

The Mobile Life of Food and Drink Packaging

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PhD Thesis. October 2014.

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Acknowledgments

I would like to thank, firstly, my supervisors Andy Gillespie, Ranald Richardson and Neil Thorpe who have guided me through the last three and half years. None of this would have been possible without them and I could not have asked for a better supervisory team.

I must also thank the participants who give up time to help me with this research. Thanks must also go to those involved in the Technology and Travel research team whose early guidance was instrumental in shaping the research. These include John Urry, Thomas Birtchnell, Christa Hubers and Glenn Lyons. I must also thank my colleagues here at Newcastle for helping me think through complex ideas and issues and who have no doubt enhanced this thesis.

Finally, this thesis is dedicated to my partner and my family who have supported me throughout this endeavour. A big thanks must go to my mother, father, brothers and especially my partner Emma for putting up with me through this process.

Abstract

Packaging is a largely neglected object of enquiry in Human Geography and, indeed, the social sciences more broadly. Yet it forms a crucial element of almost all food systems and without such mundane objects these food systems would fail or function very differently. In turn, food systems, which rely on the continuous flow of packaging and food, are vital for enabling our increasingly mobile lives. This thesis thus investigates the multiple mobilities associated with food and drink packaging. The study forms part of a wider ‘mobilities turn’ in the social sciences and is structured in two parts. The first part concentrates primarily on how packaging shapes the movement of food. The second part focuses more on the ways in which packaged food shapes the mobilities of humans. However, both these aspects of packaging’s mobile life are not viewed as separate but rather as entangled and mutually dependent on each other. Throughout the thesis attention is paid to how packaging helps standardise the repetitive and anticipated mobilities of food and humans. It is, in other words, examined as an immutable mobile that ensures the smooth flows of food and people. Thus, in the first part of the thesis it is shown how packaging ensures the smooth flows associated with highly automated, industrialised and safe packaged food production and distribution. It also opens up the mobilities of packaging to elaborate upon the similarly regular and anticipated flows of packaging as raw materials. In the second part of the thesis attention is directed towards the patterns of human mobility that packaged food permits.

However, while emphasis is placed on the role of packaging in standardising and stabilising interrelated food and human mobilities across Euclidean spaces, the thesis also begins to interrogate the topological complexities and molecular mobilities of packaging. While packaging can certainly be seen to permit the smooth and relatively unproblematic flows of food and people it may also, and from another theoretical perspective, be viewed as a fluid and vibrant technology. These topologically complex movements of packaging are explored in cases that show its fluid articulation as a barrier which has profound implications for the regulated mobilities of food. The vibrancy of packaging is also examined through its importance for mobile practices and its capacity to affect travellers.

Chapter 1. Introduction

1.1 Neglected technologies in the study of travel

This thesis is concerned with exploring the relationships between food and drink packaging and various types of physical human and nonhuman mobilities. Many column inches in the media and, indeed, a large number of academic texts have justifiably concentrated on waste packaging as an environmental issue. But developments in packaging have also enabled our mobile ways of living by making food mobile.

The initial motivation for this study came from a recent call from a project funded by the Economic and Social Research Council entitled *Technology and Travel*. The project asked to explore the transport influences of what have been termed “non-transport technologies”. In the first working paper of the research project it was suggested:

that non-transport technologies have significantly been shaping—and will continue to shape—patterns of, and the extent of, travel demand and yet such shaping remains far from fully understood in the context of rapid and changing uses of existing and new technologies and practices in society (Hubers et al., 2011:1).

There is, arguably, some ambiguity as to what exactly is meant by a “non-transport technology”. It has been defined as those technologies that are not designed specifically with transport in mind and which do not directly substitute or complement travel. Hubers et al. note that these “encompass a broad scope including: electricity, radio, credit cards, photocopiers, broadband, pervasive computing, wireless networks, fast food, DVDs, localised household recycling, mobile telephony, pay-per-view TV and so on” (2011:4). However, it may be better to view such technologies as neglected or, alternatively, as “unusual suspects” (Hubers et al., 2011) in travel and transport research which might be set in contrast with the “usual suspects” such as, for example, information and communications technologies (ICTs), which have received a great deal of attention in travel and transport research to date.

In any case it has been posited that there exist a large number of such mundane “unusual suspects” whose influences, or potential influences, on transport, travel and mobility may be significant and which may be worthy of investigation. This research, however, concentrates on one particular set of neglected or unusual “non-transport

technologies” – food and drink packaging – in order to examine their influences on and relations with travel and mobility.

Although, at first glance food and drink packaging may seem an unlikely candidate from which to explore such mobilities, a wide range of food and drink packaging technologies are used on a daily basis by almost everyone in the world. They are an utterly pervasive set of technologies. Packaging, after all, is the vehicle which drives modern-day food systems. And modern food systems are hugely important for the organisation of (increasingly?) mobile societies. For example, Carolyn Steel, in her book *Hungry City*, goes as far as saying that the modern city – a site of multiple interconnected mobilities – has only been made possible through the development of these food systems (Steel, 2009). She shows how feeding cities is an incredibly resource intensive activity with megacities such as London requiring up to 30 million meals to be produced, packaged and delivered on a daily basis. While Steel is predominantly concerned with how food shapes and has shaped the development of cities over time, there is no doubt that these flows of food also play a part in structuring and shaping the patterning of human mobility and the everyday travel experiences of the city. Sarah Gibson (2007), for instance, has introduced the term “food mobilities”; a term that draws attention to the intersecting flows of food and people and that acknowledges how food is produced and consumed:

...through complex geographies of mobile people, plants, and animals that travel across increasingly global infrastructures of production, transportation, and preparation. Food’s mobility becomes embedded in culinary cultures consisting of techniques, recipes, and styles of cooking and eating. Food is a highly mobile product and also has the capacity to move us as consumers (Gibson, 2007:16).

Yet, as mentioned, the mobility of food would not be possible without parallel developments in packaging that enable the movement of food. As such, researching packaging constitutes a crucial line of enquiry to help us better understand food mobilities. Indeed, it is worth noting from the start that it is unhelpful to think of food or of packaging as entirely separate entities given that both transform each other. For instance, without packaging most food systems, as they are currently configured, would cease to function. Similarly, packaging without food is something very different; either a resource waiting to be used or waste. When combined each transforms the other to form a more complex composite technology. And it is these complex *packaged* foods that generate and shape the mobilities of food, of people, the development of the modern city and so on. Neither the food nor the packaging by themselves would be able

to achieve this. So, understanding the ways in which packaging, once it is wrapped around food, not only shapes the mobilities of food but also the interrelated everyday mobilities of people is one of the primary objectives of this thesis and the focal point of the second part of this research.

There are, however, a great many varieties of packaged food each of which shape everyday mobilities in more or less complex ways. Therefore, the primary focus in this second part of the thesis is narrowed down to look specifically at packaged food that is designed to be carried and consumed on the go. This is still quite a broad category of packaged food products which encompasses fast foods prepared in-store, to be taken out, and pre-packaged and pre-prepared foods that may not necessarily be consumed immediately or even on the move. Nevertheless, this category of food and drink product has had a profound influence on travel practice, transport systems and everyday patterns of mobility more generally. At a very general level packaged food to-go has meant people do not need to go home for lunch during work, affecting the overall time-space patterning of societies. And when used on the go, these composite technologies play a part in making travel time less boring and even more “productive” (Kenyon and Lyons, 2007). Moreover, this category of pre-packaged and packaged fast foods is becoming more ubiquitous on everyday travel journeys whilst also being designed in increasingly user-friendly and ergonomic ways.

But packaging, more generally, also constitutes the vehicle which drives food *production*. The central concern of the first part of this thesis, then, is on the relationships between packaging and the supply and circulation of food which are crucial to understanding the influences of packaging and packaged food on patterns and practices of *human* mobility. Packaging, after all, ensures the safe and efficient movement of food along the supply chain, from processor/manufacturer to warehouse/distribution centre to shop and beyond. Developments in packaging have meant that food can now travel great distances and then wait, fresh and safe, ready to be purchased first thing in the morning on your way to work, on the train, plane, fast food outlet and so on. These developments include homogenisation of the packaging itself in terms of its material composition, its barcoding and, to a certain extent, even its size and shape (see chapter 3). For example packaging designs have been standardised to fit neatly onto containers and to ensure the food is adequately protected on its journey. Packaging also, of course, acts as a barrier (the main focus of chapter 4), preventing or limiting the movement of various micro-organisms that may transform the

compositional integrity of the food. And these micro-borders are governed by regional legislations that regulate the mobilities of packaged food across much larger areas. These developments and the standardisation of mass produced packaging have co-evolved with standardised mass produced food to create incredibly complex, centralised and industrialised food processing and distribution operations, which has meant cities like London can receive 30 million meals per day.

However, if one looks at packaging relations more closely, a number of other mobilities become apparent. For instance, while packaging certainly enables the movement of food both for consumption and supply, the packaging itself also *moves*. It moves not only as raw materials (mostly oil, gas and wood pulp) or part finished commodities, but it is also moving inasmuch as it is changing throughout the food manufacturing process (chapter 3). Packaging also flows when wrapped around food as, for example, when certain chemicals migrate from packaging into food (chapter 4). Packaging can also move people in the sense that they can appreciate or be disgusted by the way food comes packaged (chapter 6). These are some of the many different ways in which food and drink packaging is itself always mobile which will also be explored in this thesis.

Attending to these interrelated and complex “mobilities” of packaging – its role in moving food, people and in becoming mobile itself – requires engaging with and drawing upon a range of conceptual tools which have been utilised and developed in the field of mobilities research. Before detailing these conceptual tools, however, it is necessary to provide an overview of mobilities research, how it differs from other disciplines looking at transport and movement and how mobilities scholars have dealt with technology and materiality.

1.2 Mobilities, technologies and materiality

This research engages with debates and concerns that form part of a body of work that might be considered a “mobilities turn” in the social sciences or even a “new mobilities paradigm” (Sheller and Urry, 2006b; Hannam et al., 2006). The field of mobilities research was developed throughout the 2000s partly in response to the brute facts; namely, that levels of mobility (of people, objects and information) have increased and that new forms and patterns of interconnected human, object and informational mobility have emerged in the last decades. In terms of defining what we actually mean by “mobility” we might turn to the writings of human geographer and

mobilities scholar Tim Cresswell (2006a) who has argued that mobility is to movement what place has been to space. In other words, mobilities research breathes life and meaning into what have been for too long abstracted and de-contextualised movements between A and B. Thus a distinction is drawn between movement and mobility with the latter reflecting or attempting to reflect a more meaningful, lived, embodied and felt movement rather than the simple and abstract articulations of what moves, where and how.

However, mobilities research also grew as a reaction to the rather static, structured and bounded empirical studies of mainstream social science which had largely neglected the systematic movements of people, objects, information and their contingent ordering. These static approaches to social science were deemed to have excessively focused on the rootedness of communities bounded within territories and nations and saw these as the fundamental constituents of social research. As a consequence much previous social science research has tended to reify a fixed and static view of the world (Cresswell, 2006a; Sheller and Urry, 2006b; Hannam et al., 2006). This very static process of knowledge production has been underpinned and coloured by a sedentary metaphysics which “treat[ed] as normal stability, meaning and place and [treated] as abnormal distance, change and placelessness” (Sheller and Urry, 2006b:208). Movement, under this static form of knowledge production, and this sedentary metaphysics, has been largely taken for granted, black boxed and side-lined to sub-disciplines such as transport geography that have not been a priority within the overarching discipline of human geography (Shaw and Hesse, 2010).

Still, while mobilities research generally seeks to distance itself from static and sedentary ways of performing social science, it does not wholly adopt a nomadic metaphysics either. The increases in the speed and distances travelled by a great many people, and the emergence of new powerful ICTs that have facilitated the flow of people, objects and information, have led some authors to talk of the increasingly intensive “annihilation of space”, “the death of distance”(Cairncross, 2001), of reaching new levels of “time-space compression” (Harvey, 1989) and of the development of a “network society” (Castells, 1996). Such analyses were based, either wittingly or unwittingly, upon nomadic metaphors of de-territorialisation, placelessness, flight, the virtual, the unreal or mobile forms of social life which were emphasised over dwelling, community, rootedness, the real and the relatively immobile. Early mobilities agenda-setting texts, by contrast, were asking for us to understand mobilities through their

contingent immobilities or moorings (e.g. Hannam et al. 2006). As Hannam et al. argue: “mobilities cannot be described without attention to the necessary spatial, infrastructural and institutional moorings that configure and enable mobilities” (2006:3). It is worth mentioning though, and as we will see in more detail below, that there have been attempts more recently at moving beyond such binary or dialectical ways of thinking of mobility/mooring.

Mobilities research has also tackled issues surrounding the politics of mobility. It builds upon Massey’s (1994) arguments that flows and mobilities, which continually (re)produce space and place, are bound up within “power-geometries”. As Massey has stressed some are in control of mobility and flows while others are not; where some are forced to move others have the luxury of being immobile; and while some are freed by mobility and communications others are imprisoned by them. In sum, time and space are not universally compressed or speeded up (c.f. Harvey, 1989) but rather experienced very differently and bound up with diverse power relations that shape different mobile identities, experiences of place and time as well as the patterns and practices of mobility.

Cresswell (2010), however, has more recently distinguished between three aspects of mobility: movement, representation, practice. These are said to form a “constellation of mobility” that is always already historically and geographically situated. He then asks us to apprehend, question and analyse the differences in motivations, speeds, rhythms, routes, experiences and frictions of variably mobile subjects *and* objects as they relate to these constellations of mobility. Transport researchers, according to Cresswell, have been good at telling us about who moves, where and how – the movement or patterns of mobility. They have also told us a little of the identity of these travellers. But they have said little of the politics associated with the representations, meanings and embodied practices of mobility. Cresswell’s framework for a politics of mobility is particularly useful in highlighting the importance of history for understanding our present politics of mobility. As he notes: “elements of the past exist in the present just as elements of the future surround us” (Cresswell, 2010:29). A number of these facets of a politics of mobility will be traced in this research as each chapter is developed.

A series of “mobile methods” (Büscher and Urry, 2009; Büscher et al., 2011) have also been developed, which have attempted to represent and build upon our

understanding of mobile lives. It is argued that new methods and accompanying mobile theorisations are needed to avoid reifying the bounded and static accounts of social life and the world that have historically dominated much social science and humanities research. The development of new mobile methods, however, has tended to privilege methods that accompany, and often record, the movements of mobile subjects. Moving with mobile subjects is seen as one way of grasping the embodied and lived experiences associated with mobility. A strand of work has also been developed that has looked at the momentary qualities of mobile practice as an event-in-action drawing attention to “how mobilities exceed our capacities to even think about and represent them” (Adey, 2010:142). Mobility practices, after all, involve intensely corporeal kinaesthetic feelings that happen beneath language and consciousness and thus make them, or at least aspects of them, “more-than-representational”. However, Adey is careful to point out that this does not mean that bodily mobile practices are above or beyond thinking or representation but that thinking and representation of mobility and feeling mobility are deeply implicated with each other. Mobile practices, in other words, operate at both cognitive and pre-cognitive levels. Mobilities research has thus interrogated these more-than-representational aspects of mobility alongside representations of mobility.

Mobilities research has, therefore, contributed to our understanding of travel. For instance, mobilities research is said to have “transcended the dichotomy between transport research and social research, putting social relations into travel and connecting different forms of transport with complex patterns of social experience conducted through communications at-a-distance” (Sheller and Urry, 2006b:208). However, mobilities work also encompasses mobilities at global and societal levels. It has emphasised and re-framed questions around issues of mobility *and* immobility and highlighted their importance for wider social, political, economic processes. Mobilities research, then, has successfully tied together and highlighted the relations between diverse scales of mobility from movements at the level of the body to the circulations associated with globalisation (Cresswell, 2011). This contrasts with most previous studies on movement or mobility which tended to be organised around certain fixed and given scalar logics, a consequence, usually, of the conventions that structure different disciplines.

