

Fridge Stories: Three Geographies of the Domestic Refrigerator

Helen Watkins

1. Introduction: Positioning the Fridge

I am curious about how we cohabit with our things and about how objects and machines embody social relations. This paper emerges from research that brings together concerns with domestic space, everyday practice, technology and material culture in order to unravel the geographies of the domestic refrigerator. I argue that the refrigerator, as a mundane household appliance so familiar to most people in the west that it virtually slips from view, is a useful vehicle through which to explore a range of social, cultural, spatial and technological relationships.

My research is informed by geography, sociology, anthropology, material culture studies, and, increasingly, science and technology studies; as a geographer taking a ‘technological turn’, I was excited to see technology studies taking an interest in ‘transforming space’ as it is precisely the intersection between technology, space and social relations in which I am interested here. My concern is to explore the networks of objects, people, places and practices that come together on the journey from the ‘ice box’ to the ‘internet fridge’ by considering the refrigerator as, simultaneously, a technology, a tool, a storage device, a commodity, an ordering system and object of knowledge and desire. The scope of the project cuts across a range of ‘refrigerator stories’ from storage space to shopping habits, colour schemes to kinds of cold, Freon to the fetish, and geography to gender. Here I’ll focus on three ‘stories’ which draw attention to three sites and scales at which the domestic refrigerator operates.

I start with the ‘micro-geographies’ of the refrigerator and argue that we can conceive of the fridge as a particular kind of space, a ‘climate-in-a-box.’ Then I’ll talk about changing domestic practice and the notion of ‘a new economy of cold’ to give a brief sense of some of the implications of artificial refrigeration at the household level. In my final section I think about questions raised by labour saving devices and claims about ‘smart technology’ in terms of gender, labour and ‘competence’.

2. Micro-Geographies: A ‘Climate-in-a-BOX’

In many ways the refrigerator seems little more than a glorified cupboard whose use, given a basic level of dexterity, requires minimal skill or technological understanding. Its workings remain hidden and it has become, at least in a western context, normalized, mundane and unremarkable. However, I want to push at this image a bit to draw out its complexities and to

propose that the thermodynamic processes at work within it have more far-reaching implications than might at first seem apparent. I suggest that developments in domestic refrigeration have altered the way we think about food, eating and provisioning, agricultural production, the seasons and distance. Moreover, I'll argue that we can conceive of the fridge as a particular kind of space: a controlled 'micro-environment' and a form of portable 'climate-in-a-box.'

To explore this notion of a climate-in-a-box we need to get inside the fridge in order to examine its internal spaces, and also follow its 'reach' through a global 'cold chain' – a system of refrigerated transport and storage spaces forming a near-seamless refrigerated conduit connecting producer and consumer. The refrigerator's basic function is to preserve food by keeping it cool. Storing and prolonging the life of perishables has been a concern throughout history. I don't propose to discuss the physical and chemical processes of preservation and decomposition in any detail here, other than to note that refrigeration slows the development of bacteria, which is what causes food to spoil and decay. Unless it has been sterilized, all food has bacteria. At room temperature milk will spoil in a few hours. In a fridge, its life is extended for a week or two. So, refrigeration – strictly, the removal of heat rather than the 'production' of cold – does not kill bacteria, but it arrests bacterial growth, making the fridge a form of 'box to battle bacteria'.

Within the refrigerator, therefore, we get a 'micro-geography' (and, indeed, a 'microbial geography') playing out wherein the refrigerator and the freezer operate as sites of 'suspended animation.' Low temperatures hold dynamic physical and chemical processes in check and sustain the material state of goods by slowing degeneration. The refrigerator offers a powerful promise with its intervention in a 'natural order' and its potential, as Higginson and Smith suggest, "to slow and even arrest natural processes of decay" (1999, p. 338). McDermott (2003) refers evocatively to "the rubber seal that runs around the door and opens with a seductive 'thhpok', the rubber seal that gives the fridge its identity, that separates the fridge from a cupboard." It is this seal that enacts a form of spatial separation that marks off the refrigerator as a contained and controlled environment, a space apart. In this way, we can begin to see the refrigerator as a space that operates according to a different temporal logic than its surroundings, and a site where the world, in effect, turns more slowly.

