when water consumption was measured	Inhabitants in 2017 when interview was performed	Info on interviewee and interview
Levelled distribution	84	2 adults 2 children	3 adults (au pair) 2 children	Male
Levelled distribution	77	1 adult	1 adult	Male
Levelled distribution	90	2 adults 2 children 1 adolescent	1 adult 2 children	Male. Interview performed on phone
Levelled distribution	81	2 adults 1 child 1 adolescent	2 adults 1 adolescent	Male, female and adolescent daughter
Levelled distribution	79	2 adults 1 adolescent	2 adults 1 adolescent	Male
Higher evening peak	80	3 adults 3 children	3 adults (grandma) 2 children 1 adolescent	Male
Higher evening peak	86	2 adults	2 adults	Male and female
Higher evening peak	78	1 adult	1 adult	Male

Higher evening peak	88	2 adults 2 adolescent	2 adults 1 adolescent	Male
Higher evening peak	89	2 adults	2 adults	Male. Interview performed on phone
Higher morning peak	76	2 adults 1 child 1 adolescent	2 adults 1 adolescent	Male
Higher morning peak	83	2 adults 2 children	2 adults 2 children	Male
Higher morning peak	85	2 adults 1 children 1 adolescent	2 adults 1 adolescent	Male
Higher morning peak	87	2 adults 1 child 2 adolescent	2 adults 1 adolescent	Female
Higher morning peak	82	2 adults	2 adults	Male

All interviewees were anonymised both as regards names and professions, though their type of occupation is indicated where this is relevant for the interpretation of the interviews, for example if the interviewee has manual or office work. Numbers after each quote is our internal interview ID reference.

The shower habits of the interviewed Danish families are taken as a case to study temporal patterns and sequences of practices. Such issue will always be dependent on specific socio-material settings, and thus for international comparison a few details on Denmark should be provided. Showering facilities at work places are common in Denmark and if any dirty or dusty work is performed, the law stipulates that showering facilities should be availableⁱ, though facilities for showering is normal also at many offices. Especially in urban areas where biking is a frequent way of commuting, shower facilities may be available for people biking to workⁱⁱ. One of the interviewed families live three generations together in one house. This is not common in Denmark, however, even though recently popular media have presented this in positive terms as a new trend. Finally, one family include an au-pair, which is not very common in Denmark, but on the other hand not unusual in higher-income dual-income families.

Hot water time-of-use clusters

The cluster analysis of the 134 Danish households identifies three distinct clusters of time of use of domestic hot water during respectively weekend and weekdays.

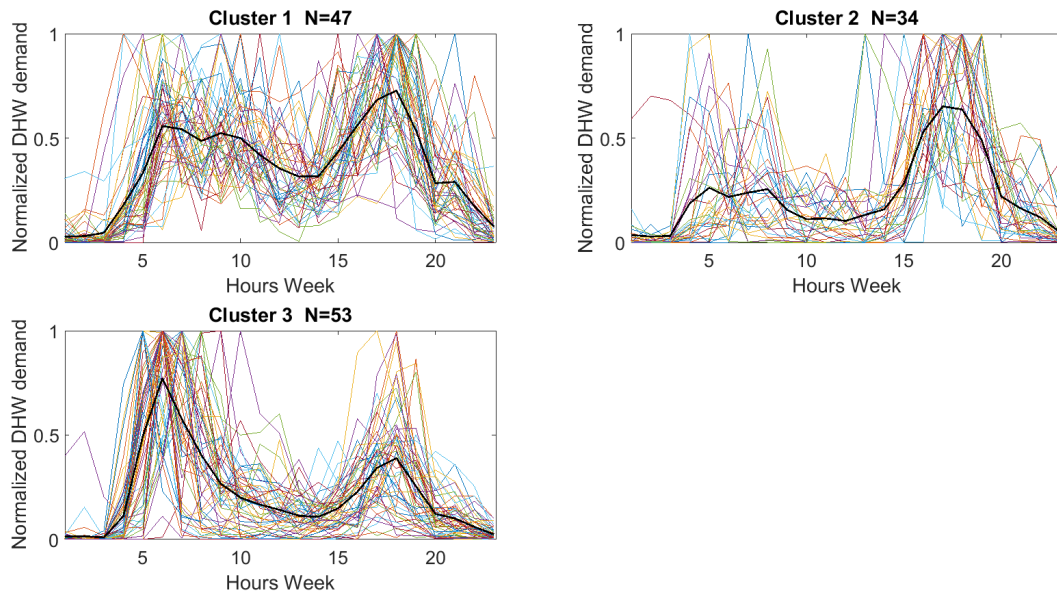


Figure 1: Three clusters of domestic hot water consumption during weekdays. The clusters are named: 1: Levelled distribution; 2: Higher evening peak; 3: Higher morning peak. (Daylight Saving Time)