Nevertheless, and despite attempts to distinguish and delineate a field of mobilities research, questions have arisen over the extent to which a “new” mobilities paradigm or mobilities research more generally is actually new (Cresswell, 2011;

Cresswell and Merriman, 2011). Mobility is not particularly new; people, objects and information have, in many respects, always been mobile. Furthermore, entire sub-disciplines within geography and within the social sciences more broadly have been built around analysing and understanding different aspects of movement and mobility. These include sub-disciplines such as transport geography, migration studies, tourism studies and time-geography to mention but a few. Nonetheless, a number of influential books (e.g. Urry, 2007; Cresswell, 2006a; Urry, 2000) and the launch of the journals *Mobilities* and *Transfers: Interdisciplinary Journal of Mobilities Studies* have gone some way to creating a space for a new and inherently postdisciplinary type of research converging “around studies of space, place, boundaries and movement” (Sheller and Urry, 2006b:214). Early agenda-setting mobilities texts have set out a number of different theoretical and empirical concerns that serve, in the first instance, to delineate the field. Hannam et al. identified a number of clusters of an emerging field of mobilities research such as those focusing on: migration, tourism and travel; virtual and informational mobilities; mobility nodes and spatial mobilities; and, materialities and mobilities (Hannam et al., 2006). A number of theoretical resources have also been identified as being important. These range from those early musings of Georg Simmel to work on materiality from science and technology studies, the mobilisation of the “spatial turn”, theories of affect, techniques of network analysis and, finally, insights from the complexity sciences (Sheller and Urry, 2006b).

We can already begin to see, however, that such a diffuse and postdisciplinary research field, which encompasses many approaches and covers many empirical themes, makes any comprehensive review of mobilities research difficult. Still, for the purposes of this thesis it is important to briefly identify from the outset a number of bodies of work that have paid particular attention to technology, materiality and mobility. As we can see from Hannam et al.’s attempt to delineate the field of mobilities research in 2006, technology and materiality are often placed centre stage. Not only have many mobilities scholars been concerned with the necessary infrastructural “moorings” which make mobility possible but emphasis has also been placed on the wide range of things that move – from people to objects, information and ideas. Indeed, Urry (2007), in building upon earlier attempts to develop a more mobilised sociology, has more precisely distinguished between virtual, communicative, imaginative, and the physical mobilities of humans *and* objects. He stressed that these should be understood through their interdependence and not as entirely separate types of mobility.

Furthermore, Urry (2000; 2007) has argued in early agenda-setting texts that mobilities are enabled by hybrid or materially heterogeneous “mobility systems” that comprise both social and technical/infrastructural elements. This includes the vast informational infrastructures that underpin mobile lives today. Consequently, an extensive body of work examining the interconnections between virtual, communicative and physical human mobilities has emerged over the last decade. That this line of enquiry should be so prominent should come as no surprise given that we live in an information age. And it chimes with a number of influential texts within the social sciences over the last decades that have emphasised the transformative role of powerful information and communication technologies in contemporary society. Most notable is the work of Manuel Castells (Castells, 1996; Castells, 1997; Castells, 1998) who published a trilogy of books that examined the emergence of networked societies and economic modes of organisation in the information age. Consequently, new concepts such as “network capital” have been introduced to capture the different degrees to which individuals have access not only to physical mobility but also to these forms of communications and connection (Larsen et al., 2006).

More relevant for this study are those lines of enquiry that have focused specifically on the increasing use of mobile information and communication devices on the move. These “small” mobile devices have been shown to significantly shape patterns, experiences, representations and practices of mobility (Sheller and Urry, 2006a). Studies have shown how “small” mobile communications devices have generated new forms of connection, disrupting old divisions of absence and presence and engendering new patterns of corporeal travel whilst reducing or reinforcing others (Larsen et al., 2006; Urry, 2004a). Furthermore, influential work on travel time in the information age (Lyons and Urry, 2005) has prompted scientists within transport studies and transport geography to begin measuring the “productivity” of travel time through multi-tasking (Kenyon and Lyons, 2007; Lyons et al., 2007). It has since been shown through a number of empirical case studies on train travel that travel time is not “dead time” but imbued with activity and meaning largely facilitated through the use of “small” mobile electronic devices (Lyons et al., 2012; Watts, 2008; Kenyon and Lyons, 2007; Lyons et al., 2007; Berry and Hamilton, 2009). The role of mobile communications technologies in shaping patterns and experiences of travel has been extended to look at those moments of travel disruption also. Peters et al. (2010), for example, show the important use of mobile communications devices for dealing with

mundane moments of everyday disruption. A recent special issue in the journal *Mobilities* also produced a number of publications that took as their focus the use of mobile communications devices and the web 2.0 to manage the disruption caused by the Icelandic volcanic eruption that caused havoc in the air transport system for nearly a week in 2010 (Barton, 2011; Jensen, 2011; Birtchnell and Büscher, 2011).

The work on information and communication technologies and mobility and, specifically, that which examines the use of mobile communications devices while travelling has certainly helped us better understand the complex relations between virtual and physical mobilities. They have also engaged in productive conversations with other disciplines that have also looked at ICTs and travel. However, in the opening provocation of this chapter it was pointed out that a great deal of time and effort has been spent examining information and communication technologies making them somewhat of a usual suspect in transport and travel research. We might conclude from the review above that these specific types of technology constitute dominant themes in mobilities research and thus might be considered usual suspects of this field too.

That is not to say that mobilities studies have neglected other technologies beyond ICTs. The materiality and material interactions with travel vehicles has, for example, been a prominent theme. Case studies have ranged from those looking at the car (Sheller, 2004a; Thrift, 2004; Latham and McCormack, 2004; Merriman, 2012), the bicycle (Spinney, 2006), the materialities of the train and train travel (Watts, 2008; Löfgren, 2008), and even the materialities involved in waiting and sitting for mobilities (Bissell, 2007; Bissell, 2008). Other investigations, by contrast, have focused on interactions with mobility landscapes (Wylie, 2005; Merriman, 2007). Strands of work looking at materiality within the mobilities field have also looked at the relatively “immobile” place-making and the material cultures of migrants (e.g. Basu and Coleman, 2008). In a special issue on materiality and migration published in the journal *Mobilities* these nuances were explored in case studies that ranged from the importance of materials in the place making within Ugandan refugee camps by Sudanese refugees (Kaiser, 2008) through to the materialities of West Indian migrant and non-migrant living rooms across four historical and spatial moments (Miller, 2008).

Hence, there are plenty of studies within the field of mobilities research which do attend to a much wider range of materialities and mundane technologies of travel and, as we will see below, there is even a small food mobilities literature that has

interrogated the role of food while travelling (but not packaging). The importance granted to the material world makes the field of mobilities research a suitable field within which to situate the current study on the mobile life of food and drink packaging where the explicit aim is to look at how these mundane technologies might enable, hinder or impede a wide range of (im)mobilities, not only those of food but also of humans, information, other non-humans and so on. It is, however, important to outline in more detail a number of conceptual tools and approaches to technology and materiality that will inform this research on the mobile life of food and drink packaging.

1.2.1 Networked worlds

We have introduced above what we might mean by the term mobility and provided a brief overview of the field of mobilities research. The task now is to outline how we might understand technology and technological development. Theorists of science and technology have offered alternative theories as to how technologies are built and developed. For example, a technologically deterministic reading of how technologies emerge would say that technologies are developed independent of their context and are simply rolled out and unproblematically adopted by users according to a so-called diffusion model. A social constructionist approach, to the contrary, emphasises “closure” – where competing groups agree over the design of a technical artefact – and the “technological frame” – ways in which cultural groups understand the benefits or disadvantages of the artefact (e.g. Bijker, 1995a). It is assumed under this model that processes of closure and technological frames reside ultimately within knowing subjects and cultural groups. Therefore technologies – and their construction, form and use – are essentially seen as socially constructed.

An alternative model is that offered by actor-network theory (ANT). Whilst equally against technological determinism, ANT (or material semiotics¹) differs from a social constructionist approach through the radically anti-foundational position it takes, positing that there is no pre-given entity called the social or pre-given competing cultural groups which decide and negotiate the design of a technical artefact. Rather the

¹ The terms ANT and material semiotics mean more or less the same thing. The networks or assemblages of which elements are part of can be said to be semiotic in character hence the use of the alternative term – material semiotics. Just as words can have an effect so too can matter. And just as words can be re-arranged and associated to create meaningful sentences so too various elements including human and non-human elements, texts, discourses and so on can be associated and re-arranged to create different programmes of action or different actor-networks. But crucially, and to repeat again, nothing stands alone or exists before or beyond these relations. For ANT/material semiotics there is neither cold, hard technology shaping societies nor society and social relations infiltrating technology but a *sui generis* collective.

“social” is itself “materially heterogeneous”, co-constituted by a number of human and non-human elements. But neither, by the same logic, is there any pre-given technical entity. Nothing exists beyond or prior to its relations. ANT approaches therefore adopt neither a strictly technological nor a socially deterministic stance but sit somewhere in the middle. Neither technologies nor societies are separate from or external to each other. Innovations, therefore, cannot be defined solely through processes of closure amongst social actors but are instead forged into existence through processes of *translation* and the circulation of *immutable mobiles*.

Translation is “both about making equivalent, and about shifting. It is about moving terms around, about linking and changing them” (Law, 2009:144). So, it implies, on some level, transformation and change through association since no two things are equivalent. Relations, then, are less causal than about inducing “two mediators into coexisting” (Latour, 2005:108), with the term mediator signifying an actor or actant who purportedly plays an *active* role in changing or transforming entities. Mediators here are set in contrast to more passive intermediaries that act as the pathway for a more direct causality. However, and importantly, once elements are translated they become somewhat stabilised into what have been termed “actor-networks”, black-boxed and hidden in the background only to show their liveliness through controversy or when something goes wrong.

Key to translation and the stabilisation of actor-networks is what Latour has called immutable mobiles. Immutable mobiles are objects which have the properties of being *mobile* but also *immutable*, *presentable*, *readable* and *combinable* with one another (Latour, 1987). These objects can take the form of inscriptions that can travel easily without change. And the accumulation of these inscriptions at a centre (of calculation) means this centre can speak on behalf of those elements that have been converted into inscriptions. This allows one centre or locale to act at a distance on many different locales and thus provides a crucial mechanism for extending networks. An exemplary centre of calculation that has been examined extensively in the literature is the laboratory (see Latour, 1983; Latour, 1987 for early examples and see chapter 6 of this thesis also). Laboratories specialise in producing immutable and mobile inscriptions and on talking on behalf of distant others.

Immutable mobiles can also take the form of technologies or machines that also remain unchanging as they move. In remaining unchanging and mobile such machines

or technologies extend networks and again permit some actors to act on others at a distance (see Law's (1986) example of long distance control by the Portuguese over their colonies in India). Thus, a technology or a machine, like an action or process, once translated, is black-boxed working in the background rarely noticed until, that is, something goes wrong. But for technologies or machines to remain unchanging over time and space there must be a great deal of work involved, as Latour notes: "facts and machines are like trains, energy, packages of computer bytes or frozen veg: they can go anywhere as long as the track along which they travel is not interrupted in the slightest" (Latour, 1987:250). So, stable, enduring and extended actor-networks require multiple elements to be translated or displaced (i.e. to remain unchanging) according to the specifications of a particular actor-network. However, once even one element becomes destabilised, the whole actor-network may be threatened. Importantly, and to emphasise once more, these elements can be human or non-human with both playing an equally important role in stabilising or de-stabilising the actor-network. As Callon puts it when talking of the unsuccessful attempt to roll out an electric vehicle network in France: "if the electrons do not play or the catalysts become contaminated this would be no less disastrous than if the users rejected the vehicle, the new regulations were not enforced, or Renault stubbornly decided to develop the R5 [an alternative electric vehicle]" (Callon, 1986:22).

Similarly, successful food packaging could be seen to convert food products into immutable mobiles. It renders food relatively immutable over time and yet mobile helping stabilise (by translating) many other elements of food systems from the food, to consumer practices to the organisation of retail. Indeed, successful types of packaging designed to be used on the go renders food a form of immutable mobile that has extended food networks into the spheres of human mobility and travel, as will be seen in the second part of this thesis. Put differently, when these technologies are successful they enrol not only the food but also those who consume it, stabilising everyday practices and everyday mobilities of people. These people have, in other words, been displaced and translated, doing what they otherwise might not have been doing.

Consequently, such ways of thinking about the relationships between the technical or material and the subject or society has profound implications for our understanding of agency. In staying faithful to a radically anti-foundational and relational way of thinking, nothing must exist beyond or prior to its relations, including

subject positions, actions or behaviours. Instead these are all forged into being through processes of translation.

Latour (1992), for instance, has pointed out the importance of the non-human world in scripting human or social actions in his treatise calling for the social sciences to take account of the missing (non-human) masses. He uses examples ranging from door closers to sleeping policemen (speed bumps in the road that slow down traffic) to show the way human actions can be or are delegated onto or into non-human objects. In other words, each of these non-humans interacts with humans to produce highly circumscribed patterns of action. Attending to these material details is, for Latour (and Akrich, 1992), important to understanding what had previously been thought purely human behaviours, intentions and moralities. Accordingly, they argue for a method of “de-description” whereby the “scripts” that are built into objects are brought to the fore.

While these theoretical positions may seem to be veering towards technological determinism, given the non-human world seems to severely script or circumscribe human actions, this only seems to be the case if one retains strict divisions between the human and technology/object. Once this line is completely disregarded the approach appears less determined but rather co-constituted. As Latour (1992) reminds us when he wanted to break the law by not fastening his seatbelt but could not bear the beeping that is made when the seat belt is not fastened: “Where is the morality? In me a human driver, dominated by the mindless power of an artefact. Or in the artefact forcing me, a mindless human, to obey the law...” (Latour, 1992: 225). He questions again in the extreme cases of either fastening his seat belt before starting the car or of an engineer who devises a sensor that makes it impossible to start the car unless the seat belt is fastened:

Where would the morality be in those two extreme cases? In the electric currents flowing in the machine between switch and sensor? Or in the electric currents flowing down my spine in the automatism of my routinized behaviour (Latour, 1992:225)?

Therefore, social agency is best thought of as a de-centred, distributed and precarious achievement and not in any way the unified intent of a sovereign subject. Thinking of agency in these terms allows us to move beyond agency/structure or indeed subject/object binaries. These binaries are overcome by viewing co-fabricated bodies and worlds that combine both agencies and structures, subjects and objects within wider material, natural, technical, social, political and economic webs of association. As soon

as the world is viewed in terms of this connectedness it makes no sense to separate action and place it into a solely human realm.

Such radically anti-foundational positioning has profound implications for our understanding of scale too. Just as the rigid divisions over the human/non-human, the social/technical, nature/culture, agency/structure have been transcended so too must the divisions over scale be disturbed in a networked world. What, after all, does it mean to be big, global or large scale?

ANT advocates argue that we must, firstly, move away from thinking about scale as somehow fixed, given, eternal or as bound by some overarching, elusive and purely social force that somehow extends across time and space. Scale is instead best thought of as an outcome of heterogeneous connections. Even large entities that seem so foundational, such as a nation, must be seen not in terms of their boundaries that have existed for centuries but as an on-going effect of countless situated actor-networks, from government bureaucracies, immigration offices and border controls. All these perform scale. Scale, in other words, is achieved through the connection *and* circulation of materially heterogeneous elements and is not a pre-given entity. It is these connections or relations between places that allow actor-networks to grow and become powerful as they are held together by various immutable mobiles – technologies, texts and many other elements – which comprise a specific sociomaterial set-up. As Callon and Law note:

The importance of technologies for folding together places, actors, or actants separated by time and space is obvious. Technologies and material arrangements distribute action and actors. The local is never local. A site is a place where something happens and actions unfold because it mobilises distant actants that are both absent and present (Callon and Law, 2004:6).