Ausubel (1991) asks whether climate has become a less significant concern for human well-being now that technological developments have lessened vulnerability to climatic variation. "The ability to colonize almost the entire planet is due to the human ability to carry with us that particular range of environments in which we survive and prosper" (Escudero 1985). Heating, refrigeration and air conditioning extend the range of living conditions by offering a degree of

‘climate proofing’ (Ausubel 1991). The effects of being able to circumvent environmental conditions to contain and control temperature are significant. An ability to create ‘winter’ in ‘summer’ detaches food provisioning from weather, the seasons and local production. It spreads production risks across more climate zones and diversifies diets (Ausubel 1991), at least in principle. “Quick freezing at once does away with the space-time limits of perishable-food distribution. With frozen foods”, a 1939 *Fortune* article suggested, “neither season nor geography has any meaning” (cited in Holmes Smith 2001, p. 184). Control over cold permits the preservation and transportation of food and medicines and has increased the ‘reach’ of humans round the globe, contributing to significant changes in landscape and social order and playing a key role in processes such as urbanization. Of course, we need to be aware of the class privilege implicit in this story. As with any technological innovation its access, benefits and patterns of adoption are unequally distributed and culturally specific. As a means to isolate and control temperature, the refrigerator becomes a contained and portable environment. Clearly there were interventions throughout history to strategically exploit natural conditions, but this is different. This is about cold on demand.

Delving further into the fridge exposes other micro-geographies, and we see the mapping of its internal spaces and a more detailed differentiation between ‘climate zones’ in different parts of the refrigerator. Considerable attention is given, particularly in early instruction manuals and handbooks, to the appropriate placement and ordering of foods according to temperature variations, patterns of air circulation and the behaviour of the foodstuffs themselves (for example, those prone to drying out or to absorbing odors). *The Silent Servant*, a 1943 manual explains that “your BTH electric refrigerator requires very little assistance from you in caring for your food supply. You must help in two ways only: by keeping it clean and arranging the food properly.” It goes on to give directions for the care and arrangement of food. In a diagram indicating the direction of air flows around the interior, recommendations are given for the correct places for milk, butter, cheese, fish, fresh and cooked meats, vegetables, salads and fruits even left-overs (BTH 1943 p. 9-10).

In some designs these divisions and demarcations proliferate. In a 1940 Westinghouse advertisement for the *Leisure Line* of electric home appliances a small child exclaims “I never worry about the bacteria count in our foods.” The text beneath states that “five kinds of cold are needed *and provided* in this roomy Westinghouse Refrigerator” (Lupton 1993, p.14, emphasis in original). International Harvester goes further in a 1953 advertisement: “It takes 7 different areas of cold – from 6° to 55° – to keep basic foods like these in prime condition. You get all 7 of these essential Food Climates – all working at once – in the New 7-Climate Refrigerators”, which Isenstadt describes as offering “a new and rationalized freshness topography” (1998, p.

318). “In effect”, Grahame notes, “the micro-climates inside the refrigerator were to be treated as standardized sites for different types of food handling” (1994, p. 296), which leads us into a more detailed consideration of domestic practice at the household level and some of the changes associated with adoption of artificial refrigeration.

3. Changing Household Practice and a ‘New Economy of Cold’

“In 1951, my family bought its first fridge – a gas one, because it was cheaper to run. Our previous means of delaying food decay had been earthenware coolers soaked in water, marble slabs, and leaving food outside in winter. Our new fridge kept things cold for longer. It also signified for us, however, the end of post-war austerity and the family’s progressive optimism. Objects of use, in short, seldom have solely practical significance, but also carry ritual and symbolic meaning” (Gillian Crampton Smith, in Dunne 1999, p. 9).

A refrigerator is a technology to keep things cold, but it is clearly also much more than that; “the refrigerator holds it all: food and finance, weight and wellbeing, organization and chaos, all rolled up into one big cold box” (<http://www.organizedhome.com>). Crampton Smith’s words speak both to the changes in practice that came about with a shift to mechanical refrigeration and to the positioning of the refrigerator as a social object with multiple meanings.

While I refer to the fridge as ‘a technology’, I should be clear here that I am using a conception of technology that includes the ‘machine’ itself and also the social practices bound up with it; I work with the understanding that “technology includes both hardware (for example, materials, physical structure, devices and machines) and software (rules and recipes for behaviour)” (Ausubel 1991, p. 649). This notion of ‘rules and recipes’ captures the nature of refrigeration quite neatly. There are literal associations with ‘recipes’ in terms of cooking and dining and it operates according to laws of thermodynamic as well as embodying ‘rules’ in the sense of social norms and behavioural patterns.