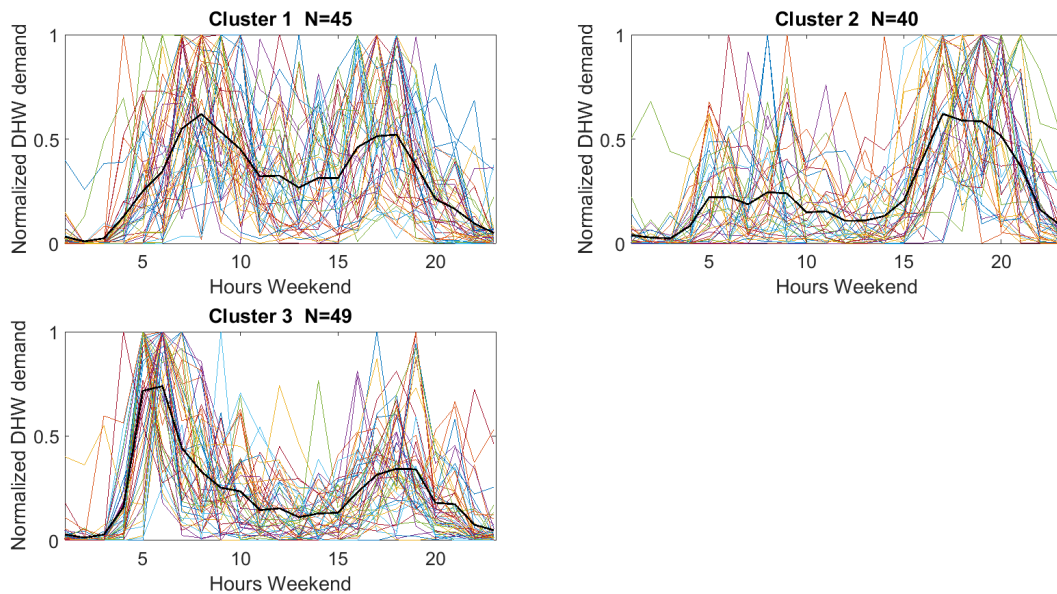


Figure 2: Three clusters of domestic hot water consumption during weekends. The clusters are named: 1: Levelled distribution; 2: Higher evening peak; 3: Higher morning peak. (Daylight Saving Time)

For weekdays, cluster 1, called Levelled distribution, represents a daily domestic hot water profile with two peaks of similar magnitude; one in the morning (at 6 am) and one in the evening (at 7 pm) as well as higher consumption during the day compared with the other two clusters. Cluster 2, called Higher evening peak,

comprises households with a tendency towards an almost negligible peak in the morning hours, but with a distinct peak in the evening (peaking at 5 pm). Cluster 3, called Higher morning peak, represents households with a marked peak in the morning (at 6 am) and a moderate peak in the evening (at 6 pm). Though each cluster is comprised of homes with relatively high individual variations (coloured, thin lines), see Figure 1, which implies that belonging to a certain cluster does not mean that the individual household displays exactly the averaged pattern of the cluster (dark, thick line); only that it is the cluster that the household matches best according to the applied clustering method.

Clusters with similar daily profiles are found for weekends, see Figure 2. Analysis on data shows that 50 of 134 households shift their profile between weekdays and weekends. Furthermore, the consumption in general peaks slightly later in the weekend compared with weekdays. During weekends there is thus slightly less hot water used in the mornings compared with weekdays, though the majority of families actually perform their hot water practices with quite similar routines comparing weekdays and weekends.

As mentioned earlier, only little socio-economic data are available for analysing differences between clusters, but we do have number and age of children. Figure 3 shows the family composition (with/out children/adolescents) for the three weekday clusters, which indicates that families with children are more likely to belong to cluster 2, Higher evening peak. Besides this observation, the three clusters include various forms of families.