The large or the global, then, is better thought as an emergent effect of countless local performances and less a “cause”. Therefore, when scale is approached relationally, size or the overarching environment becomes an effect of or contingent upon the links within heterogeneous actor-networks. With more connections or associations so actors, that can only be distinguished as such once the construction of the actor-network is stabilised, become bigger or grow. These *hybrids*, then, are held together within networks, but not networks as in some overarching frame that may be used to designate “society” or “structure” but rather as more of a local “summing up of associations” that might be distributed widely in a Euclidean space and time (Murdoch, 1997; Law, 2004b).

1.2.2 Mobility systems and technology

ANT along with other post-structuralist theories has laid the foundations for much research that has emerged within the field of mobilities studies. In this section, though, I wish to interrogate the strengths and weaknesses of approaches that attend to the systemic qualities or character of mobilities. As mentioned already prominent mobilities scholar John Urry (2007) has strongly argued that systems and more importantly “mobility systems” are crucial for mobilities to happen. These so-called “mobility systems” permit repetitive, predictable and relatively risk-free movement of people, objects and information.

Crucially, these mobility systems are different from the social systems that comprise entirely of social communications and interactions taking part separately from their environment, as espoused by the likes of Nicholas Luhmann (1995), for instance. Mobility systems are instead materially heterogeneous or hybrid and are sometimes referred to as *sociotechnical* systems. They are closer to the accounts of materially heterogeneous systems comprising of human and non-human elements as outlined by the historian of technology Thomas P. Hughes (1986). He introduced the term “large technical system” in the 1980s to describe the seamless web of interconnections that make up “large scale systems”. He was concerned, for instance, with how small intercity lighting systems of the 1880s evolved into massive regional power systems by the 1920s in the US. His goal was to move beyond what he termed “internalist histories of technology”, which tended to focus only on technological development, to look more broadly at factors that might be considered economic, organisational, political or social. Thus in the case of the building of the electricity system in New York he noted how it was comprised of: “transmission lines, generators, coal supplies, voltages, incandescent filaments, legal manoeuvres, laboratory calculations, political muscle, financial instruments, technicians, laboratory assistants, and salesmen” (Law, 2009:143).

The systemic approach to mobilities advocated by some mobilities scholars similarly moves away from understanding technologies as the sole *cause* of anything but rather as elements embedded within and shaping and being shaped by (mobility) systems that are comprised of interlinked social, economic, organisational and political elements as well. Already we can see strong parallels with the ANT approach which also emphasises the materially heterogeneous elements linked to form stable actor-networks. Likewise, in his initial drive to develop a “mobile sociology” Urry (2000) has asked us to treat things, objects or technologies as social facts and to see agency as

stemming from the mutual intersection of humans and objects. It is here where Hughes' account might differ from accounts of mobility systems as he placed great importance on the work done by so-called "system builders"; key agents who weave together the multiple components that comprise large technical systems.

Consequently, decisions to travel, for example, are not seen to reside ultimately within individual, sovereign human subjects but are only made possible within the conditions of possibility afforded by various mobility systems. Human mobility (and for that matter object mobility too) are, in other words, highly circumscribed and linked with a vast array of technical, organisational, cultural and political elements. Thus the traveller or passenger may be re-conceptualised as materially heterogeneous, a more-than-human entity whose normally rather puny powers and motility are greatly enhanced once combined with mobility systems. Needless to say, such ways of thinking about social and technical relations, and of agency, contrast markedly with the thinking and models of human agency that has characterised transport studies and earlier transport geographies.

However, systemic approaches to mobility have drawn upon additional insights from the complexity sciences in order to understand the *complex* and *adaptive* character of hybrid or sociotechnical (mobility) systems. The main features of complex adaptive systems will now be outlined and then illustrated with a reference to the development of the steel-and-petroleum car system, which has been the case most studied in this regard within the field of mobilities studies.

Complex adaptive systems, firstly, involve emergent effects that cannot be reduced to the sum of their parts. Incidentally, these features of complex systems are not entirely dissimilar from those espoused by Hughes (1986). Hughes also recognised that the dynamics of large (socio)technical systems resemble more the emergent circuits, systems and networks of electrical and chemical processes, as described in the fields of electrical and chemical engineering, than linear, mechanical models.

Complex adaptive systems also evolve in non-linear ways meaning small "causes" can generate large, disproportionate outcomes or effects or, similarly, large "causes" or inputs into the system can have small or no effects (Urry, 2003). Put differently, small changes in initial conditions can be amplified through positive multiplier effects. Positive multiplier effects contrast with the dampening of change characterised through negative feedback mechanisms. Finally, complex adaptive

systems are said to be self-organising or autopoietic. In other words, feedback mechanisms reproduce the components that make up and sustain the system.

The steel-and-petroleum car system displays such features of complexity. Yet additional vocabulary has been introduced from the field of complexity economics in order to trace the complex adaptive evolution of *sociotechnical* systems. Thus the sociotechnical steel-and-petroleum car system which emerged during the last decade of the 19th century resulted from a series of small contingent events and technical developments which, though non-linear processes, became the dominant mobility systems today. Its success was partly a result of the petroleum-fuelled vehicle being one of only two vehicles that completed a horseless carriage competition in Chicago in 1896 (Urry, 2004b:32); a “small” contingent event that would eventually set petroleum-fuelled cars on a so-called *path-dependent* trajectory.

Path-dependency refers to the networked interlinking with other firms, industries, institutions, political decisions, social practices, and cultural meanings. that make complex hybrid systems inflexible, relatively predictable and stable once established and dominant. However, while path-dependent complex systems may seem predictable and stable they are generated from emergent and non-linear patterns that cannot be predicted in advance nor reduced to any one element. Crucial to path-dependency is the concept of increasing returns. Increasing returns are generated precisely because of the networked connections of systems that drive non-linear or exponential growth or output. A good example here is the fax machine. One fax machine is not much use but with each additional fax machine added to the network so its output or use value grows exponentially. The same can be said of the steel-and-petroleum car system which did not evolve in a steady linear way but grew exponentially as more elements (e.g. cars, roads, petrol stations etc.) were added to the network. But as Urry points out the steel-and-petroleum car system is also self-organising or autopoietic. In other words these complex sociotechnical systems generate the preconditions for their own self-expansion and have an internal momentum. Thus, in one example outlined by Urry, it is posited that the car has restructured time and space such that “it generates the need for ever more cars to deal with what they both presuppose and call into existence” (Urry, 2004b:27).

Complex adaptive systems like the steel-and-petroleum car system have therefore emerged in non-linear ways. Such complexity makes prediction in advance

impossible but these “small causes” can, retrospectively, be identified and traced. Moreover, once these systems are locked-in to path-dependent trajectories transitions to new systems become much more difficult.

Parallels can be drawn between these analyses of the steel-and-petroleum car system and the multi-levelled perspective (MLP) of system transition (Geels, 2002; Elzen et al., 2004). The MLP consists of three levels the niche, regime and landscape, with each interacting with the other. The niche level is where innovative new technologies or practices get developed. Many of these niche innovations fail but some are stabilised and grow in non-linear ways. As they become more stable so these niche developments can then disrupt incumbent regimes, what may alternatively be thought of as dominant path-dependent systems. These “regimes”, which are held together by technical, organisational, institutional and socio-cultural elements, may also come under pressure from overarching landscape developments which might include changes in the geopolitical environment, the economy or the climate.

Empirical studies have used the MLP framework to examine mobility transitions. One such study has looked, for example, at the transitions from horse and cart to automobile (Geels, 2005). Like Urry, Geels highlights the contingent events that led to the eventual dominance of the car system today. Yet empirical work using the MLP perspective has gone further by examining transitions in other mobility systems like the transition from sail boats to steam ships (Geels, 2002).

These complex approaches to hybrid mobility systems are certainly helpful in explaining the persistence of certain forms of mobility and they usefully highlight the connectivity between heterogeneous human and non-human elements within these systems. They also draw attention to the historical contingencies and, importantly, to the small elements and technologies that can work to disrupt regimes and shape the subsequent unpredictable evolution of systems over time. For example, the emergence of the steam ship was shaped by changes in ship ownership structures, war, and the improvement of communication through mercantile libraries, trade journals, ship-to-shore semaphore systems as well as through the mail subsidies paid by the British government to steamship owners after 1838 on account of the faster delivery service. But the steamship system was also stabilised only after a number of other “small” innovations were achieved such as the development of the screw propeller, the increase in efficiency of boilers and the perfection of iron hulls. Taking these insights forward

we can begin to think about how it is that small, mundane technologies like food and drink packaging might disturb or shape larger systems.

However, despite these advantages, complex systems approaches to mobility may fail to grasp local differences. This constitutes one important difference between complex systems approaches and the flatter ontologies of ANT which focus on local details. Moreover, there is no need for levels or institutions in an ANT framework. Rather there exist only places connected to other places which are defined and held together by the circulation of things and information. As Callon puts it in an interview:

So you are freed from this image of a multi-level society. You don't need several layers, different layers. You don't need infrastructure and superstructure and embeddedness. You only need places that are connected and the possibility of actors and information to circulate from one place to another one. (Callon in Barry and Slater, 2002:293)

In fairness, mobilities scholars adopting complex systems approaches to understand mobility do recognise that scale is not pre-given and external to the system but rather produced through connection. And Urry (2003), in his analysis of global complexity, has suggested that the large scale or the global can be found by attending to its local articulations. More precisely, Urry argues that whatever is said to be large or global should be thought of as a countless series of local *iterations* that, through their partial connections to other localities, produce large scale or global emergent effects. Consequently, when analysing “large” and “global” food systems or “large” and “global” mobility systems, we must recognise that these are only large and systemic inasmuch as they continuously connect many distant yet localised actors and actants through the constant exchanges of immutable and mobile elements, documents and information. Thus food systems grow and become powerful only through their connections and the local iterations of combined technologies, texts and socio-material set-ups that make social actions durable and, consequently, large scale. The same could be said for mobility systems. If we understand complex hybrid systems in these terms then both ANT and complex systems approaches become more compatible. MLP models, however, by positing distinct hierarchies or levels, are less amenable to the scalar thinking of ANT, especially with regards to the “landscape level” that constitutes the “overarching” and “external environment” within which niches and regimes evolve.

A more noteworthy limitation that arises from adopting a complex adaptive systems approach rests in its inability to adequately deal with interactions, interconnections and influences *between* systems. There is a tendency, empirically at

least, to focus too narrowly on elements that are deemed to be part of unified autopoietic systems. For example, Luhmann quoted in Urry (2004b:27) defines autopoietic systems as:

. . . everything that is used as a unit by the system is produced as a unit by the system itself. This applies to elements, processes, boundaries, and other structures and, last but not least, to the unity of the system itself.

Autopoiesis is certainly a useful concept and at times appropriate, especially in the example of how the car has structured time-space to such an extent that it generates the need for more cars. However, questions might be raised as to the degree to which such systems are unified or neatly bounded. What, for example, does and does not constitute an element of a system and where do systems begin and end? In placing emphasis on the unity and boundaries of systems such approaches are empirically restricted in terms of the elements that they can incorporate into the analysis. Thus complex systems analyses of, say, the steel-and-petroleum car system, often fail to look at what Shove and Walker (2010) call the “horizontal circulation of elements” (2010:472) that interact and shape them. Consequently, a complex systems approach by itself is not useful for this study where one of the primary aims is to look at the influences and interactions between food and drink packaging (part of the food system) and travel (constituted by and constitutive of mobility systems).

Conversely, it is precisely the attention paid to the connections between localities that make the conceptual approach of ANT a useful tool to explore connections beyond what might be deemed the “boundaries of the system”. Put slightly differently, ANT leaves open the possibility of investigating *all* elements that are present in any given situation. Any given locality, as suggested, will comprise of multiple distant connections that work to configure that locality. Every local interaction involves some materials, technologies or immutable mobiles which circumscribe and script them. As Murdoch puts it: “Interaction is never (for humans at least) purely local; it is constituted, construed and configured by distant actions” (Murdoch, 1997:329). An ANT approach, then, not only allows us to investigate elements that might seem far removed from the phenomena under investigation but it also takes us to unusual places in the process. ANT, therefore, allows us to build upon complex systems approaches by leaving open the possibility of exploring elements, technologies or events that happen outside of what might be considered the “boundaries” of a particular system but which nonetheless matter. In other words it allows us to attend to interactions between small

elements that circulate within *and* between these systems. For this reason ANT provides a useful tool for achieving the aims of this research that seeks to examine the extent to which “small” technologies like food and drink packaging might influence changes not only in food systems but also in “large” mobility systems.

It is important to note, though, that while there is a tendency towards concentrating on bounded autopoietic systems in systems analyses of mobility, the interdependence between different *mobility* systems has been stressed. Indeed, John Urry (2007) has argued that particular “knowledge and software based systems” provide the basis for all other types of mobility systems:

“...overall I see mobility systems as a subset of powerful, interdependent knowledge-based systems that organise production, consumption, travel and communications around the world. These systems, almost all software based, ensure and make it seem unexceptional that products can be purchased, meetings will happen, components will arrive at the factory, planes will be waiting, messages will get through... These systems make repetitive or iterative actions possible and mostly happen without much cognitive thought. They produce regular and repetitive ‘spaces of anticipation’ distributing economies, peoples, activities across the world.” (Urry, 2007:273)

Nevertheless, while the systemic interdependencies between different mobility systems has been a primary concern of mobilities research much less is said of the systemic interdependencies between mobility systems and other systems like the food system. Less still is said of the many small technologies that circulate between such systems (although see Birtchnell and Urry, 2014). Perhaps this is a consequence of the difficulties a systems perspective places in terms of drawing attention to the interdependence and interactions between systems. Such questions do not readily fit within the language of self-organising, autopoietic, and bounded systems. In any case, I want to hold on to the concept of system in order to build upon and connect this research with the substantial bodies of work on food systems and mobility systems. ANT clearly provides a useful and complementary alternative perspective for understanding the entanglements between systems which adds another dimension to this analysis of the mobile life of food and drink packaging.

1.2.3 Topological complexities, vibrant matters and assemblages

While ANT and complex systems approaches may be compatible – albeit with caution – there is the danger that both present rather stable accounts of phenomena. For example, the notion of immutable mobile was introduced, a concept that implies objects remain unchanging through time and space in order to secure networks of association. Stable networks, and the stable technologies that comprise these networks, then permit

regular, anticipated and patterned behaviour. Similar accounts are offered with regards to the path-dependencies of complex systems which include path-dependent technical designs and highly scripted user practices. But the relatively stable accounts so far presented fail to adequately grasp the fluidities, multiplicities and agentic capacities of technologies, practices or events. Things are rarely so stable. Additional theoretical resources are needed to overcome these conceptual challenges.

Mol and Law (1994) offer one way of dealing with instability and change that are inevitable features of societies, economies and technical development. They introduced the concept of fluid space as a way of thinking beyond the network or regional (Euclidean) metaphors. In trying to understand the differences in the levels of anaemia between regions Mol and Law (1994) started by tracing the measurement networks that produce these regional differences from a fairly standard ANT perspective. It was shown that these networks consisted of a wide array of technologies, organisations, texts and actors which allow machines, texts, statistics and so on to travel, unchanging, between nodes making it possible for the rates of anaemia to be compared between two places. Thus the networks of anaemia remain unchanging allowing the object of anaemia to remain stable (and knowable) as it moved across Euclidean space. Put more simply, the movement of anaemia was only made possible in Euclidean space by its immutability in network spaces.