Grahame’s analysis of interwar discourses of refrigeration provides a useful framework to consider the new and evolving ‘sphere of conduct’ which emerged from and, in turn, informed the adoption of artificial refrigeration (1994: 294) and I’ll comment on four key dimensions of change; the displacement of traditional practices, centralization, standardization and increasing shifts towards extra-local organizing. In a series of mutual transformations, shopping, provisioning, storage, preservation and domestic labour patterns altered in concert with the commercial availability of mechanical domestic refrigerators from 1914 and the more rapid growth in their use in the 30s and 40s.

The refrigerator did not necessarily ‘succeed’ or ‘replace’ existing ways of doing things. Rather, it emerged into a raft of associated cooling practices and brought about uneven effects depending on where, when and how it was mobilised. “As an object, the mechanical refrigerator was inserted into a stream of practices, redirecting some, stifling others, provoking the initiation of still others” (Grahame 1994, p. 302). Prior to the refrigerator, as Crampton Smith indicates above, a number of temperature-reduction measures were used which took advantage of local and seasonal conditions. Ice houses, cellars and earthenware jugs were used alongside preservation methods like salting, bottling and pickling. Refrigeration brought social and spatial displacements of goods and practices. New patterns of consumption emerged; refrigerated transport, an increasingly car-oriented society, growing numbers of woman in the formal economy and the post-war development of the out-of-town supermarket fuelled a shift to bulk shopping in place of daily grocery shopping.

Spatially we see some interesting effects. Greater access brings an increased ‘relative proximity’ to once-distant goods; these items start to have a greater reach, make longer journeys and become available out of season though an extended ‘cold chain.’ But, conversely, there is also what might be thought of as a ‘psychological distancing’ from the foods themselves. A less intimate knowledge is required about the nature and properties of individual foodstuffs or of their particular storage and preservation needs. Over time, technologies like packaging, bar codes and ‘best before’ dates have superseded practices of looking, touching or smelling for freshness; both can be considered ‘technologies’ but the one, informed by a different kind of authority, and couched in terms of ‘scientific’ rather than ‘embodied’ or ‘domestic’ knowledge, becomes privileged. When food comes stamped with a ‘sell by’ date, or one can defer to the packet for directions, a detailed understanding of the product itself becomes less crucial. The user simply ‘reads’ a different material form: the container rather than the contents. And so we see a practice of devolved responsibility in which centralized scientific bodies monitor and advise on appropriate storage and use. In this way the responsibility has become delegated to someone else somewhere else.

With ‘centralization’, we see a rationalisation and convergence of what had been spatially and temporally dispersed temperature control practices (Grahame 1994, p. 301). Rather than strategically juggling the relative advantages of different spaces and devices such as cellars, cool boxes or ice deliveries, attention shifted to one appliance which could fulfil the same role for multiple products in one site. The refrigerator became framed around ideas of convenience and consistency. It was immediately accessible, constantly available and its form and performance were becoming increasingly standardised. Mechanical refrigeration could achieve a more consistent and uniform cold than ice, so what counted as ‘correct refrigeration’ could be

set, measured and monitored by scientific authorities (p. 290). The notion of scientific standards for refrigeration emerged in the mid 1920s and the optimum temperature stabilized at 40-50 degrees (cleverly captured and marketed by Kelvinator as a “The Zone of Kelvination”). “Proper refrigeration is assured with the temperature kept always below 50°F, which modern science agrees is the danger point. Unnecessary food spoilage is eliminated and the health of every member of the family is protected with Prestcold” (Pressed Steel Co. Ltd, undated, p. 3). Put up against these standards, older methods were found wanting: “adequate refrigeration was increasingly defined in terms of a standard which only mechanical refrigerators could achieve at all consistently” (Grahame 1994, p. 298).

Early advertising emphasised that the domestic refrigerator offered the consumer a ‘new kind of cold’ – one qualitatively and quantitatively different from that using ice (Grahame 1994, p. 290) – and, for the first time the availability of *below-zero* temperatures. This promoted a new menu of ‘cool salads’, ‘chilled dainties’ and ‘frozen desserts’ and introduced the concept of cold as itself a ‘cooking technology’, as indicated in publications like *Prestcold Cold Cookery* (Pressed Steel Co. Ltd, undated) and Carson’s “Cooking with Cold” (1947). In the dominant discourse there was a shift of focus from safety, health and protection to the role of refrigeration in meal planning, entertaining and leisure, and particular attention was given to its ability to make food more attractive and appetising. Ideas about what constituted ‘fresh’ food were also recast with the idea of ‘frozen freshness’: in this capacity, “things just killed or long dead were equivalent in the refrigerator’s controlled climate” (Isenstadt 1998, p. 317).