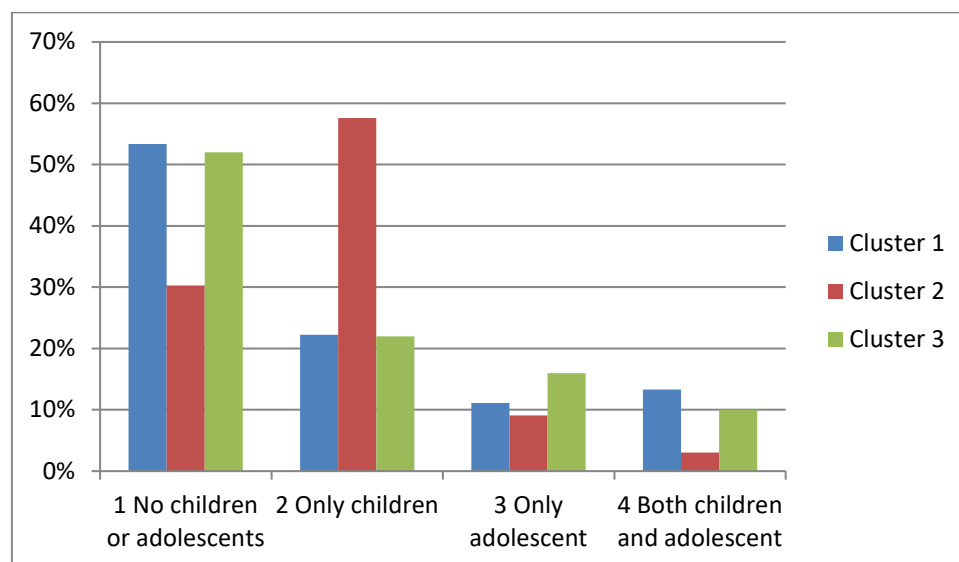


Figure 3: Descriptive statistics comparing the three different clusters of weekdays with questions of having children (12 years and younger), having adolescents (13 years or above) or having none or both children and adolescents.

Qualitative analysis on temporalities of the practice of showering

This paper explores the temporalities behind the patterns shown in the previous cluster analysis, and as stated in the introduction, this includes understanding how showering, as a practice, interrelates with other practices and how this varies with dispositions reflecting differences in social position and background. In further developing this, we first use extracts from the interviews to explain how showering is something that is done before or after doing something else.

Several of the interviewees said they had a well-established routine of showering every morning before leaving for work, though they sometimes deviated from this routine because of exercising. Anders is a man doing technical office work and married to a self-employed woman, and they have two children of seven

and ten years. He explained how he and his wife wake up every morning, take a shower and then wake up the children. When asked if this is an established routine, he answered:

M: Yes, for me it is. My wife, sometimes, if she does not have any work outside the home, she might go to fitness, and then she takes a shower there. But I would say, as a main rule, yes.

I: Why do you shower, would you say? What is the primary reason to shower?

M: That is to feel... It is two things. It is to wake up, which I think is very difficult in the morning, and then to feel clean

Later he continued:

M: Well, sometimes it may be an extra shower, for instance if I go to work first and exercise after work, then I take a shower in the morning and then a shower after exercising, but if I don't have any meetings in the morning and go exercising in the morning, then I don't shower at home first. (84)

Other interviewees indicated having an equally well-established routine of showering in the evening or when coming home from work. A couple with vocational training, who had previously been employed at an office and a laboratory, respectively, are now in unskilled manual employment due to different life situations. In explaining their own and their adult daughter's showering habits, and in response to a question from the interviewer about their morning routines, the woman answered:

F: Well, no one takes a morning shower... It is done in the evening.

M: It is good night. I'm raised with it... I am from a farm, and there was a basis for taking a shower in the evening. The toes had a different colour, if it was...

Later the wife continued:

F: When I come home from work, I might take a shower... Because it is rather dusty... It is partly warehouse work, and it is rather dirty, so it is nice to rinse off the work... So it is like having new batteries in the back. Then you can go on some more.