However, Mol and Law pose the question: to what extent are these objects really unchanging? To what extent are they really *immutable* and mobile? When Mol and Law followed the anaemia measurement networks, they noted that anaemia was *enacted* differently; it was not the same and the networks were not as seamless as might initially be thought. In the Netherlands, where anaemia levels are relatively low, the measurement networks consist of sophisticated laboratories, equipment, maintenance regimes and trained people able to define anaemia. In war torn parts of “Africa”, where anaemia levels are relatively high, machines and laboratories can travel but are held together precariously. The measurement networks, in some cases, are held together through the clinical gaze. So anaemia is *performed* or *enacted* differently in different places and yet it still constitutes the “same” anaemia. It is this continuity in spite of its changing relations that makes anaemia a fluid object and one that is different from that enacted by the network.

Another example of a fluid technology is that of the Zimbabwe bush pump (De Laet and Mol, 2000). This technology was assembled and used differently across different villages in rural Zimbabwe. In some cases it was a success, ensuring healthy water for its local population. In other cases it was unsuccessful. But while being enacted very differently in different regions it could still be said to be the “same” object. What we are dealing with in these cases is topological complexity.

As Martin and Secor (2014) point out “topology is everywhere” and in human geography in particular phenomena ranging from cities, borders, networks, power and computing have been seen as “topological”. As such, there is some degree of ambiguity surrounding the term and it has been used as a heuristic device, a metaphor, an analytical approach and as an ontological relationship. Law and Mol (2001a) use topological thinking as an analytical tool and as a way of denoting the changing ontological status of objects. Law and Mol use a topological approach, then, to foreground the immanent and emergent qualities of phenomena without the need of relying on fixed Euclidean reference points for their definition or description. It is a form of thinking in non-linear terms which highlights the relations of objects as transitive and changeable and not only mechanical, fixed and enduring. To put it more succinctly, topology in this sense, and as Lury et al. (2013) have pointed out, is a way of supplementing and extending Euclidean analytical approaches and of recognising the multiplicity of modes of connection, continuity and discontinuity.

The spaces of regions and networks outlined above thus constitute two types of topology. Fluid objects offer a third. Moreover, and importantly, these topological spaces and objects interfere and interact with each other to produce movement and mutability. For example, it was shown in the previous section how immutability in network spaces allows movement in regional space. However, fluid technologies and spaces also permit movement where immutability is no longer possible. As Law and Mol note, McDonalds, which might be considered an exemplary immutable network, only moves internationally given that it (slightly) changes its offering according to cultural contexts. It is not in fact exactly the same all over the world.

The metaphors of fluidity have been used in mobilities literature. Metaphors of fluidity (or gels) have been used to better understand the dynamics of mobility within complex *adaptive* mobile systems as well as the dynamics of mobile publics (see for example Sheller, 2004b; Urry, 2000). Urry (2003) has successfully incorporated these

insights into his analysis of global complexity too. He draws upon the metaphor of fluidity to talk about uneven, emergent and unpredictable phenomena ranging from: the movement of people, to social movements, the internet and world money. These global fluids are set in contrast to more brittle and rigid globally integrated networks that include multinational organisations such as corporations or NGOs. Global fluids instead act like waves and are the outcome of countless local iterations and interactions between people, objects and information that give rise to their uneven and unpredictable character. Such fluidity arguably threatens all stable, powerful and globally integrated networks that render, and rely upon, objects and practices being stable, singular and relatively immutable when mobile. So while complex sociotechnical systems can be stable, they are also always in some sense fluid-like, adaptive, dynamic, in-flux and in this sense mobile.

Introducing a more fluid way of thinking has not only been useful but also necessary in order to think of the world as a lively, vibrant and dynamic place of flux and flows. Such ontologies chime with process-orientated approaches to mobility and to recent critiques of mobilities/moorings binaries. Drawing on process philosophies like those of Gilles Deleuze, mobilities scholars have argued against any notion of absolute immobility or mooring. Concepts like “molecular mobilities” have been introduced as a way of thinking of the world and things as continually in-process; as “becoming-flows” (Merriman, 2012). These becoming-flows or “matter-flows” (Ingold, 2010) might aggregate in molar assemblages which can be more easily sensed but these molar assemblages are also continually in flux and are the outcome of more fundamental molecular mobilities. Molecular mobilities, then, are “less easily perceptible, constituting life, the becoming of objects, and the unfolding of events.” Merriman continues, “...the danger of focusing only on discrete, sensed, molar movements is that they are frequently said to occur in a spatial setting which is deemed to be both containing and static” (Merriman, 2012:6). In other words, conceptions of space and time that are absolute, Newtonian, Euclidean. It is, according to Merriman, movement and becoming which are primary. Molar mobilities emerge from these becomings-flows.

Accordingly, seemingly “immobile” infrastructures, like airports, that have been framed as necessary for permitting mobilities, have instead been examined in terms of their fluidity and their ontological or molecular mobilities (Adey, 2006). More recent investigations have instead looked at things like the on-going “matter-flows” of an

unpredictable ash cloud and its disruptive impact on mobilities (Adey and Anderson, 2010). Similarly, at the level of the body, it has been convincingly argued that we are always being moved affectively. Even in those instances of apparent stillness, stasis, waiting and supposed “immobility” that are a necessary part of the travel experience have been re-framed as embodied, animated, affective, expressive and indeterminate events in-flux – always fidgeting, being distracted or daydreaming (Bissell, 2007; Bissell, 2008).

We might, therefore, think of things and practices as always already “ontologically mobile” (Law and Singleton, 2005). Certainly these processual accounts of a mobile world resonate with the fluid topologies outlined above where movement (in Euclidean spaces) relies on mutability and change. Yet this way of thinking of the world as in some sense always in motion has implications for our understandings of the politics of mobility. We must be careful, firstly, to recognise the differences in fluid worlds of becoming-flows that occasionally group together and precariously cohere into assemblages. There is a politics associated with these worlds that might, at first glance, seem like a reiteration of the nomadic ontologies critiqued above (see also Kaplan, 2006). While “everything is mobile” (Adey, 2006) these mobilities are, nonetheless, qualitatively different and happen at different speeds, rates, rhythms and viscosities. As Merriman points out these types of mobilities are diverse, plural, qualitative events not homogenised, uniform, flat and/or linear. So, not only must we attend to differential elite mobility (Birchneil and Caletrio, 2014), forced mobilities (Gill et al., 2011), forced immobility and uneven distributions in access or ability to move (Kaufmann et al., 2004), but we must also appreciate the differences in speeds and rhythms at the more fundamental level of molecular mobilities.

A separate yet interrelated strand of social science and humanities thinking has conceptualised these molecular and molar mobilities as assemblage. An assemblage might be thought of as “a cluster of parts remaining in sufficient proximity and coordination to function as a (flowing) system” (Bennett, 2005:446). Like complex sociotechnical systems or actor-networks these assemblages are composed of human and nonhuman parts. However, there are a number of important differences between assemblage theory and the versions of ANT outlined in the previous sections.

Firstly, assemblage theories, as hinted already, move away from any notion of an already assembled form. It gives ontological priority to the processes of formation

through which forms might emerge and might return. Vital to this processual perspective, though, is the idea that relations are external to their terms which means the components of an assemblage have a degree of *autonomy*. It means that relations are neither secondary to the atomistic individuals (like humans, objects, or anything else) nor that relations fully determine these individuals (like early versions of ANT are in danger of suggesting). Parts are not determined by the whole but rather “co-function” in order to form a “provisional, open, whole” (Anderson et al. 2013:177). An assemblage, then, is an emergent effect of “gatherings and dispersions”. Assemblage thinking provides a way of sustaining accounts of how orders emerge and endure across differences and amid transformations (Anderson et al. 2013). In this sense, assemblage thinking is again similar to those of the fluid topologies outlined above. Fluid objects outlined by Mol and Law are also assembled by heterogeneous parts where orders are held together across and through differences.

The autonomy of assemblages and their component parts means highlighting the difference between thinking of objects as having *properties* that might be constructed through actor-networks towards thinking of *things* as having *capacities*. Granting things capacities makes them open and unpredictable. The component parts of an assemblage always exceed their current actualisations. The stable relations and entities figured in networked relations can always be otherwise; they can be disrupted/disruptive and can be fluid and enacted differently within different assemblages. This liveliness has not been adequately stressed in ANT accounts that figure actor-networks and their components as translated and immutable entities.

Jane Bennett provides an eloquent way of articulating the autonomy of vibrant materials and assemblages. She talks of the impersonal affect of things drawing upon a definition of affect taken from a Spinozian-Deleuzian line of thought. Bennett points out that the capacities of bodies to affect and be affected are not constrained to human bodies but can include the non-human too. Bennett draws upon Spinoza’s concept of conative bodies to explicate this rather unusual proposition. All bodies, simple or complex, are associative and are neither subjects nor objects but “modes”. Modes are assemblages of many bodies, all interacting with each other, all with the capacity to affect and be affected by other modes. Simple bodies express conatus through their stubbornness and persistence. The conatus of a complex body or mode:

“...refers to the effort required to maintain the specific relation of “movement and rest” that obtains between its parts, a relation that defines the mode as what it is. This

maintenance is not a process of mere repetition of the same, for it entails continual invention: because each mode suffers the actions on it by other modes, actions that disrupt the relations of movement and rest characterizing each mode... What it means to be a “mode”, then, is to form alliances and enter assemblages: it is to mod(e)ify and be modified by others.” (Bennett, 2010:22)

She goes on to talk of matter and materiality in terms of “a vibratory effluence that persists before and after any arrangement in space: the peculiar ‘motility’ of intensity” (Bennett, 2010:57). Following this line of reasoning Bennett argues that any components of an assemblage are *vibrant* and have the capacity to affect and be affected as are the assemblages or modes themselves. It must be pointed out, though, that in this dynamic and interconnected world of affective bodies turning into modes or assemblages which also then form alliances and influence other assemblages, the idea of an individuated “thing” is rendered problematic. Packaging, just like humans (even though humans might be considered more complex assemblages comprising of a multitude of material and immaterial, mental and bodily component parts), are merely effects of flows of different speeds but whose states are, nevertheless, in continual transformation. It follows, then, that any notion of agency must be re-conceptualised as a mere effect of distributed autonomous entities interacting which are themselves only effects. For all the talk of the agency of non-humans posited by early ANT accounts, critics have argued that (earlier) ANT tends to deaden matter or leave it to one side (Swanton, 2013; Ingold, 2010). This is perhaps a consequence of reducing everything to their (stable) relations through translation (Bennett, 2005; Anderson et al., 2012). But in asserting that relations are exterior to their terms a degree of autonomy is granted to both human and non-human elements, which endows both with agentic capacities. Agency, in other words, is distributed or de-centred and politics is seen as a conjoined effect between various (human and nonhuman) bodies. In assemblages materials (but so too immaterial entities) vibrate, disrupt, interfere and have the capacity to affect other bodies, constituting “a cascade of becomings” (Bennett, 2005). Such formulations, therefore, highlight the dynamism of a world of flows where (material and immaterial) elements are constantly interacting and changing each other. Assemblage theory thus provides a way of thinking dynamically – about process and change – within relational ontologies that have often rendered matter too static, stable or unimportant by reducing them to their relations.

It is also worth pointing out that assemblage theory also bears striking similarities to some of the concepts of complexity outlined in the previous section. Like with complex adaptive systems, assemblage theory views causality as a non-linear and

emergent process, where the very small can have a large impact or the very large can have no impact at all and where trajectories of assemblages are, in advance, unpredictable. Note, for instance, the parallels with the path-dependent modes of analysis when Jane Bennett talks of Hannah Arendt's articulation of the emergence of totalitarianism:

...the political phenomenon [totalitarianism] is such that its sources can only be retroactively revealed. These sources are necessarily multiple, made up of elements unaffiliated before the crystallization process began. In fact, what makes the event happen is precisely the contingent coming together—the crystallization—of a set of elements. (Bennett, 2005:460)

However, the crucial difference between systems approaches and assemblage thinking (and ANT) is that the potential range of elements that can produce any given effect is expanded to include elements that might not necessarily be thought of as part of a unified and bounded system. Thus we can begin to think about the interactions between systems and, more importantly, the “horizontal circulation of elements” (Shove and Walker, 2010) that get plugged into different systems and, in the process, change them or retain a degree of consistency. This feature of an assemblage frame is particularly relevant for the current research which traces the ways in which packaging connects, disconnects and gets plugged into different assemblages from the assemblage of a processing plant (chapter 3), as an affective vehicle for consuming food on the move and changing travelling assemblages (chapter 6), as the lively object of scientific enquiry and measurement (chapter 4), as an object of fear and passion (chapter 4), or as forming part of complex method assemblages when designers are looking for ways to improve or innovate upon existing packaging designs (chapter 6). Assemblage thinking, then, like ANT, provides a much greater scope to investigate these types of interactions and their effects.

It is worth pointing out also that while earlier versions of ANT may have deadened matter, subsequent developments and clarifications, including thinking of things as emerging within fluid topological spaces, have arguably, re-awakened it. As Latour notes when clarifying the ANT approach in the late 1990s:

John and Anne Marie Mol have used the word fluid. Adrian Cussins the word trails. Charis Cussins the word choreography. All of these words designates in my view what the theory should be and what the overdifusion of the `double-click' networks has rendered unretrievable: it is a theory that says that by following circulations we can get more than by defining entities, essences or provinces (Latour, 1998:3).

In addition, Law and Mol (2001) have highlighted a fourth spatial topology – that of fire space – which stresses the absent present relations of things but also, crucially, the vast world beyond the network that, nonetheless, can have profound impacts. As Callon and Law argue: “A site is a place where something happens and actions unfold because it mobilises distant actants that are both absent and present (2004:6)”. However, it is worth discussing fire topologies and absent presences in more detail and as they relate to this research.

One version of shape constancy in a fire topology can be thought of as a star-like shape whereby the centre depends upon many absences. This is certainly the case for the gust response formalism that Law has used many times as an example of absent presences (Law and Mol, 2001b; Law and Mol, 2002). Take the gust response which is represented as the figure G in the equation used to design aircraft wings. The object G , or gust response, must fall within certain parameters for flight design and is a function – or so the equation tells us – of wing area, the weight of the aircraft and the speed at which the aircraft is flying. However, within the figure of G there exist the absent presences of sick and frightened pilots who had to fly at low altitudes very fast in order to establish the acceptable level of gust response. These sick and frightened pilots do not appear on the page or the calculations used to design aircraft but they are nonetheless present. Moreira (2004) has discussed similar absent presences in the operating theatre and in relation to the “rule of thumb” method used by neurosurgeons for measuring the “Wernicke’s area” of the brain. This standard practice used by surgeons to roughly measure an incision area takes us back to the trials and errors and accumulated experiences of neurosurgeons since 1932. But these absent presences are, of course, not made present in the operating theatre today.

The notion of absent presence has been used to examine mobilities too. For instance, mobile communication devices mean that people can be simultaneously absent and yet present; at once plugged into a virtual network and just as quickly plugged into a different co-present network (Urry, 2004a). Thrift has also referred to these sorts of absent presences or what he terms the “phantoms of space-times” (Thrift, 2000:222). These phantoms, according to Thrift, not only relate to the lingering absent present histories of space-times and to the problematisation of objective distinctions between proximity and distance, but can also relate to the approximations and unactualised possibilities of the event; unactualised possibilities that seem to linger in the present nonetheless.