It is interesting the extent to which this domestic economy of cold is also a very much *moral* economy of cold. Higginson and Smith explore the ways in which ice is framed as a moral good in Paul Theroux’s novel *The Mosquito Coast*. Describing what ice is good for, one character explains that “mainly it’s a preservative – it keeps food fresh ... it kills germs ... it’s an anaesthetic ... it’s free. It’s even pretty. It’s civilization” (1999, p. 338). Ice embodies powerful cultural associations with protection, preservation and purity and it seems that these associations were transferred from ice itself to ‘technologies of cooling’ more broadly, including the artificial cooling by the mechanical means. A resilient moral coding remains, with chilled foods carrying meanings of freshness and purity. Thus, cooling became cast as a essential for civilized living and the refrigerator moved from ‘luxury’ to ‘necessity’.

And so, a diversity of cooling practices were flattened and refrigeration became understood as “a standardised condition to be sustained year-round in a fixed location, rather than as a loose ensemble of cold storage practices” (Grahame 1994, p. 195). It was both fixed in one site, at the scale of the home, and, at the same time, made common across all locations, all households. In this sense, interestingly, *domestic* refrigeration became an *extra-local* practice: “Cooling was no

longer a local accomplishment – it became a standard condition. The refrigerator did ‘the same thing’” in different places, and, it is suggested, “to a greater extent than other technologies, it stood free from architectural ..., seasonal, and geographical variations, as well as from variations in the skill of the user” (p. 302).

4. ‘Smart Technology’ and ‘Labour-Saving Appliances’: Claims and Contradictions

“IBM’s fridge doesn’t just hum, it knows the words. ... Imagine being paged with word that the milk in the refrigerator has spoiled. Imagine turning off the porch light at home while vacationing at the beach. ... In the kitchen, a screen on the refrigerator tells what’s inside – without opening the door. ... Servers that are built into the décor will allow wireless devices, appliances, thermostats, security systems and computers to be networked, or ‘talk’ with one another from anywhere” (USA Today 2001).

In this final section I want to consider ideas around ‘smart’ and labour-saving appliances and what the intersecting histories of technology in the home might mean more broadly for gender, work, skill and notions of ‘competence.’

Developments in integrated computing are marrying computers, refrigerators and other household appliances; rather than a discrete activity, computing capabilities are being built into all sorts of products and we are witnessing a shift away from free-standing appliances towards more integrated home-automation systems. *The E2-Home*, which has been piloted in Stockholm and Copenhagen, is a collaboration between Electrolux and Ericsson and represents one of a growing number of ‘networked home’ initiatives. “Electrolux’s research shows we now spend about 40% of our non-sleeping time at home in the kitchen. And that’s increasing in both the US and Europe. As it’s the room we spend most of our waking time in, we’ve chosen it as the base for new services” (Marks 2001).

With the kitchen firmly positioned as the home ‘hub’ and locus of household control, communication and, increasingly, entertainment, it is the refrigerator that is being recast as ‘home server’ or ‘command central.’ The Electrolux ‘ScreenFridge’ prototype premiered in February 1999 at the *Domotechnica* trade show in Cologne and Frigidaire’s ‘smart fridge’ debuted at *Markettechnics*® in New Orleans in the same month, although it is LG’s internet-enabled product range that has been the first to become widely available in stores. Their fridges are multifunctional appliances with touch-screens that enable the user to control other devices on the system, browse and order online, check email and video messages, watch TV and monitor surveillance technologies such as alarms, baby monitors or security cameras as well as storing food, checking ‘best before’ dates and suggesting recipes. While many may welcome

these capacities, others have reservations; columnist Dave Barry writes an entertaining piece, which nevertheless raises some pertinent questions about the phenomena of ‘smart appliances’:

“What they [appliance manufacturers] say they want to do is have us live in homes where ... appliances will be ‘smarter than most of their owners’. ... Listen, appliance manufacturers ... we don’t need a refrigerator that knows when it’s out of milk. What we could use is a refrigerator that refuses to let us open its door when it senses that we are about to consume our fourth Jell-O Pudding Snack in two hours. But here is what really concerns me about these new ‘smart’ appliances: Even if we like the features, we won’t be able to use them. We can’t use the appliance features we have NOW. I have a feature-packed telephone with 43 buttons, at least 20 of which I am afraid to touch” (Barry 2000).