They also explained how their daughter at high school also showers in the evening:

F: She wants to be clean when she goes to bed. (81)

In other families, there is a mixture of who is showering in the morning and afternoon/evening. In a family where the man is a skilled worker, working shifts in a rather dirty work environment, and the wife is salesperson in a shop, she normally showers in the morning before going to work, whereas he showers in the evening. The man explains his showering habits:

M: I also have the possibility to shower at work, but I do think it is a little futile when I know I will go home and continue messing around with something at home... So. Now this week, where I have the late shift from 13 to 23... Then I naturally take a shower at work before driving home, because then it is just home and to bed. (88)

From these three examples of families, as well as from the interviews in general, we extract some clear rules governing the practice of showering, which strongly relate to different sequences of practices. In all cases, showering is presented as something which is done before or after something else. Some people shower before work or before going to bed, or they shower after work, after DIY or after exercising. Among many of the interviewees, there are examples of sequences of different practices leading to when to shower. If exercising in the morning, then the morning shower is postponed until after exercising, and similarly if one is going to be "messing around" after work, then the afternoon shower will be postponed. These rules of showering before or after doing something else also show how showering is most often done on a daily basis, and how people to some degree seek to orchestrate sequences of practices in order to make it possible for them to shower only once a day.

Whether showering before or after work depends quite clearly on what type of occupation people have. Office workers feel a need to be presentable at work, and manual workers feel a need to clean themselves after finishing their work. However, there is also an element of what you have learned during your

upbringing. We can see how different dispositions of what is the normal way of showering are taking part in ordering the temporalities of when to shower. A man explains that the habit of evening showering is something he was brought up with, and even though he has not always been doing manual work, he continues the practice. This is similar to the daughter of ID 81, and the normative statement of the mother that her daughter “wants to be clean when she goes to bed”. This indicates how norms of the right time of showering is passed on via close social relations. Dispositions for when to shower may thus relate to both social upbringing and current position in society, with its slightly different social expectations of cleanliness. In this way, temporal procedures of what time of the day to shower become part of a tacit knowledge, as explained by Southerton (2013).

Some interviewees describe fixed scheduling in the everyday life, and thus established schedules regarding showering habits. This is for instance seen in a family consisting of a couple living together with their three children and their grandmother. The family lives quite far from Copenhagen where the adults work, and they schedule their mornings to avoid the worst part of the morning rush hour, while the grandmother takes care of the children three mornings a week; the man does it two days a week and then drives to work:

M: Hanne and I drive early, so we usually exercise at work, or Hanne goes jogging around the Lakes (a well-known place for jogging in the centre of Copenhagen) and then showers at work afterwards. So, Hanne actually showers five times a week at work, and I shower three times a week at work. We shower every day during the week. (80)

Other families told us about an everyday life with more day-to-day variation in schedules. A man living alone and often working from home answers the question if he follows the same schedule every day in this way:

M: No, it varies a little. It depends on whether I go to work or I work from home. It is obvious, it relates most to that.

Later he continues:

M: It may happen that I sit in my robe, when I am home alone. Only if I am alone... Then it may happen that I sit in my robe until late in the morning and only then take a shower. (77)

As seen in these two families, as well as more generally in the interviews, questions of the daily routines are more or less fixed, and this relates to various issues. These include flexible working hours and children's school hours, how many people are living together in the household, and the geography of the home and workplace, and thus issues of e.g. rush hours and time of commuting. Temporalities of the individual everyday life are thus dependent on the social and material context of the individual performance of the practices, as well as dependent on the societal temporal rhythms. Thus, questions of to what degree a de-routinising of the everyday life is happening also varies along these lines.

It may also be interesting to compare weekends and weekdays when analysing how fixed routines are. As already shown in the cluster analysis, some families exhibit differences, but not all, and this also seems to relate to what degree other practices change between weekends and weekdays. Like this self-employed craftsman, some interviewees stated that there is little difference between the weekend and weekdays:

M: I work, what shall I say... We can say all the time, if the need is there. So it may be Saturday or Sunday, or Christmas Eve or whatever. Every day is the same, independent of whether it is a holiday or not. (89)

In addition, a man working at an office related that sometimes weekdays and weekends might look alike as regards showering routines. Asked if it is an established routine to shower every morning, he answered:

M: Yes, more or less... The only thing is those days, when you work from home or something. Then I skip the shower because... I think I can do without, and my body does not necessarily need to be

washed every day. So if I am just at home, or in the weekend, then I do not shower. So it is not regular as such, it is more when we go out of the home, if we are going somewhere, then we do. (87)

Difference in showering habits between weekend and weekdays thus strongly relates to what practices are performed in weekends and weekdays, and how different these practices and their related temporalities are.