Absent presences also register throughout this analysis of the mobile life of food and drink packaging. In general terms we might argue that food and drink packaging constitutes an absent presence in all mobilities research given its centrality in historically enabling the movement of people through being a vehicle that moves food but also through its unactualised possibilities as a potential element of the travel event. However, brief discussions are also had in the first part of this thesis over the absent presences implicated in the food system and especially of the absent present risks associated with food packaging (Cidell, 2012b; Bickerstaff and Simmons, 2009). These latter absent present risks arise from the great deal of uncertainty over the harmful effects of contaminants migrating from packaging as well as the absent presence of micro-organisms that are used to justify certain packaging systems. Chapter 6, similarly, sheds light on the absent presences of the packaging designers who accompany passengers and travellers when they carry and consume packaged food and drink. And it could be argued that in chapter 5 there exist absent present relations between packaged food not eaten on the move but which nonetheless significantly influences patterns and practices of everyday mobility.

We might also think of fire topologies as reflecting a vibrancy of matter and assemblages. As Law and Mol (2001) note fire space presents continuity as an effect of discontinuity; a discontinuity that Bennett and other posit as always already happening. Furthermore, as Law and Mol mention “if water is the element of flow then fire is the element of passion, action, energy, spirit, will and anger” (Law and Mol, 2001:615). Such verbs, when applied to the cases of matter, express a capacity of things to suddenly disrupt, surprise and affect as outlined by Bennett (2010; 2005).

We have, then, a number of complementary concepts which offer distinct opportunities and possibilities for understanding the *mobile life* of food and drink packaging. These are helpful in developing accounts that are not only about the predictable and stable movements of path-dependent systems or immutable mobiles circulating within stable networks. These additional concepts also allow us to go beyond using packaging as a mere probe to investigate the movement of food or of people. Things like food and drink packaging, and the flowing *assemblages* they join and re-join, can also be fluid, unstable, unpredictable and uncertain. When this happens we move from talking of immutable mobiles to *mutable* mobiles and from easily observable movements to the seething and turbulent molecular mobilities that are ongoing and underpinning everything. Employing these conceptually more

sophisticated approaches opens up and illuminates a wider range of interconnected mobilities that form part of the *mobile life* of food and drink packaging.

The remainder of this introductory chapter will situate the current study within two small strands of mobilities research on food and waste respectfully whilst also reviewing a number of relevant literatures on packaging outside of the field of mobilities. These brief and selective reviews are provided on account of their relevance for this research in general. Additional strands of literature, both within and outside the field of mobilities research, will be reviewed as they relate specifically to each chapter and as each chapter is developed.

1.3 Food mobilities

From the late 1990s a body of work emerged which examined the material cultures of tourism and travel (see Rojek and Urry, 1997 for example). Within this body of work the study by Celia Lury, which looks at the material cultures and mobilities of food, is particularly relevant. Lury used certain foods to illustrate the way in which such objects, which are implicated in construction of a global cosmopolitanism, can become entangled within certain relations of dwelling and travel. She reflects upon a magazine review of a book produced by the famous Japanese restaurant Wagamama, and in particular on the slogan “Food Intelligence = Open Mouth + Open Minds” (1997:82). Lury comments upon how “Food Intelligence” refers not only to people’s intelligence about food but also food’s intelligence about people. Put simply, Lury posits that openness to the world (her definition of a global cosmopolitanism) is not only a human capacity but rather is constituted through the people-object practices in specific relations to travelling/dwelling. She adds:

Food’s intelligence about people indicates the ways in which people’s eating practices are built into the food itself, such as, for example, the requirement that food can be produced and consumed in a relatively brief period of time. It thus refers to the ways in which norms and values about eating are, literally, objectified; or to put this the other way around, it refers to the processes in which objects are given integrity in the way in which they are made to objectify a preferred mode of use, or usability... Objects of global cosmopolitanism contain within themselves an awareness or knowledge of a preferred context of-use, that is, they have inscribed in their very composition, a technologically interpreted and mediated context-of-use, what I prefer to call an environment (Lury, 1997:82).

Sarah Gibson has since drawn upon Lury’s ideas when articulating a new area of food mobilities. Food mobilities, according to Gibson (2007), is a term that works to foreground corporeal, technological, virtual, imaginative, and object mobilities that inform or inflect cultures of food, taste and eating. Echoing Lury, Gibson examines

food as an object that moves in relations of “travelling-in-dwelling” but also to “dwelling-in-travel” (Gibson, 2007). Place, so it is argued, is articulated through these material food mobilities and helps shape various subject performances around food. Jennie Germann Molz explores one such subject performance around food – that of the culinary tourist (Germann Molz, 2007). But instead of framing such encounters in terms of “eating the other” she examines the ways in which round-the-world travellers eat different foods to consume the global, to be part, in other words, of a global cosmopolitanism. Such an emphasis is consonant with Cook and Crang’s argument that we must consider foods as both emblematic of place but also as displaced, as a “world on a plate” that can be consumed by cosmopolitans without even leaving their neighbourhoods (Cook and Crang, 1996).

These texts usefully emphasise how foods, and presumably other objects, can get caught up within complex relations of physical and imaginative travelling and dwelling. However, these studies fail to highlight the importance of packaging. This is particularly surprising when Lury talks of the intelligence of food in terms of its user-friendliness and the cultural scripts and norms of eating built into these objects. Granted her main aim was to explore the construction a global cosmopolitanism but to talk of the user friendliness of food is to talk also of the way it comes packaged and not only of the food. This research, by contrast, places a greater emphasis on the importance of the *packaging technologies* and how these influence human travel and enable the movement of food. However, it is important to note that it is not helpful to think of food and packaging (nor incidentally of physical and imaginative mobility) as separate entities, both are intertwined to such an extent that one would not be possible without the other. And yet despite this importance, little consideration is given to the packaging in this food mobilities literature.

An important additional limitation of these studies on the mobilities and material cultures of food and travel, and of those that look at mobile objects and place-making more generally, is that they remain very much focused on (im)mobile *consumption*. Research on food within the field of mobilities studies has, as yet, failed to link accounts of mobile food consumption with accounts of mobile networks of food production. Little is said of the interconnected global or regional flows of the commodities which the material cultures of travel and the consumption of stuff relies upon (although Gibson does briefly talk of the mobilities of potatoes in these terms). Indeed, there is, arguably, a neglect of the physical flows of commodities, goods and

freight within mobilities scholarship more generally; a scarcity which is echoed in the field of transport geography too (see Rodrigue, 2006; Hesse and Rodrigue, 2004). Moreover, the small number of studies within the field of mobilities research that do focus on the mobilities of food production similarly fail to connect these with moments of mobile food consumption. John Law's (2006) examination of foot and mouth, for instance, takes as its focus the flows of animal parts and prions which produced the Foot and Mouth disaster in agriculture but does not go further to investigate how this disaster effected the consumption of beef. And while Abrahamsson and Mol (2013) highlight the historical trajectories of wheat and the present-day movements of pineapple and pork, they leave the moment of consuming the pizza Hawaii largely up to the imagination. Furthermore, Ian Cook (2006) himself noted how he has failed to adequately cover consumption in his paper which followed Papaya (Cook, 2004) or in his co-authored piece for the special issue on food mobilities in *Space and Culture* which followed West Indian Hot Pepper Sauce (Cook and Harrison, 2007).

More, then, could be done to link the *mobilities* of food production that make the practices and sites of mobile food consumption possible. Such an argument echoes the debates had over the 2000s between food studies and agro-food studies (Watts et al., 2005; Winter, 2003). The so-called "production-consumption debate" involved a shift in thinking away from agro-food networks as unidirectional and linear chains to thinking of them instead as "interactive, socio-ecological metabolic circuits linking agricultural nature, social labour, the corporeal and the symbolic" (Goodman and DuPuis, 2002:4). Since then a growing body of work within food studies has explored the circuits and relations of production-consumption of food (Hughes and Reimer, 2004). Some have been inspired by an actor-network perspective to do so (Barrett et al., 2004; Murdoch and Miele, 2004; Stassart and Whatmore, 2003). However, while the mobilities of food and other components are clearly crucial they are rarely stressed in these accounts. They are in other words rather static accounts of food production-consumption chains, cultural circuits or networks. Little is said, for instance, of the ways in which these foods are implicated in mobile place-making through food consumption on the move. And like the food mobilities literature no attention is paid to the container journeys that packaged food undergoes or the trip packaged food takes in the boot of the car. Furthermore, food studies, agro-food literature and the work on the geographies of food commodities pay little attention to the *packaging* that make the (mobile) food system – its *mobile* production and *mobile* consumption – possible. Consequently, there exist

opportunities not only in linking the *mobilities* of food production with the *mobilities* of food consumption but also to shift the focus to examine packaging that makes it all possible.

1.4 Waste mobilities

Another relevant strand of work that can be identified as part of a mobilities field and which, in some cases, does look at packaging is the small but growing body of literature on waste mobilities. In calling for geographers to pay more attention to issues of waste (im)mobility Davies writes: “waste moves (and is moved) through time and space between places and is changed by (but also changes) the wider environments it interfaces with in unpredictable ways.” She adds: “To attend to the things that are called trash, garbage or waste, their materialities, where they go and how they evolve is not a waste of space but surely at the very heart of geographical enquiry (Davies, 2012:194-195)”. In a review article Davies identifies four strands of an emerging waste mobilities literature (Davies, 2012). These focus on the mapping of flows, on the illegal mobilities of waste, on the immobilities of waste and, finally, a body of work that follows things of rubbish value.

The first strand of waste mobilities literature, according to Davies, includes the work done by a number of environmental organisations and government agencies who have mapped (and continue to map) the flows of waste. The types of waste mapped are primarily electronic waste (mobile phones, TVs, computers etc.), although there are some examples of where flows of waste packaging are mapped (see for example Leonard and Conrad, 2010).² Within academic circles Khoo and Rau (2009) have tracked and mapped the flows and moorings of hazardous waste as it moves in and out of regions in East Germany and Malaysia. In so doing they show that politics and contestation are both the source and product of concrete (im)mobilities (in this case of hazardous waste). They claim to build upon mobilities literature that they argue treats politics (and especially local and national politics) as somehow transcended by mobility. The cases illustrate how waste, like politics, can be mobilised and displaced but do not go away entirely. They usefully stress the importance of the particularities of place, culture and identity which, in combination with wider political structures, play a role in fuelling or preventing the mobilisation of local resistance to hazardous waste disposal facilities. They fail, however, to track or examine similar mobilisations of local resistance related to municipal waste focusing instead on commercial or industrial

² See also online multimedia at <http://storyofstuff.org/>.

wastes. Bulkeley et al. (2005) have, to some extent, tracked municipal waste, and thus packaging, in their analysis of the different modes of governance of waste in the UK, but the movements of such wastes remain implicit in their analysis.

A second strand of waste mobilities literature deals with the illegal (im)mobilities of waste and the politics associated with municipal dumping. For example, Davies and O'Callaghan-Platt have highlighted the illegal dumping of a quarter of a million tonnes of municipal waste from the Republic of Ireland into landfills in Northern Ireland as local agents tried to profit from the differences in landfill tax. Over a quarter of a million tonnes of commercial and municipal waste must now be relocated to the Republic of Ireland at the cost of 36 million euros to the Irish taxpayer (Davies and O'Callaghan-Platt, 2008).

A third strand of a waste mobilities literature includes those studies that centre on issues of waste immobilities. The work of Sunderberg and Kaserman is apposite here when they focus on the waste packaging left behind by illegal migrants crossing the US-Mexican border. They argue that the media representations of a contaminated "pristine nature" resulting from the trash left behind by illegal immigrants serves to delimit and naturalise the national body which is, in turn, seen as under threat (Sundberg and Kaserman, 2007). Davies, alternatively, looks at a different set of issues surrounding the immobilities of waste packaging through her examination of citizens in Dublin, Ireland, who prevented municipal waste collection during 2003 as a protest against new waste taxes being introduced (Davies, 2007).

As is evident much of this work stresses the policy context of waste and addresses issues of waste governance. As such it builds upon existing work looking at similar issues but which neglect or render implicit the (im)mobilities of waste (e.g. Davoudi, 2009; Bulkeley et al., 2005; Petts, 2004). A final body of waste mobilities literature, however, moves away from understanding waste, and in some cases waste packaging, as simply fixed and given entities that occupy relatively stable categories or which are the mere outcome of policy. This forth sub-theme of a waste mobilities literature which follows things of rubbish value views waste as more vibrant and lively, as in flux and flow, and as forming part of on-going socio-material assemblages. This strand of waste mobilities literature stresses the situational and relational character of wastes in a similar way as this study stresses the situational and relational character of food and drink packaging before it turns into waste. It thus opens up the ontological

complexities of waste and in some cases of waste packaging. This strand of literature also uses the same methodological approach as this research as it follows things (of rubbish value). Such methods are used to (try and) capture wastes in their lively and transitional (re)productions.

1.4.1 Following vibrant (waste) matter

A recent ESRC funded project entitled “*The Waste of the World*” proposed re-thinking waste as an “ever-present potential” as opposed to something that is merely disposed of or as the end point of a production-consumption process. Emphasis is placed on the materialisations of waste; that is, the continual coming together, transformations and disassembly of (waste) materials that form an integral part of global economies. As Gregson and Crang (2010) add:

To focus on unbecoming things foregrounds sequestering, unleashing, the transgression of boundaries and borders, and positions waste firmly within a scalar world of fixings and flows (Gregson and Crang, 2010:1031).

In focusing on the molecular mobility of waste and in then connecting these to “a scalar world of fixings and flows” this strand of work can be placed firmly within the category of waste mobilities literature. Re-thinking waste in terms of its complex, unfolding and ever-present potential broadens the focus to include the examination of the changing relations of such unfolding objects as they move within or across boundaries. By moving with wastes as they transgress boundaries and borders this body of work also usefully moves beyond the predominantly national or regional studies of waste governance or management (e.g. Bulkeley et al., 2005) to shed light on the global flows and circulations of the materials and the global economies of waste. This literature that has followed what has been termed the “shit end of capitalism” (Gregson and Crang, 2010:1029), therefore, remedies a purported neglect, to date, of the globally interconnected circulations of such wastes as well as the often very vibrant (after)lives of such “shit” objects.

However, the types of more or less mobile wastes followed in this literature do not normally include waste food and drink packaging. They instead tend to focus on the neglected areas of commercial or industrial waste. Consequently, the things that have been followed include end of life ships, their hazardous disassembled components or their re-birth into furniture (Gregson et al., 2010a; Gregson et al., 2010b). However, relocated and re-materialised consumer goods such as furniture or clothes have also been followed (Gregson et al., 2007). Very few studies have concentrated on food and

drink packaging as waste from this perspective. One exception is the work Jane Bennett (2010).

Jane Bennett has explored the impersonal affect of trash in a gutter one spring morning. This included amongst other things a plastic bottle cap. Bennett contemplates these things in the gutter in order to develop her concept of “thing-power” and to explore the lively capacities of impersonal things to affect. This task is partly an attempt to move away from the dominant and entirely human or subject-centred accounts of things that have tended to dominate social science accounts. It is also an attempt to grant a specific type of agentic capacity to non-humans existing within a world of on-going assemblage, composition and re-composition.

The work of Bennett has certainly generated fruitful insights with regards to the materialisation or, alternatively put, the on-going life of packaging as waste. And the work from the *Waste of the World* programme has begun to highlight issues of mobility, albeit of industrial wastes. One of the few social science researchers who has dealt with packaging, not only as waste but in terms of its lively and vibrant uses before it becomes waste is Gay Hawkins, who draws heavily upon Bennett’s vital materialist perspective when she examines the water bottle.