Rather than explore the relative merits of opposing positions, I am more concerned here with thinking about what these shifts might mean in terms of redistributing attributions of skill and responsibility. I want to raise questions about ‘smart technology’ by asking just how smart it is and for whom, where this ‘smartness’ is located and how it is gendered?

Contemporary understandings of ‘smart houses’ tend to focus on their ‘wired’ capacities, emphasising their information, security and entertainment functions. Digitally they may be advanced, but their practical capabilities may be more restricted than the rhetoric implies. GABe (1984) and Berg (1994) discuss the GABe ‘Self-Cleaning House’ designed by female architect Frances GABe some forty years ago. This house offers a very different conception of ‘smart’ by aiming to minimise heavy repetitive domestic labour; here floors are cleaned automatically and devices are designed to enable clothing and utensils to be both cleaned and stored *in situ* without endless loading and unloading. GABe’s philosophy was that removing the drudgery was the ‘smart’ thing to do.

Feminist debates over the sexual division of labour have drawn attention to the curious situation where, despite the language of ‘labour-saving’ appliances, the time most women spend on housework had not decreased significantly. Cowan’s (1983) *More Work for Mother* argues that, paradoxically, increased mechanisation has not, for the most part, reduced domestic labour for women. Historically, labour has been saved, she suggests, but it has tended to be the labour of men, children, servants and commercial suppliers, though it is important to recognise the class-specific nature of her argument; broadly, technology did bring improvements to working class women’s lives but it was the middle class woman who tended to see her labour and responsibilities rise.

As Terry and Calvert observe, “we live in a world not only *structured* but *saturated* by technology” (1997, p. 2). They show that gender is organised through and embodied within everyday relationships with objects and technologies and that women, much more so than men,

still maintain ambivalent relationships to machines. We can see that household appliances tend to be positioned in an interesting, if ambiguous, way as both ‘technological’, usually coded masculine, and ‘domestic’, and hence feminised. Cockburn comments on a lingering reluctance to associate technology with the domestic sphere. By conceptualizing technologies as ways of building order, she argues that “cooking, whether with a wooden spoon or an electric liquidizer, is technological” (Cockburn 1992, p. 35), but notes that attention is generally given to inventors, not users, as ‘technologists’. Discussing The Women’s Museum in Åarhus, Denmark, Porter comments that:

“many exhibitions are concerned with the working lives of women, and show women’s skills – even where these are difficult to convey through the usual ‘language’ with which museums communicate work. ... In [an] exhibition about changes in housework, exhibits focused on the different skills and senses which women employed before mechanization and automation: preserving food; choosing different woods to create different oven temperatures; testing heat with their hand or arm; smelling to judge the freshness of food” (Porter 1996, p. 120).

These practices are embodied knowledges and they are also technological skills, though rarely conceived of as such. Often housework is seen as neither technological nor work but scripted as a form of ‘giving’ or an expression of familial care that sits outside of an economic realm. Miller develops this theme in his ethnography of shopping when he describes family grocery shopping in terms of “making love” in supermarkets (1998). Here I draw upon Silva (2000) who highlights connections between gender, appliances and skill in her analysis of microwave cooking. This builds upon Akrich’s (1992) work analysing the ‘scripts’ written into objects. These contain assumptions about behaviours, morals and competence which guide and shape their users, though do not, of course, *determine* behaviour. Silva argues that the construction of the microwave as an appliance of convenience which reduces labour has had the effect of concealing significant skill and labour, often that of women. The time and the responsibility to monitor correct cooking remain with the cook and thus the microwave demands certain technologies skills and yet denies these competencies through its marketing as an ‘intelligent’ appliance. Human work is concealed and the skill is attributed to the machine and not the user.