This further relates to differences between being part of the workforce or being retired, and what implications this has for showering. As this retired man explained, the difference between weekends and weekdays was not big for him. When asked if he showers every day, he answered:

M: No, if I am in the garden, and not together with anybody, I do not bother to shower

I: Do you then shower later that day?

M: I might, but it depends on what I am going to do...

I: And there is no difference between weekends and weekdays?

M: No, I cannot say which days I am not showering. It varies... (82)

Again, this quote exemplifies how the difference between weekends and weekdays mainly relates to differences in practices performed. Thus, if there are no big difference for some people in what practices are performed when, then there are also no systematic differences in showering routines between weekends and weekdays. Seen in a historical perspective, differences between weekends and weekdays may be eroding for people in employment, but still the difference between being employed or being unemployed is marked, and this points to showering habits as something closely related to the life cycle (e.g. being retired) and whether one is employed or not.

Another example of the importance of the life cycle is found in interviews with families with children. Several parents explain that children have baths rather than showers and that there is an aspect of cosiness and socialising associated with bathing. Bathing children typically takes place in the evening where families have less time pressure. In one family, the two children aged 6 and 10 typically go in the bathtub together once or twice a week; "then they sit there together for an hour and dissolve" (84). Another family explains how they sometimes went in the bathtub together, both parents and children, when their children were small (81), and an older couple explains that their Jacuzzi is only used when their grandchildren are visiting (86). Using the bathtub thus relates to another type of time as compared with that of showering. Bathing could be seen as relating to cold spots of creating cosy times, whereas showering is most often part of the hot spots of squeezing time and managing to perform as many practices as possible in the shortest time possible, as also argued in a historical context (Hand et al., 2005). However, there are also a few examples in the interviews of adults and teenagers taking longer showers, including the use of showering products or listening to music, and thus creating individual cold spots by the practice of showering. Furthermore, the daily morning or evening shower may be interpreted as part of creating a micro cold spot (Friis and Christensen, 2016) in the hectic everyday life; as expressed by the woman explaining how her daily shower after work felt like "recharging the batteries".

Together with these differences related to hot and cold spots of bathing and showering, there are also differences in the meanings associated with these practices. The cold spots of bathing children thus include aspects of socialising, including ideas of the appropriateness of being naked together. Especially one family explained how being naked together was "healthy" for their children and was part of why they had bathed together with their children when they were small. In these meanings, we find a parallel to the more historic associations of bathing as part of a collective process (Hand et al., 2005). When teenagers and adults use showering for creating personal cold spots of relaxation, the meanings associated with the practice of showering may also draw on the historical roots of the therapeutic aspects of water. Though bathing and showering in all cases also draw on the meaning associated with norms of hygiene, cleanliness, and not smelling of sweat.

Norms of cleanliness and bathing/showering for children are different from what they are for adults. However, teenagers appropriate the adult habits and norms of showering in their teenage years as part of becoming a grown-up. Summarising these norms for adults across the performed interviews, they include some general rules related to appropriate sequences of practices, especially: Showering before socialising; showering after exercising; showering after manual or dirty work; and showering after garden or DIY work. On a more basic level, this reflects general rules of showering *before* socialising with people outside home/family (either at work or in other contexts) and showering *after* physical exercise/work.

The individual can be seen as the intersection between different practices (Reckwitz, 2002, p. 256) which implies different sequences in the individual performance of these practice. As different social groups are carriers of different types of practices some of the variation in sequences may be analysed as part of these social structures. This may for instance include the social structures of doing office or manual work, and thus following norms of showering before or after work. As the sequences of practices, i.e. the right order of practices, may be guided by dispositions and habitus, the social upbringing with its performance of practices may also take part in guiding temporality and sequences of practices. For instance, the evening shower may be part of such a disposition. However, even though there are these social variations in the temporal performance of practices, the case of showering shows how socially different performances may take part in reproducing the same practices-as-entities. When manual workers shower after work and office workers before work, this may be analysed as a socially distributed reproduction of the same rule of showering: being clean before socialising. Thus this research demonstrates that while the practice-as-entity is reproduced it is done so in varied ways across social groups.