1.4.2 Packaging mobilities?

Hawkins has also attended to the afterlife of food and drink packaging and its role in shaping regimes of urban waste management and in re-configuring domestic habits and perceptions over the relations between waste and the environment (Hawkins, 2012). But she has also begun to explore the agentic capacities of packaging in assembling markets and practices. In another, earlier, paper Hawkins (2011) asks how do plastic bottles participate in the materialisation of the bottled water market and how do they participate in the engagement of publics? How, in other words, do the material affordances of the bottle participate in the making of products and protest. She combines Callon’s concept of a “Hybrid Forum” which is “a site where questions about matter, politics, nature, science and more proliferate” (2011:539) with Bennett’s vital materialist perspective to interrogate these questions. She illustrates the generation of one such hybrid forum through a specific advertisement/image of a person drinking oil from a water bottle. This advertisement was created by a company that makes water filters and the aim is to make visible the amount of oil that goes into making water bottles. Hawkins argues that such images serve to disturb and affect the consumer and

therefore brings out the “thing-power” of such mundane commodities as a bottle, even when such things are represented in images. More importantly for this research she begins to trace not only the afterlives of such mundane packaging but also its flows from raw materials, a concern shared in this research and particularly in chapter 3.

Hawkins also highlights how the materiality of the bottle is central to the arrangements of markets, enabling water to become singularised and, importantly, mobile:

In the case of bottled water the package is at the heart of market arrangements, it allows new relations of calculation to be established around water that interfere with its status as a ubiquitous service. Even though water flowing through taps and provided by utilities is often subject to various market arrangements it is generally not experienced as a singularized good. Bottles contain and delimit water *and make it mobile* in ways that taps do not and this is why their role in market arrangements is so crucial (Hawkins, 2011:536 emphasis added).

Even though this observation may seem quite obvious it is often missed in studies that attempt to uncover or reveal the commodity fetishism of products. As Gregson and Crang (2010) mention to highlight these aspects of packaging is “to decentre the object of commodity fetishism, by thinking not with the point-of-sale commodity but through what enables its distribution.” (Gregson and Crang, 2010:1028). Shifting the focus in this way clearly provides opportunities for grasping a number of intersecting and often hidden mobilities that are connected to, converge upon and flow through things, like packaging, as they move and mutate.

Hawkins’ work builds upon other literature within science and technology studies which have provided slightly different accounts of packaging as a market device. Callon et al. (2002), for instance, have “unpacked” what goes on at the supermarket and show how packaging helps configure particular socio-cognitive arrangements and help with the “singularisation” of goods. By singularisation they mean the mechanism by which consumers can become attached to a specific product.

Callon et al. (2002) argue that the qualification of products and the positioning of goods are major concerns for market actors in our contemporary era. And packaging is crucial to the process of product qualification as it serves to guide consumers according to points of reference, supports and affordances, enabling comparison on the shelf. Callon et al. (2002) in ruminating upon these processes of attachment as they unfold at the supermarket then ask how it is that consumers break from the routine patterns and choices of consumption. How, in other words do they become detached

from some products and re-attached to others. Again changes in the packaging can constitute one important device to destabilise the networks of product qualification or as Callon et al. term help with the “re-configuration of the distributed apparatuses of qualification”. They have demonstrated such processes of re-qualification within the “economy of qualities” through looking at how a manufacturer of orange juice gained competitive advantage and market share through changes, amongst other things, of their packaging. In this case packaging designers, along with the marketing professionals (and their focus groups, surveys etc.), used a Pokemon toy that was included with the bottle in order to detach the child from parent and connect both with the new packaged orange juice, which has now been connected with the Pokemon network. Of primary importance, though, is the notion that attachment to a singularised product cannot be disassociated from the wider “apparatus of distributed cognition in which information and references are spread out between many elements” (Callon et al. 2002:205), including material devices such as packaging.

Cochoy and Grandclément-Chaffy (2005) have similarly highlighted the distributed information and references spread out between elements when looking at how the health warnings on a cigarette package renders the packaging a “little parliament” where distinct voices can be heard, in this case between the tobacco manufacturers and the state. Franck Cochoy (2012) has elsewhere elaborated on the historical changes in packaging and specifically on the changes in the information provided. He traces packaging as it shifted from a device that enabled fraud, as the contents or “naked product” could no longer be assessed, to a device that now does precisely the opposite by providing us with more information that tells us more about the product than we could ever have hoped to access through assessing the “naked product” alone. Much of this information has gone some way to re-balancing the asymmetries of information that once pervaded the buyer-seller relationship. Labelling standards that provide consumers with detailed product information have now been codified in law and turned into contractual commitments and legal obligations that all food packagers and food manufacturers must adhere to. The increase in scientific and cultural information on packaging has, according to Cochoy, engendered a more mediated relationship between product and consumer, with mediation implying a largely active role in capturing consumers rather than a more passive intermediary role. Cochoy further argues that the current configuration of market assemblages would no

longer function without the important mediating role of packaging: desires would not be stimulated and quality could not be ensured.

However, there are two issues with this literature on packaging. First, while packaging is the central focus one gets a sense that the packaging itself is left behind given the largely semiotic analysis of its imaging and labelling. Second, while these accounts of packaging usefully help us understand the role of packaging in attaching or detaching consumers from products, little is said of what happens beyond or outside of the shop or supermarket. Consequently, there exist opportunities to explore many multiple interconnected mobilities of lively things such as packaging beyond the shop or in addition to its (after)life as waste. Hawkins' work on the plastic bottle has begun to open up a space for examining the ways in which packaging interacts and shapes everyday practices or sustains the political economic organisation of food systems. Yet there exist opportunities to explore further the ways in which different types of packaging (beyond the plastic bottle) are implicated not only in the organisation of food markets but also in the organisation of eating and mobility practices. Looking more closely at the ever present potential of packaging during its associations with moments in the production and consumption of food may, therefore, allow us to attain a fresh perspective on the dynamics of variously mobile systems, practices and societies.

Finally, a number of studies have looked at the mobilities and immobilities of the shipping container; which might be considered a form of packaging. Martin Parker (2012), for example, chooses the shipping container as an object from which to examine the relations between economics and culture. He opens up the idea of containerisation, saying it cannot be contained, explained or apprehended purely in terms of economic rationality, sameness, security and plenty when it is simultaneously represented as difference (in sizes and standards), emptiness (from "zombie ships" to lonely container ports), and danger (as a vehicle for smuggling and crime). Julie Cidell (2012a), alternatively, investigates the mobilities, immobilities and pauses of shipping containers in relation to local regulations. She argues that problems over containers in local and regional areas are a function not of the objects themselves but their state of (im)mobility – on roads, on trains or in temporary (and sometimes illegal) storage by the docks. It is fair to say, though, that there is much room within mobilities research to follow many more types of packaging other than the shipping container or, indeed, the plastic bottle.

1.5 Packaging and (mobile?) society

There is no doubt that packaging constitutes what Science and Technology studies scholar Bruno Latour would call a “matter of concern” (Latour, 2005). The public perception of packaging is often negative and packaging as waste remains an environmental and social problem. It is unsurprising, therefore, that many social scientists have focused on issues of waste and waste management whilst saying relatively little about its uses or purposes. In the social science literature that has investigated packaging before it becomes waste it has been examined semiotically as a label or surface for branding.

An extensive volume of work outside of the social sciences focuses on the science and technology of packaging but fails to adequately articulate the social, cultural or even political implications of packaging innovation. These include the many papers published in the influential journal *Packaging Technology and Science* as well as a number of books that exist on packaging technology (see also Yam, 2009; Coles et al., 2003). The concerns of these studies range from those dedicated to improving the engineering and manufacturing of different types of primary packaging to those attempting to find out more accurate ways to measure various medical, toxicological or environmental dimensions of packaging. In terms of the environmental issues surrounding packaging, for example, the solutions presented in this literature centre on possible source reduction through purely technical innovations such as light-weighting or at finding better ways to measure lifecycle assessments of packaging systems for more effective policy intervention and the development of more environmentally sustainable integrated waste management systems. What is missing is any explanation as to how innovations in packaging and various social processes have co-developed and become co-dependent upon each other. This vast body of work on packaging technology, in other words, present de-contextualised accounts with little to no discussion of the social, cultural or even broader historical and macro-economic transformations that have co-evolved with packaging innovations.

A number of books that examine the social histories of packaging have been better at highlighting the central role of packaging in the construction of social, cultural and economic processes and vice-versa. The most notable examples are Thomas Hine’s (1995) book *The Total Package : The evolution and secret meanings of boxes, bottles, cans, and tubes* and Robert Opie’s (1989) *Packaging Source Book: A visual guide to a century of packaging design*. These books usefully articulate the important ways in

which packaging has shaped societies and food systems. Furthermore, by adopting a long-term view these social histories also help bring into focus what are today largely taken for granted entanglements between packaging innovations and wider social, cultural and economic norms and practices.

A large part of these social histories is, unsurprisingly, dedicated to looking at the important role packaging plays in informing and convincing consumers to buy products. Informing consumers and helping sell products are, of course, crucial functions of packaging and one that generates its own dedicated technical and marketing literatures both within and outside of academic circles. Recently published books such as *Packed - The Food Entrepreneur's Guide: How to Get Noticed and How to be Loved* (Stuart, 2013) or *Eat ME: Successful, Seductive Food Packaging Design* (Hargreaves, 2004) as well as the regular publication of the *Packaging Now* volumes, aim to provide successful formulae for packaging design that will capture attention and maximise profits. These have largely to do with establishing unique brand identities as well as drawing on various aesthetic techniques and cultural references in the design of packaging. A large number of articles are also published each year in top ranking marketing journals that concentrate on such aspects of packaging design. But as argued already, packaging is not only a cognitive market device. It is also a lively thing that can script or destabilise behaviours. It can enable different practices of food consumption which themselves get combined with and shape a wide range of other social practices.

These wider effects of packaging are highlighted through a number of documents from the packaging industry and packaging industry associations where the importance of packaging for society is stressed (see, for example: “Packaging in Perspective” published by INCPEN (2007); an early UK Centre for Economics & Environmental Development sponsored report entitled, “Packaging in a Market Economy” (UK CEED, 1995); and an industry sponsored document entitled, “Packaging’s Place in Society” (PIRA, 2004); Levy (1999 especially chapter 2); as well as a number of articles on the social implications of packaging innovation from the trade magazine *Packaging World*).

However, while these industry literatures do stress the importance of packaging for society they tend to view packaging as either the passive outcome of external social drivers or as a mere reflection of society. For example, it is stated in the above mentioned document *Packaging’s Place in Society* that: “Packaging is a reflection of

the society in which we live.” In the same report the following paragraph goes on to claim how:

The packaging we use reflects a range of external drivers, such as demographics, changing lifestyles and aspirations, economic growth and globalisation, competition, product and technology developments, and supply chain demands (PIRA, 2004:21).

Such comments problematically assume a unilinear direction of causality. As this thesis argues, packaging is not just a reflection of the society we live in; it is part of the society we live in. Another document entitled “Understanding Packaging” better grasps the active role packaging plays in shaping society when it says:

Lifestyles have changed, with many women going out to work full time. Shopping habits have changed, and so have the shops we use. Holidays abroad have given us a taste for exotic foods, but lack of time makes us want convenience. We no longer shop daily for perishable foods, but use refrigerators and deep freezers to store goods. We want to take food from the freezer, via the microwave, to the table in minutes. *Packaging innovation has helped us to achieve all these things* (INCPEN, 1998:4 emphasis added).

This latter quote, like Hawkins’ accounts of the relations between packaging and society mentioned in the previous section, provide a broader picture of the roles that packaging performs beyond that of providing information, communicating brands or convincing consumers to buy products. The quote above suggests that packaging is an equal partner in assembling and shaping social processes. However, while some of these literatures begin to show that packaging is more than a sales device, what is not mentioned, or at least rarely stressed, is how these technologies and the forms of economic and social organisation they are entangled with are fundamentally mobile. As a result such accounts are too static. For a start any questions surrounding transport, travel or mobility are largely left out of most accounts of packaging and society, including those examining the social histories of packaging. But these industry literatures and social histories of packaging also treat packaging as a static object, a container fixed in Euclidean times and spaces. The small body of work within the social sciences that looks at the ever present potential and mobilities of packaging during its (after)life as waste provides a helpful counterbalance to these rather static accounts of packaging. But even this literature could go further to examine the molecular mobilities of packaging as it assembles *mobile* production or *mobile* consumption situations. This research, by stressing the entanglements between *mobile* packaging and *mobile* societies, markets and cultures, can, therefore, contribute to our understanding not only of the relations between technologies and travel but also of packaging and of society.

1.6 Summary, thesis structure and trajectories not taken

This extensive introductory chapter began by setting out a provocation that provided the initial motivation for this research. This provocation related to the neglect of small or mundane technologies in the study of travel or transport. The primary and overarching objective of this research, therefore, is to examine the extent to which food and drink packaging shapes the physical mobilities of humans. However, in order to achieve this aim we must also look at the ways in which food and drink packaging has shaped the mobilities of food.

After a brief overview of the main concerns and contributions of a mobilities field of research a number of different conceptual tools and approaches were outlined that help us achieve the aims of this research and to understand the mobile life of food and drink packaging. To begin with the notion of immutable mobile was introduced. Immutable mobiles circulate and help translate other human and nonhuman actors within stable actor-networks. It was suggested that packaging might be thought of as an immutable mobile that can work to script and translate other actors. The concept of complex systems was then introduced. Complex systems approaches have been used in mobilities research and especially to understand the car as a complex system. Complex (mobility) systems are also networked, comprising of technologies but also socio-cultural practices, institutions, government regulations and other elements that work together to lock systems into path-dependent trajectories. Food and drink packaging is most obviously an element of a path-dependent food system, and one which has enabled, over time, the patterned flow of food across extended distances or regions. But it may also be a useful probe to explore human mobilities and mobility systems.

However, these approaches tend to present accounts of stable, predictable and patterned mobilities of food or humans figured as displacements in Euclidean space-times. Additional concepts were introduced as a way of thinking of networks, systems and even objects themselves as mobile, unstable, fluid, uncertain, disruptive and vibrant. Mobilities can also be molecular; fundamental to everything and part of on-going becoming-flows. And things can exist and move within complex spatial topologies that fold in on and interfere with each other. As a consequence of adopting these more nuanced conceptual tools, this research not only uses packaging as a probe from which to examine the patterned movement of food and humans but also explores the mobilities and mobile mutability of packaging itself and the multiple spaces and times it helps shape. This involves tracing the complex transmutations of packages as

they move and as their relations shift. Opening up the ontological complexity (and politics) of packaging, therefore, means thinking about the different circumstances within which their forms can change.

Therefore, packaging, as it is conceived in this thesis, is not simply something fixed and stable and part of equally fixed and stable systems and networks but it can simultaneously be comprehended as always in flux and flow, part of fluid, dynamic and indeterminate assemblages and existing in multiple spaces and times. Such conceptual approaches give us more purchase from which to attend to packaging's mobile *mutability*, its molecular mobilities, its vibrancy, its material affects and the absent presences that impact, give shape to and interfere with its movements across Euclidean times and spaces. However, I do not want to lose sight completely of packaging as a Euclidean container moving within (and helping food and humans move within) larger Euclidean containers. I want to continue to hold on to the metaphors of systems and networks as these illuminate another type of mobility: the movement of immutable mobiles and the circulations across networks that displace packaging, packaged food and humans across Euclidean times and spaces. These mobilities are important too and are largely neglected in food studies literatures and certainly in studies of transport and travel. These alternative types of mobility must be considered alongside the more nuanced molecular mobilities of becoming-flows and fluid assemblages. Throughout the thesis, then, we will draw upon these distinct conceptual tools in order to provide a multi-faceted examination of the mobile life of food and drink packaging.