Returning to B.T.H.’s *Silent Servant: a treasure book for housewives* as an example, we learn that “planning 4 meals a day, 365 days a year, is either a most interesting game or a task of deadly monotony” but that a B.T.H. refrigerator, “with its ability to make all sorts of delicious and inexpensive chilled sweets and savouries, will certainly give you a new interest in the whole question” (p. 18). The language clearly presents the refrigerator as making this food, removing the work and the ‘monotony’ from the housewife and making it a ‘game’. The language of

technological progress often has a tendency, therefore, to conceptually shift the ‘location’ of certain abilities. Work by feminist historians of technology, such as Cowan and Cockburn, has shown a relative ‘deskilling’ of domestic work associated primarily with women, and the transferral of attributions of ‘skill’ to objects and machines rather than people. Despite the planning, work and physical interaction required, the discourse constructs the appliances as neutral and autonomous and thus sustains the claim that it is the appliance is doing the work, making the calculations, making life easier.

I am concerned, however, that this discussion should not be read as resistance or opposition to technology, nor do I want to romanticize the labour associated with pre-mechanized housework. Mechanisation *has*, undoubtedly, made life easier for countless people, women included. A survey on new technology in the home, carried out by the UK’s Mass-Observation Archive in 1991, asked which piece of equipment had made most difference to the lives of respondents or their parents. The most common response was that the washing machine had substantially eased the workload for women’s lives and the second was the refrigerator (and although these appliances are generally reported in very positive terms by both male and female participants, it is striking to note how they remain cast very much within a female sphere of responsibility). I am not intending to celebrate a simpler ‘low-tech’ life and sense that, like Rich, I too could not “imagine life without multiple telephone lines, portable computers, on-line services, or fax machines, and no, I don’t want to go back to a simpler unwired life. I’ve mutated enough to be comfortable. I await the next generation of technology as eagerly as the next generation of humans” (1997, p. 226-7). Rather, my objective is to draw attention to what is going on in this process, to question understandings of ‘technology’, to consider the embodied skills and knowledges that may be overlooked, lost or diminished, to think about the practical work that these technologies perform and also the ‘work’ that they do in the public imagination by shifting conceptions of labour, skill and competence. So, even when it comes to hi-tech shiny new appliances, I think it is still valuable to ask questions about who will be cleaning, stocking and organizing these fridges, ‘smart’ or otherwise?

5. Conclusion

My fridge stories are stories about technological change, but they are also stories about space, scale and time, even if they are not always conceived as such. In addition they are, of course, bound up with rich stories of people’s lives, their homes and their work and serve to illustrate that the way we use and think about household objects is very revealing of social relations. I argue that a fridge can be read as much more than just an object sitting there, cold and

humming; rather, it should be recognised as a dynamic technology, performing a vast range of sociocultural roles over and above cooling food.

I have emphasised that refrigeration technology can be viewed as a range of social practices, not just a set of processes contained within a machine. As refrigeration became ‘domesticated’, we have witnessed mutual transformations of the technology itself and of domestic space. Neatly embodying the processes of time-space compression symbolic of modernity, the refrigerator and its new technologies of temperature control have shaped people’s lives in often subtle but sometimes profound ways, from impressing guests at dinner parties to inhabiting ‘new’ regions of the world or affirming people’s self conceptions as modern and ‘civilized.’ And currently we see moves to reposition the fridge more strongly still as a core node in people’s homes, connecting more explicitly than ever to other dimensions in their lives. Integrated appliances are busy blurring the boundaries between people, practices and machines and, while they are smart in many respects, there are still questions to be asked about what exactly we think is smart, and why.

I am concerned with the spatial and temporal journeys of objects, with the multiple meanings of things, and the practical but also the symbolic roles that technologies play. I suggest there is a need for more attention to technology within geographical analyses and, likewise, a more nuanced understanding of spatiality within technology studies and I have tried to draw attention to just some of the interwoven spatial, practical and conceptual shifts that a story about domestic refrigeration reveals.

References

- Akrich, M. (1992) “The De-Description of Technical Objects”, in Bijker, W. & Law, J. (eds) *Shaping Technology / Building Society*. Cambridge, MA: MIT Press.
- Ausubel, J. H. (1991) “Does Climate Still Matter?” *Nature*, vol. 350, no. 6319, pp. 649-652.
- Barry, D. (2000) “I’m toast in the battle with appliances”, *The Holland Sentinel*, Feb 27, 2000, http://www.thehollandsentinel.net/stories/022700/fea_barry.html.
- Berg, A-J. (1994) “A gendered socio-technical construction: The smart house” in Cockburn, C & Fürst-Dilic, R. (eds) *Bringing technology home: gender and technology in a changing Europe*. Buckingham & Philadelphia: Open University Press.
- B.T. H (1943) *The silent servant : a treasure trove for housewives*. London: B.T.H.
- Carson, R. (1947) “Cooking with Cold”, *Collier’s*, Jan 4 1947, p. 51.
- Cockburn, C. (1992) “The circuit of technology: Gender, identity and power” in Silverstone, R. & Hirsch, E. (eds) *Consuming technologies: Media & Information in domestic spaces*. London & New York: Routledge.