Rules of showering, however, take part in ordering other practices. In quite many of the interviews, respondents explained how their ordering of other practices was also guided by the attempt to follow the “sequence rules of showering”. This, in combination with avoiding to shower more than once a day, made them group practices which require “showering after” or “showering before” together in certain sequences

Conclusion

This paper had three different perspectives that were all part of the reason for performing the study. First, the question of what can be learned from a sustainability perspective where time of use of resources increasingly comes into focus. Second, the question of what can be learned from a time and practice theoretical perspective of how to understand social differentiation in temporalities of the performance of everyday practices. And, finally, the question of what can be learned methodologically from a mixed-methods study combining extensive digital data of time of use with in-depth qualitative interviews. The following concludes on all three perspectives.

A sustainable future to a large degree relates to the introduction of renewable energy with wind and sun power as some of the main contributors. However, these types of energy supply are fluctuating, and as energy storage is both costly and inefficient, demand-side management where provision systems in different ways influence the time of use of energy is expected to be part of the future energy system. Thus, a better understanding of what constitutes the time-of-use of resources seems highly relevant. Energy consumption results from the performance of a variety of everyday practices. Results from this paper help explain how the temporality of such practices on one hand is ordered according to other practices performed during the day, and on the other hand is also ordered by social structures which in part relate to varying institutionalised social rhythms. Understanding how temporalities of consumption change, thus includes understanding the social dynamics in the temporal performance of the practices. From an energy policy perspective this implies that the policy target could be those practices that precede or succeed showering, as these practices shape the temporal structure of the hot water used for showering. Or it

should more generally be the showering as a practice-as-entity, including its rules of when and why to shower, which should be at the centre of the policy.

From the perspective of theories of practices and time, this paper has contributed by applying mainly the work of Southerton to an empirical field and thus examined its usefulness (Southerton, 2013). Notably, Southerton introduced Bourdieu's notion of habitus and relates this to social differences in the performance of practices related both to questions of at what times and for how long certain practices are performed. The concepts proved valuable, especially together with the understandings of sequences of practices as being important for further theorising understandings of time and practices. Our analysis showed how dispositions from childhood or later were working together with general societal rules of appropriateness related to showering, and how these together formed the different temporal patterns. However, temporalities of the performance of the practice of showering was found to relate to different lifecycles, with children, teenagers, adults and retired people performing the practice in different ways as regards time, and to some extent also in relation to the meanings associated with the performance. Thus, the study showed how temporalities varies hugely with different social groups, and at the same time how this variation in the performance of the practices contributed to the general reproduction of the practice-as-entity. Thus, there are general rules of showering and cleanliness across the social strata, though these rules may relate to different temporalities depending on how different practices are crossing each other in the individual everyday life.

Finally, this paper was interested in developing approaches to include quantitative data in practice theoretical studies and to combine qualitative and quantitative data, including new types of digitalised time-of-use data. Our analysis suggests how quantitative cluster analysis can be used to identify different patterns of practice performances according to domestic hot water consumption. Ideally, this analysis could furthermore be supplemented by relevant socio-economic data to reveal statistical relations between these social characteristics and the clusters of patterns. In the present paper, this was only done to a very limited degree due to the lack of relevant socio-economic data, though it was shown how the clusters partly related to the age of children in the household. Furthermore, the combination between qualitative and quantitative data could be done more directly in future research, as there was a relatively long timespan in this project between quantitative and qualitative data collection, thus preventing direct comparison. Still, our analysis presented ways of performing such analysis which may serve as inspiration for future studies. More generally the study has contributed to pointing out the possibilities which quantitative data posits in unfolding trajectories in practices with regard to study changes in practices over time and as part of this, as well as in its own interest, to investigate the social variation within the performance of practices.

Acknowledgements

This paper was written as part of the project UserTEC (User practices, technologies and residential energy consumption) financed by Innovation Fund Denmark. We would like to thank all interviewees for participating in the study. We also thank colleagues in the research group Sustainable Cities, Housing and Everyday Life, as well as an anonymised reviewer, for valuable comments on a previous version of the paper.