Accordingly, the thesis could be read in a number of ways. It could be read as a study adopting two conceptual approaches on mobility and packaging with each building on the other – one where mobility is understood as movement in Euclidean terms and the other sensing movement as molecular mobilities which associate with fluid and on-going assemblages. It could also be read as four distinct essays on various aspects of the mobile life of food and drink packaging connected by the thread of mobility and movement. Yet another way of reading this thesis is as a study of a politics of mobility. The thesis loosely follows Cresswell's (2010) outline of a "constellations of mobility" in that it investigates how packaging shapes differentiated and interrelated historical and contemporary patterns, meanings and practices of food and human mobility. Underpinning each chapter are questions concerning why packaging or packaged food moves or not, how fast it moves, what routes do they take and how these packaging and packaged food mobilities affect the forces and starting points, speeds,

rhythms, routing, experiences, and frictions of human mobilities past, present and future. A fourth way of reading this thesis is as forming two parts with two chapters in each, one concentrating primarily on food and drink packaging and the movement of people and the other focusing more on packaging and the movement of food. Though, it is important to stress that the divisions between the consumption and production of packaged food have been made for analytical purposes only and do not seek to privilege one context or setting over the next. Indeed, the purpose of the first part is precisely to draw attention to the interconnectedness between the mobilities of packaging and packaged food and its instances of mobile consumption.

Therefore, the first part of this thesis, as mentioned, examines *Packaging and the Movement of Food*. Chapter 3 begins by detailing the ways in which packaging affords the smooth flows associated with highly automated, industrialised and centralised food system today. This takes us from exploring packaging's role in food distribution and processing to examine how these complex *packaged* food systems rely on the repetitive and stable flows of packaging as raw materials. By shifting the focus to examine packaging's mobile life as raw material we draw attention to packaging as a site of continual transformation rather than stability. This then gets extended to problematize the stable and repetitive flows outlined in the first sections of this first chapter. Chapter 4 draws our attention to enduring, new and contested borderlines and regimes of (packaged food) mobility governance. These borders range from those on a regional or national level to those borders of the packaging itself which are consequential for many other forms of food mobility. The second part of this chapter then looks to the fluidity and vibrancy of packaging as a barrier as it encounters controversies relating to chemical and microbiological mobilities.

This first part then sets up the second part of the thesis looking primarily at *Packaged Food Consumption and Human Mobility*. This second part of the thesis directly addresses the opening provocation relating to the neglected study of mundane technologies in transport and travel research. In interrogating packaging as an "unusual suspect" of everyday transport and travel, chapter 5, then, starts to examine the extent to which advances in food and drink packaging may have shaped the wider everyday temporalities, spatial orders and patterning of mobility in the past and in the present. It does this by specifically looking at how the development of packaged food *to-go* has shaped the metabolism of cities. From the relatively immobile event of eating packaged breakfast or lunch at the workplace or work desk we can trace and tease out the

reverberations of these technologically mediated practices have on other times and spaces throughout the day. In this sense chapter 5 addresses the *indirect* implications of packaged food on patterns of daily mobility.

The final substantive chapter (chapter 6) will then explore packaging's "*direct*" influence on the meanings and practices of travel. Starting from a cultural-historical account of packaging's symbolic importance for air travel and as an element of the drive thru system we then move on to more closely explore the vibrancy and affective capacities of packaging as it is used on the go. In order to attend to these direct influences on bodily practices of human mobility we must firstly move away from understanding the passenger or traveller as a bounded sovereign individual but rather as an on-going assemblage of things, affects and emotions. In adopting this conceptual shift we can then more clearly illustrate how packaging and packaged food shape dynamic "human" times and spaces on the move. Attention is also paid to the absent presence of designers of packaging who accompany (and engineer) these travelling assemblages.

It is important, finally, to discuss the scope of the current research and empirical themes not addressed. As the next chapter will discuss in more detail the roads travelled with packaging in this research were constrained by a combination of time limits, lack of resources and/or the power dynamics involved in researching packaging and the food system more generally. This has meant some lines of enquiry have been cut off. For instance, while the first part of the thesis examines food and drink packaging in general the second part relates more specifically to packaged food and drink designed to be consumed on the go. This latter category of food and drink packaging encompasses both fast foods and pre-prepared foods and drinks such as pre-packaged sandwiches, salads, sushi; cereal, snack and chocolate bars; cans and bottles of drinks. What are not followed are those countless packaged foods that are not designed to-go but which might nonetheless be used on the go. Furthermore, little is said of the packaged foods that are used for other meals at home such as cereals for breakfast or ready-meals for evening meals. These types of packaged food and packaged food consumption have significant influences on mobility but are beyond the scope of this research.

Secondly, this research could have provided more detail on the implications of packaging innovation for shopping. Packaging, insomuch as it has improved food storage both at home and along the food chain, has radically re-configured shopping

patterns over the course of the last century (c.f. Cairns, 2005). Whereas once people shopped twice or thrice weekly it is now more common to shop weekly, although it seems to be becoming more popular (again) to shop a few times per week or even every day on the way home from work. This latter social practice, though, has been afforded by changes in the packaging of food – e.g. smaller portion sizes, advances in ready-meal packaging – as much as it has relied on longer opening hours or more densely clustered convenience stores. These aspects of packaging’s mobile life are only sparingly addressed in this research.

Thirdly, it could have been possible to build upon the literature on the (after)lives of packaging as waste. For instance, the classic McToxics campaign that successfully forced McDonalds to abandon the foamed polystyrene clamshell might be re-imagined as being partly the result of the visible immobilities of waste packaging, but it is also related to the mobilities of chlorofluorocarbons that were produced as a by-product from foamed polystyrene production and which damaged the ozone layer (Blumberg and Gottlieb, 1989; Castro, 1990). Here a series of concerns centred on the clamshell which forced McDonalds to change its packaging and thus dramatically re-configured the mobilities of packaging supply chains. Other mobile stories of waste packaging could be told of the transcontinental flows and fixities of rubbish (much of which is packaging) emanating from the coastlines and watersheds of the world which accumulate in various stages of decomposition within the Pacific Gyre, for example (Hohn, 2012). While largely invisible to the human eye, these phenomena nonetheless represent matters of concern and become the “stuff” of mobility politics.

More could be said also of the ways in which waste packaging is put to use. For example, plastic bags as bin bags, paper or paperboard as fire kindling or even plastic bottles as lights for slum dwellings (Zobel, 2013). These are all worthy paths of analysis and could usefully build upon the existing work on packaging and waste mobilities as reviewed in this introductory chapter. But these are stories that are beyond the scope of this particular research which focuses instead on mobilities associated with packaging production, consumption and distribution and its role in facilitating the production, consumption and distribution of food. These areas, after all, and as the previous sections have shown, have received much less attention in the social sciences than the (after)lives of waste packaging.

Fourth, this research does not address the hugely important role packaging plays in communication of both brand and product information. This is partly a consequence, again, of the work that has already investigated these issues as outlined in the last sections. Nevertheless, focusing on the branding and information on the surface of the packaging could be considered a series of communicative and imaginative mobilities that allow food manufacturers to speak directly to their customers without the need of human intermediaries. The package is, after all, a very important surface for very mobile brands and branding and works to transform a commodity into highly differentiated products that capture consumers (see also Lash and Lury, 2007).

Finally, it is worth noting that while the primary focus could be said to be on packaging, packaged food systems and eating practices in Britain, the analysis is nonetheless connected, partially at least, to the “global” or other locales around the world as will be seen throughout the analysis. Nevertheless, a greater emphasis could have been placed on cross-cultural comparisons and differences between nation states.

Despite these omissions the current research advances our understanding of travel and of mobility more generally. In so doing it contributes to debates over technology and travel within transport studies and transport geography whilst also building upon the “mobilities turn” in the social sciences. This thesis also adds to our understanding of the mobilities of food production and consumption. Existing literature on food mobilities and other studies looking at the mundane objects of travel tend to focus more on the symbolic and cultural aspects of food consumption and the material culture of travel and tourism. Little is said of how these sorts of technologies, firstly, come packaged, and secondly how they literally script patterns and practices of mobility. They also fail to adequately link up the mobilities of production which, after all, enable these practices of mobile consumption. By shifting the focus to the packaging and by foregrounding the entangled *mobilities* of food production-consumption, this research also contributes to the vast literatures on food networks.

The current research also provides novel insights into the uses and purposes of food and drink packaging, insights which might contribute to our understanding and debate over the various controversies of packaging such as those relating to its disposal or re-use. As the last section pointed out packaging (as waste) constitutes a “matter of concern” (Latour, 2005); an environmentally unsustainable and socially problematic technology that has received a good deal of attention already within the social sciences.

The negative perceptions surrounding packaging has motivated the packaging industry to produce documents that highlight the role of packaging in society as discussed. In this industry literature it is argued that only by addressing the role of packaging in society can we begin to think clearly about issues of waste packaging. This research, in some ways, shares this view but brings a much more sophisticated understanding of what is actually meant by society and its relationships with packaging technologies.

These are some of the main contributions of this research which will be discussed in greater detail in the final chapter. But this thesis also draws upon innovative methodological approaches that permit the flexibility needed to reveal a wide range of mobilities that might remain hidden if one was to focus on only one part of food and drink packaging's journey. The next chapter will now turn to detail how packaging was followed and how what has been termed a "fractional" mode of knowing and writing was produced.

Chapter 2. Methods

2.1 Romantic and baroque knowledge practices

This methodological chapter will present an account of how a “fractional” way of knowing and writing was produced in this research – a way of knowing and writing that allows us to accept or leaves open the possibility of multiplicity in complex and mobile objects whilst simultaneously accepting their concrete singularities and stabilities. Put differently, a fractional way of knowing and writing can cope with understanding packaging as immutable and mobile, forming part of “larger” food systems that extend into mobility systems, whilst also allowing us to understand packaging as mobile in the sense of being mutable and continuously in flux, part of on-going assemblages of food, mobile humans and other mobile bodies. But before detailing how a fractional mode of knowing and writing was produced it is necessary, firstly, to outline the differences between “romantic” and “baroque” knowledge practices.

Packaging can, in one sense, be thought of as a pre-determined object, existing “out there” independent of our knowledge of it and forming part of a larger food system. John Law (Law, 2004b) and philosopher Chunglin Kwa (2002), term these as forming part of “romantic knowledge practices”. The methodological principles of romantic complexity, according to Kwa, look up, “all the way up to the world of Platonic forms – and recognize collections of individuals as higher-order individuals”. Romantic complexity, in other words, is about seeing things as a whole and incorporating more and more elements that were previously separate and making them similar in kind. But as Law (2004b) has also noted romantic knowledge practices are about centring. They are about looking up in order to look down. Such a romantic understanding informs the work on large technical systems that aim to incorporate more elements into larger systems making them similar in kind and centring them as overarching systems built by system builders. The injunction to look up implies always attempting to incorporate the next step in complexity. Analysts working under a romantic frame are, therefore, always looking beyond the system, to its “environment”, to connect more and more elements, to work on a larger and larger scale in order to obtain a more “holistic” perspective. The large technical systems literature, then, despite correctly accounting for the growth of systems as the progressive connection of social and technical elements into seamless webs, envisions an environment outside of the “system boundaries” which may or may

not interact with the system depending on whether that system is open or closed. The same goes for those providing analyses of sociotechnical path-dependency or from the multi-levelled perspective. Systems, as described in these accounts, are also always seen as being engulfed by an “environment” and the methodological imperative is to connect more elements making them similar in kind and part of a larger system. This is the challenge of romantic understandings of complexity which always seem to seek a more holistic picture. It is also a limit of this research which also, admittedly, looks up at times to connect elements, such as packaging, within larger interconnected food and mobility systems.

It is possible to think ANT romantically too. Indeed, critiques have argued that the approach constitutes a form of functional managerialism, providing heroic accounts of large and homogeneous sociotechnical systems, a network of networks connecting and translating more and more elements from the outside and thus spanning a larger and larger area (Law and Hassard, 1999). A truly relational approach, however, would not posit the existence of complex environments outside of the system nor would they be concerned with looking up to find these environments. ANT, at least in its less romantic versions, does not assume the existence of bigger, overarching environments seeing size as the capacity of any given actor to connect and be associated with many other elements at many places and at many times and not some pre-given scale imposed beforehand.

In paying more attention to the local summing up of associations (Murdoch, 1997), less romantically inspired ANT accounts look down at the inherent complexity within actions, objects or events. As Kwa, quoting Leibniz, says:

Every portion of matter may be conceived as a garden full of plants, and as a pond full of fish. But every branch of each plant, every member of each animal and every drop of liquid parts is itself likewise a similar garden or pond (Kwa, 2002:26).

Kwa terms the methodological principle of looking down a “baroque complexity” or a “baroque knowledge practice”. This implies looking down at the detail and concrete specificity and not up at the broader picture. This mode of inquiry finds the large or global from within and as small and non-coherent. A brief example can be found in Law’s (2004b) analysis of the different ways of thinking about the (capabilities of the) Russian enemy during the Cold War, when British military and government were weighing up the decisions over whether to invest in a new military aircraft or not. A romantic view of the Russians would assume these to be a large-scale, nuclear power

with more or less hostile intentions that formed the environment for military decisions in the late 1950s. However, a baroque mode of inquiry traces how it is that the Russians manifest themselves. Law takes us to the Operational Requirements branch of the RAF, to their discussions with intelligence over the future of aircraft, warfare and so on, and to their expectations that the Russians would be doing something similar. In its attention to detail and specificity, baroque knowledge practices lead us in many surprising directions.

Romantic sensibilities are clearly evident in the literatures on food and drink packaging as discussed in section 1.5. Here industry literature is abound with external factors forming the “environment” within which packaging is placed. The social histories of packaging also aim to connect elements and situate packaging as an element within coherent wholes or overarching narratives. Strands of mobilities research are also guilty of forming romantic, overarching narratives, connecting aspects of transport and travel with wider social contexts, for example. This thesis, by aiming to highlight the profound influences that small elements like food and drink packaging have had on large mobility systems in the past and present, to a certain extent, and as hinted already, also achieves this form of storytelling by connecting packaging developments with “larger” social practices and “large” mobility systems. In other words it looks up to connect these small technologies to much larger food systems and with much larger mobility systems. Such an approach, though, is appropriate for addressing the provocations outlined in the first working paper of the Technologies and Travel research programme.

And yet, at the same time, and in some chapters more than others, this research also looks down at the concrete specificities, details and local manifestations of packaging to reveal greater multiplicity, molecular mobilities and the vibrancy of food and drink packaging. These mobilities are not only associated with the physical movement of packaged food, people or packaging from A to B across Euclidean space, but may also involve movement in other “topological spaces”; movements that work to de-centre objects and render them mutable, fluid, multiple and part of on-going and indeterminate assemblages. Such ways of thinking of objects are arguably only possible through a baroque mode of inquiry. A rhizomatic rather than arborescent way of thinking, to use Deleuze and Guattari’s terms (2004).

This is not the place to argue whether one way of thinking is better than the other, but each form of knowledge practice brings with it its own advantages and are good for thinking about mobilities in different ways. Romantic sensibilities are good at thinking about patterns of mobility at scale and how these are shaped by technologies. Baroque sensibilities, conversely, are better at picking up molecular mobility, fluidity and multiplicity as they relate to on-going, indeterminate assemblages.

The methodology used for this research incorporates elements of both knowledge practices. Combining and switching between both romantic and baroque accounts and, crucially, examining the interferences between both. In so doing it grasps different packaging mobilities – as movement in Euclidean space and time and as molecular mobilities. As a result baroque knowledge practices are important and deployed in this research to build upon the romantic elements of this research when they begin to hit their limits of explanatory possibility. By opening up such complexities and fluidities we can usefully move away from thinking of objects like packaging in terms of their ontological stability and singularity or, indeed, how these supposedly singular entities or categories are only differentiated through interpretation. We can begin, instead, to explore their complex, connected and interdependent mobilities, their multiplicities and the possibilities that things or events might be otherwise and are always flowing, unfinished and indeterminate. Baroque modes of enquiry are also deployed to counteract the very romantic versions of events and objects that are (re) produced within industry literatures on packaging and in studies of transport and travel.