- Cockburn, C. (1997) "Domestic Technologies: Cinderella and the engineers", *Women's Studies International Forum*, vol. 20, no. 3, pp. 361-171.
- Dunne, A. (1999) *Hertzian tales: electronic products, aesthetic experience and critical design*. London: RCA CRD Research Publications.
- Escudero, J. C. (1985) "Climate Impact Assessment" in Kates, R. W., Ausubel, J. H. & Berberian, M. (eds) *Climate impact assessment: studies of the interaction of climate and society*. Chichester, West Sussex & New York: Published on behalf of the Scientific Committee on Problems of the Environment of the International Council of Scientific Unions by Wiley.
- GABe, F. (1984) "The GABe Self-Cleaning House" in Zimmerman, J. (ed) *The Technological Woman: interfacing with tomorrow*. New York: Praeger.
- Grahame, P. R. (1994) "Objects, texts, and practices: The refrigerator in consumer discourses between the wars" in Riggins, S. H. (ed) *The Socialness of Things: Essays on the Social-semiotics of Objects*. New York: Mouton de Gruyter.
- Higginson, I. & Smith, C. (1999) "'A magnified piece of thermodynamics': the Promethian iconography of the refrigerator in Paul Theroux's *The Mosquito Coast*", *British Journal of the History of Science*, vol. 32, no. 2, pp. 325-42.
- Holmes Smith, C. (2001) "Freeze Frames: Frozen Foods and Memories of the Postwar American Family" in Inness, S. A. (ed) *Kitchen culture in America : popular representations of food, gender, and race*. Philadelphia : University of Pennsylvania Press.
- Isenstadt, S. (1998) "Visions of Plenty: Refrigerators in America around 1950" *Journal of Design History*, vol. 11, no. 4, pp. 311-321.
- Lupton, E. (1993) *Mechanical Brides: Women and Machines from Home to Office*. New York: Cooper-Hewitt National Museum of Design, Smithsonian Institution; Princeton: Princeton Architectural Press.
- McDermott (2003) "Whitegood Mischief", Paul McDermott: Case File, <http://www.geocities.com/tangawarra/paulwri15.html>.
- Marks, P (2001) "Brave New Fridge", *New Scientist* <http://www.newscientist.com/hottopics/tech/bravenewfridge.jsp>.
- Mass-Observation Archive (1991) *Autumn Directive 1991, part 2, 'New Technology'*. University of Sussex.
- Miller, D. (1998) *A Theory of Shopping*. Cambridge, UK: Polity Press.
- Porter, G (1996) "Seeing through Solidity: a feminist perspective on museums" in Macdonald, S. & Fyfe, G. (eds) *Theorising Museums*, Oxford & Cambridge MA: Blackwells and The Sociological Review.
- Pressed Steel Co. Ltd. (undated, c.1930s) *Prestcold cold cookery*. Cowley, Oxford: Pressed Steel Co. Ltd.
- Rich, B. R. (1997) "The party line: gender and technology in the home" in Terry, J. & Calvert, M. (eds) (1997) *Processed Lives: Gender and Technology in Everyday Life*. London & New York: Routledge.
- Silva, E. B. (2000) "The cook, the cooker and the gendering of the kitchen", *The Sociological Review*, vol. 48, no. 4, pp. 612-628.

Mikael Hård, Andreas Lösch, Dirk Verdicchio (ed.) (2003): *Transforming Spaces. The Topological Turn in Technology Studies*. (<http://www.ifs.tu-darmstadt.de/gradkoll/Publikationen/transformingspaces.html>)

Terry, J. & Calvert, M. (eds) (1997) *Processed Lives: Gender and Technology in Everyday Life*. London & New York: Routledge.

USA Today (2001) “IBM’s fridge doesn’t just hum, it knows the words”, *USA Today*, 2nd July 2001, <http://www.usatoday.com/life/cyber/tech/review/2001-07-02-smart-house.htm>.

Woods, K. L. & Woods, R. (1991) “Bacon’s Chicken”, *Nature*, vol. 352, no. 6334, p. 368.