References

- Bourdieu, P., 1986. *Distinction: A Social Critique of the Judgement of Taste*, 1 edition. ed. Routledge.
- Browne, A.L., Pullinger, M., Medd, W., Anderson, B., 2014. Patterns of practice: a reflection on the development of quantitative/mixed methodologies capturing everyday life related to water consumption in the UK. *International Journal of Social Research Methodology* 17, 27–43. <https://doi.org/10.1080/13645579.2014.854012>

- Christensen, T.H., Gram-Hanssen, K., Friis, F., 2013. Households in the smart grid: existing knowledge and new approaches. Presented at the 2nd Nordic Conference on Consumer Research 2012, Centre for Consumer Science, University of Gothenburg.
- Christensen, T.H., Røpke, I., 2010. Can practice theory inspire studies of ICTs in everyday life?, in: Bräuchler, B., Postill, J. (Eds.), *Theorising Media and Practice*. Berghahn.
- Do Carmo, C.M.R., Christensen, T.H., 2016. Cluster analysis of residential heat load profiles and the role of technical and household characteristics. *Energy and Buildings* 125, 171–180. <https://doi.org/10.1016/j.enbuild.2016.04.079>
- Flyvbjerg, B., 2006. Five misunderstandings about case-study research. *Qualitative Inquiry* 12, 219–245. <https://doi.org/10.1177/1077800405284363>
- Friis, F., Christensen, T.H., 2016. The challenge of time shifting energy demand practices: Insights from Denmark. *Energy Research & Social Science* 19, 124–133. <https://doi.org/10.1016/j.erss.2016.05.017>
- Fuentes, E., Arce, L., Salom, J., 2018. A review of domestic hot water consumption profiles for application in systems and buildings energy performance analysis. *Renewable and Sustainable Energy Reviews* 81, 1530–1547. <https://doi.org/10.1016/j.rser.2017.05.229>
- Gram-Hanssen, K., 2015. Housing in a sustainable consumption perspective, in: Reisch, Thøgersen (Eds.), *Handbook of Research on Sustainable Consumption*. Edward Elgar Publishing, Incorporated.
- Gram-Hanssen, K., 2014. New needs for better understanding of household's energy consumption – behaviour, lifestyle or practices? *Architectural Engineering & Design Management* 10, 91–107. <https://doi.org/10.1080/17452007.2013.837251>
- Gram-Hanssen, K., 2011. Understanding change and continuity in residential energy consumption. *Journal of Consumer Culture* 11, 61–78. <https://doi.org/10.1177/1469540510391725>
- Gram-Hanssen, K., 2007. Teenage consumption of cleanliness. *Sustainability: Science, Practice, & Policy* 3, 15–23.
- Hand, M., Shove, E., Southerton, D., 2005. Explaining Showering: a Discussion of the Material, Conventional, and Temporal Dimensions of Practice [WWW Document]. URL <http://www.socresonline.org.uk.zorac.aub.aau.dk/10/2/hand.html> (accessed 5.27.14).
- Hansen, A.R., 2016. The social structure of heat consumption in Denmark: New interpretations from quantitative analysis. *Energy Research & Social Science* 11, 109–118. <https://doi.org/10.1016/j.erss.2015.09.002>
- Hansen, A.R., Gram-Hanssen, K., Knudsen, H.N., 2018. How building design and technologies influence heat-related habits. *Building Research & Information* 46, 83–98. <https://doi.org/10.1080/09613218.2017.1335477>
- Hitchings, R., Browne, A., Jack, T., 2018. Should there be more showers at the summer music festival? Studying the contextual dependence of resource consuming conventions and lessons for sustainable tourism. *Journal of Sustainable Tourism* 26, 496–514. <https://doi.org/10.1080/09669582.2017.1360316>
- Jacobsen, M.H., 2016. Social bases of material consumption: The relationship between social groups and possession of household appliances in Denmark , Social bases of material consumption: The relationship between social groups and possession of household appliances in Denmark. *Journal of Consumer Culture* 1469540516684190. <https://doi.org/10.1177/1469540516684190>
- Kuijer, L., Watson, M., 2017. 'That's when we started using the living room': Lessons from a local history of domestic heating in the United Kingdom. *Energy Research & Social Science* 28, 77–85. <https://doi.org/10.1016/j.erss.2017.04.010>
- Palm, J., Ellegård, K., Hellgren, M., 2018. A cluster analysis of energy-consuming activities in everyday life. *Building Research and Information* 46, 99–113. <https://doi.org/10.1080/09613218.2017.1302225>
- Pantzar, M., Shove, E., 2010. Temporal Rhythms as Outcomes of Social Practices. *Ethnologia Europaea* 40, 19–29.

- Pérez-Lombard, L., Ortiz, J., Pout, C., 2008. A review on buildings energy consumption information. *Energy and Buildings* 40, 394–398. <https://doi.org/10.1016/j.enbuild.2007.03.007>
- Ramos, S., Duarte, J.M., Duarte, F.J., Vale, Z., 2015. A data-mining-based methodology to support MV electricity customers' characterization. *Energy and Buildings* 91, 16–25. <https://doi.org/10.1016/j.enbuild.2015.01.035>
- Reckwitz, A., 2002. Toward a Theory of Social Practices A Development in Culturalist Theorizing. *European Journal of Social Theory* 5, 243–263. <https://doi.org/10.1177/13684310222225432>
- Røpke, I., 2009. Theories of practice - New inspiration for ecological economic studies on consumption. *Ecological Economics* 68, 2490–2497. <https://doi.org/10.1016/j.ecolecon.2009.05.015>
- Røpke, I., Christensen, T.H., Jensen, J.O., 2010. Information and communication technologies – A new round of household electrification. *Energy Policy, Energy Security - Concepts and Indicators with regular papers* 38, 1764–1773. <https://doi.org/10.1016/j.enpol.2009.11.052>
- Schatzki, T.R., 2002. *The Site of the Social: A Philosophical Account of the Constitution of Social Life and Change*. Pennsylvania State University Press.
- Schatzki, T.R., 1996. *Social Practices: A Wittgensteinian Approach to Human Activity and the Social*. Cambridge University Press, Cambridge.
- Shove, E., 2009. Everyday Practices and the Production and Consumption of Time, in: Shove, E., Trentmann, F., Wilk, R. (Eds.), *Time, Consumption and Everyday Life. Practice, Materiality and Culture*. Berg, Oxford and New York.
- Shove, E., 2003. *Comfort, Cleanliness and Convenience: The Social Organization of Normality*. Berg, Oxford.
- Shove, E., Pantzar, M., Watson, M., 2012. *The Dynamics of Social Practice Everyday Life and how it Changes*. SAGE Publications Ltd, London.
- Shove, E., Trentmann, F., Wilk, R., 2009. *Time, consumption and everyday life. Practice, Materiality and culture*. Berg, Oxford and New York.
- Southerton, D., 2013. Habits, routines and temporalities of consumption: From individual behaviours to the reproduction of everyday practices. *Time & Society* 22, 335–355. <https://doi.org/10.1177/0961463X12464228>
- Southerton, D., 2006. Analysing the Temporal Organization of Daily Life:: Social Constraints, Practices and their Allocation. *Sociology* 40, 435–454. <https://doi.org/10.1177/0038038506063668>
- Southerton, D., 2003. 'Squeezing Time': Allocating Practices, Coordinating Networks and Scheduling Society. *Time & Society* 12, 5–25. <https://doi.org/10.1177/0961463X03012001001>
- Southerton, D., Olsen, W., Warde, A., Cheng, S.-L., 2012. Practices and trajectories: A comparative analysis of reading in France, Norway, the Netherlands, the UK and the USA , Practices and trajectories: A comparative analysis of reading in France, Norway, the Netherlands, the UK and the USA. *Journal of Consumer Culture* 12, 237–262. <https://doi.org/10.1177/1469540512456920>
- Southerton, D., Tomlinson, M., 2005. "Pressed for time" - The differential impacts of a "time squeeze." *Sociological Review* 53, 215–239. <https://doi.org/10.1111/j.1467-954X.2005.00511.x>
- Strengers, Y., 2011. Beyond demand management: co-managing energy and water practices with Australian households. *Policy Studies* 32, 35–58. <https://doi.org/10.1080/01442872.2010.526413>
- Walker, G., 2014. The dynamics of energy demand: Change, rhythm and synchronicity. *Energy Research & Social Science* 1, 49–55. <https://doi.org/10.1016/j.erss.2014.03.012>
- Warde, A., 2014. After taste: Culture, consumption and theories of practice. *Journal of Consumer Culture* 14, 279–303. <https://doi.org/10.1177/1469540514547828>
- Watson, M., 2012. How theories of practice can inform transition to a decarbonised transport system. *Journal of Transport Geography* 24, 488–496.

ⁱ At the Danish Working Environment Authority' website these regulations can be found under the issue of welfare arrangements <https://arbejdstilsynet.dk/da/regler/at-vejledninger/v/a-1-13-velfaerdsforanstaltninger-faste-arbsteder>

ⁱⁱ In Copenhagen approximately 45% of all commuters use bike <https://www.kk.dk/indhold/45-cykler-til-arbejde-og-uddannelse-i-k%C3%B8benhavn>