Nevertheless, shifting between and combining romantic and baroque accounts poses significant methodological problems. Most notably, how to deal with the difficulties and contradictory logics brought about by “knowing” objects that are simultaneously singular and multiple, stable and yet constantly changing and mobile whilst also immobile. How do we avoid producing incoherent accounts?

2.2 Ontological politics and fractional knowing

John Law (2004a) has offered suggestions for overcoming the problems of knowing objects that are multiple and single, stable and changing, mobile and immobile. The first step is to recognise the “ontological politics” implicated in all methods. The term “ontological politics” was first coined by Ann-Marie Mol (1999) and it describes how methods not only describe phenomena but also go some way to enacting them or making them real. Consequently, if there are multiple ways of

describing an object these cannot be reduced to mere differences in interpretation but rather enact multiple *realities*.

Dominant Euro-American methods and metaphysics have tended to enact singular, stable objects that exist out-there independent of our knowledge of them. They erase, in other words, any multiplicity or disturbance that does not fit this singular and stable reality. However, when objects are looked at *in practice* fluidities, multiplicities (and absent presences) proliferate. Take the medical condition atherosclerosis, for example. This object gets enacted or crafted at five different locales and in five different ways in the hospital (Mol, 2003; Law, 2004a). First as a clinical diagnosis where the doctor interacts with patient and deduces the condition based on the responses given. Atherosclerosis then gets produced at the pathology department, the radiography department, through a method of describing/tracing atherosclerosis involving ultrasound called Duplex and, finally, at the operating theatre. Each of these methods are describing the same condition and yet at the same time are enacting something very different. Methods may, for example, contradict each other or they may be incompatible. Yet these inconsistencies are effaced or explained away so as to perform the singular stable realities upon which modern medicine is based.

The strategies that are used to gel together multiplicity into singularities are themselves interesting topics and are studied, accordingly, in this research. Translation is one method of doing this. Rationalisation is another as is maintaining a single narrative about a thing, like packaging, even though *in practice* these objects are multiple. These strategies, which are also practices that craft packaging, are encountered during the course of this research and are especially deployed by those in academia, government and industry who research packaging. For instance, many of the methods used by packaging and food industries, marketing professionals and government departments reproduce these strategies when they talk of a single object – packaging. This drive for coherence and singularity helps to stabilise packaging, it helps enact it as a singular entity and script its performances and those of others who are connected with it (e.g. food or mobile users). This constitutes one way of performing ontological politics; by using strategies to efface the multiplicities and uncertainties of fundamentally de-centred objects.

But ontological politics can be performed the other way too. Other actors can actively try to multiply packaging, to make it, or aspects of it, controversial, uncertain,

vibrant and ambiguous. They can try also to make visible the absences that hold packaging systems together. For example, environmental campaigns, some government departments, and certain activists may all try in different ways to “open out the possibility that realities might be otherwise” (Law, 2004a:66). These varied concerns cannot be reduced to mere differences in interpretation either. Crucially these differences are enacted, they are made real.

In the case of packaging it makes sense for certain actors (e.g. industry and government) not to want to know or think about how packaging or, indeed, the food system might be otherwise, uncertain or multiple. That is, their ontological politics are (unwittingly) directed at making things absent when they are present and in creating consistent and coherent stories which are aligned with their economic (or other) interests that require packaging to be a safe, single, stable and indispensable commodity. This sort of ontological politics can be seen if we turn back, for a moment, to what was said in section 1.5 in the introduction where it was suggested that existing literature on packaging and society tends to treat packaging at a categorical level. Packaging just *is* packaging for many researchers. Treating packaging in this way is necessary, so it is believed, for the food system to function which, in turn, is deemed necessary for social systems to function. This type of research is too often set by agendas which try to render problematic the other realities of packaging that are made visible by environmental campaigns, certain government departments, some activists or so-called “rogue” scientists. In many instances these other voices not only reflect object fluidity but enact new or multiple realities. However, when the food industry or packaging technology departments describe packaging they are often effacing the multiplicities which are partially connected to these singularities. As Latour (2005) would argue, it is in industry and many government departments’ interests to talk in terms of matters of fact and not to open up packaging as a matter of concern.

There are, therefore, at least two forms of ontological politics that can be enacted: one that closes down and another that opens up. There are, no doubt, good reasons to engage in both forms of ontological politics depending on the situation, but being aware of the ontological politics of all research is crucial. Despite its importance most studies on packaging outlined in section 1.5 are not aware of the ontological politics in which they are implicated. These studies need to be more reflexive about the ways in which they enact realities and how food and drink packaging can get enacted differently at different times and places whilst still retaining a coherence and

singularity. Needless to say it is necessary for this study not to fall into the same trap and to recognise from the outset the ontological politics that this project might enact.

By recognising the ontological politics of method we are at once forced to abandon any assumptions of a singular and stable reality, independent and prior to the observer, with definite shape and form, and which can be accurately described by a method. Such are the assumptions of what Law (2004a; Law, 2002) calls the dominant modernist Euro-American methodologies and metaphysics. But we must not accept the fragmented, pluralist worlds of epistemological and political relativism offered by postmodernism either. While objects like packaging can be multiple it is quite clear that they are often (mostly?) enacted (temporarily and romantically) as a coherent objects and part of larger wholes.

However, and in returning to the question posed at the end of the last section, how do we avoid producing incoherent accounts of packaging and packaging mobilities? Law argues that that we need to start knowing, thinking and writing *fractionally* in order to attend to the contradictions posited above. The contradictory logics of the world are instances of *fractional coherence*. Fractals, as Law (2002) points out, are “lines in mathematics that occupy more than one dimension but less than two.” He adds that:

...fractal coherences are coherences that cannot be reduced to a single dimension. But neither do they exist in two or three separate and independent dimensions. In this way of thinking, a subject or an object is one that balances between plurality and singularity. *It is more than one, but less than many* (Law, 2002:3, emphasis in original).

We can therefore say that objects can be singular and stable but that this is only contingent and often precarious and it is held together by vast apparatuses and huge efforts which seek to hide the multiplicities inherent in objects. So there is a degree of coherence and coordination of objects and of the world more generally, but only to a degree or only to differing degrees. It is best instead to use the term fractional coherence. Thinking, knowing and writing fractionally provides a way of dealing with simultaneous singularity and multiplicity, stability and change and helps move beyond the perverse dichotomy of dominant Euro-American methodologies on the one hand or postmodernism on the other. Fractional ways of thinking, knowing and writing allow us to draw things together without centring them (Law, 2004a) and help us enact objects like packaging and its mobilities as more than one and less than many. It constitutes a way of knowing, thinking and writing that accepts the inherent multiplicities and

uncertainties of things whilst also acknowledging their singularity and coherence; an approach that allows for both romantic and baroque visions to be articulated. Thinking, knowing and writing about objects in this way also allows us to probe deeper into the multiple mobile relations that intersect with, converge on and get produced by packaging.

But how can we start to think and write *fractionally*? How can we be open to multiplicity and change whilst also recognising singularity and stability? One way to do this, as hinted above, is to focus on the situated *practices* where such differences both get enacted and, at times, effaced (e.g. Mol, 2003; see also Law, 2004a chapter 3). Indeed, Mol (2003) goes as far as calling for a “praxiography” instead of ethnography as a way of capturing the complexities and multiplicities of objects. These multiplicities, generated within fluid assemblages and fluid technologies, can be found by attending to the practices that craft objects as such. In theory objects are stable and singular. However, often *in practice* they become unstable, vibrant, fluid and multiple. But through the creation of immutable mobiles and through processes such as translation and rationalisation these multiplicities get gelled together into recognisable and stable singularities. Paying attention to the situated specificities and details of how objects get crafted *in practice* thus offers one way of thinking and writing fractionally. It also, incidentally, provides a way of combining romantic accounts of packaging and mobility (which are real and get enacted as such) and baroque accounts: a way of knowing both how local differences may get enacted as coherent wholes and how coherent wholes may get fragmented into local differences.

Focusing on how objects are crafted in practice and adopting modes of fractional thinking and writing therefore constitutes one way of overcoming the contradictions that exist when objects are fluid; both singular and multiple, stable and changing, safe and unsafe, mobile and immobile. It allows us to overcome the contradictions that arise when networks or systems seemingly fail and yet seem to continue functioning, albeit differently; when objects are constantly moving and yet seemingly stay the same. It also allows us to trace the networked relations that are made absent but which are simultaneously present.

2.3 Following things

The research design and methods of data collection are inspired by Appadurai’s (1986) call to “follow the thing”; a methodological approach that permits the sort of

fractional knowing that was sought after. The object(s) followed in this case are different types of food and drink packaging. In the introduction of Appadurai's seminal edited collection entitled *The Social Life of Things* it is argued that we must "follow the things themselves, for their meanings are inscribed in their forms, their uses, their trajectories." (1986:5). A key part of Appadurai's argument was that the paths and diversions of commodities (broadly defined) create value and that this is always a politically mediated process. This return to the "things themselves" was seen as a response to the tendency of anthropological research up until then to "excessively sociologise transactions in things" (Appadurai, 1986:5). In the same edited collection Igor Kopytoff (1986) introduced the notion of a cultural biography of things. Kopytoff's processual model of how things enter in and out of the commodity phase is useful in highlighting the contingency of what might be defined a commodity and in this way relates to the argument made by Appadurai over the ways in which paths and diversions shape value.

Around the same time Bruno Latour was adopting a similar approach when following scientists, engineers and their multiple technical objects and inscriptions in the creation of actor-networks (Latour, 1987). The parallels with Appadurai's call to correct the dominant approaches of anthropology which looked at social life rather than the social life of things are apposite, especially since Latour (2005) also talks of the excessive sociologising that has hitherto been a central theme running through the discipline he calls the 'sociology of the social'.

Studies that follow things might be thought of as multi-sited ethnographies (Marcus, 1995). Marcus distinguishes multi-sited ethnographies from conventional ethnographic research designs in that the former defines for itself an object of study that circulates in diffuse time-space. Following things has also been marked, more recently, as an exemplary "mobile method" (Büscher and Urry, 2009; Büscher et al., 2011).

Foundational mobile methods texts (Büscher and Urry, 2009; Büscher et al., 2011) refer to the work of Scott Lash and Celia Lury (2007) who, following Appadurai and Kopytoff, followed seven different cultural objects of the global culture industries. Their aim was to explore a new *global* cultural industry in terms of a mediation of things, instead of analysing classical cultural industries mediated through representations. They followed a wide range of branded objects (from objects connected to Nike, Swatch, the Wallace and Gromit and Toy Story animation franchises amongst

others) and by following they mean simply “finding out as much about that thing as possible” (Lash and Lury, 2007:20).

However, despite the importance granted to following things as a mobile method there has, as yet, been relatively little work that explicitly identifies with the field of mobilities that takes the object itself as the primary focus and organising principle for research. Most work that can be firmly placed within the field of mobilities research has tended to emphasise “mobile ethnographies” that involve the observation of and participation with *people* while moving (Laurier et al., 2008; Jirón, 2011) with some researchers recording these experiences on video (e.g. Büscher, 2006; Spinney, 2011). Mobile ethnographic methods have also included more straightforward ethnographies of places of in-between movements or places of flow such as airports (Kellerman, 2008), border spaces (Burrell, 2008) and even cafes and service stations (Normark, 2006). These mobile ethnographies often highlight the complex materialities associated with travel or mobility nodes but they do not follow objects themselves or take the object itself as the primary focus and organising principle of research.

A significant amount of published work within the field of human geography has followed different types of food, although, as noted, the extent to which these studies identify explicitly with the field of mobilities research varies considerably. Studies that follow food have detailed the socio-political relations and biographies of products as diverse as: fish (Mansfield, 2003a; Mansfield, 2003b); French beans and broccoli (Frieburg, 2005; Fisher and Benson, 2005); tortillas (Lind and Barham, 2004); Papaya (Cook, 2004); and hot pepper sauce (Cook and Harrison, 2007). Within the social sciences more broadly authors have chosen to follow foods like the tomato (Harvey et al., 2002); sugar (Mintz, 1985); Christmas Pudding (O’Connor, 2009). In addition to these studies that follow food, and as mentioned in the introductory chapter, there is a growing body of work starting to follow waste and, in some cases, waste packaging.

The body of work that follows waste or “things of rubbish value” highlight the opportunities to make more use of such a flexible method. First, there exist opportunities to follow things along many more paths. Gregson et al. (2010a), for example, have critiqued following studies for not taking into account the extended chains in the life of a commodity, which they remedy through their examination of the disassembly of ships and their conversion into different materials and products at the

end of their lives (see also Gregson and Crang, 2010). Second, following studies have been restricted in what it is they follow. Not only have following studies been dominated, as Crewe (2000) points out, by ‘food, flowers, fruit and fashion’ but even within the work that focuses on these commodities there is often a neglect of the multiple components that comprise these objects. For instance, packaging is largely neglected in those studies that follow foods and yet, as argued in the introductory chapter, it is crucial in enabling the movement of food and for (re)configuring their many relations across multiple sites. The multi-sited autoethnography of paper, glass and beans by journalist Leah Cohen (Cohen, 1997) constitutes an important exception. Still, she pays little attention to how packaging moves and is implicated in the movement of others. Furthermore, and as with many studies that have followed food, Cohen’s analysis is more concerned with “uncovering the fetish” of these products, and attempts to ground their origins at their sites of production and to foreground the politics of labour exploitation.

Following things in order to de-fetishize commodities thus constitutes one way of following. Yet in attempting to provide ‘deeper’ accounts of commodity biographies by grounding their origins in sites of production these approaches can also work to essentialise the places, cultures and localities of production (Castree, 2001). Moreover, grounding investigations in multiple yet *fixed* and *bounded* sites becomes less useful if what matters most are the mobilities and flows that enact these places/spaces, objects, cultural groups, identities.

There is, thirdly, a tendency inherent within such modes of following to retain a social or subject-centred view of objects, with meaning inscribed onto what appear largely passive, discrete and taken for granted objects and commodities with origins traced back to similarly discrete and taken for granted places of production. Fourth, ‘demystifying objects’, as Bennett (2010) puts it, also may engender a “hermeneutics of suspicion” by presuming a human agency projected onto things. Such suspicion, so Bennett argues, implies that the researcher can know or at least suspect manipulation and coercion embedded and embodied within objects in advance of researching them.

A final limitation of uncovering the fetish or demystifying commodities is the apparent inability of such approaches to bring forth new positive alternative formulations. The tendency is to critique and expose, not to generate alternatives. As Bennett states the point is “that we need both critique and positive formulations of

alternatives, alternatives that will themselves become the objects of later critique and reform.” (Bennett, 2010:xv). What Bennett, and in my view Latour also (see Latour, 2005 final chapter), argue for is a critical proximity instead of a critical distance as a productive way forward. Proximity that includes being caught up in the impersonal affect of materiality, to “suspend for a moment suspicion and adopt a more open-ended comportment” (Bennett, 2010 xv). In other words we must try to think beyond things as being already assembled and instead view them as unfinished and part of on-going assemblages. As Bennett remarks: “if we think we already know what is out there, we will almost surely miss much of it” (2010: xv).

There are examples of work that follows things and even that follows foods which does adopt a more open-ended comportment. For instance, geographers Ian Cook and Phil Crang have asked us “to get with” (rather than uncover) the fetish by moving from developing thicker and deeper accounts of more “authentic” commodity relations to focus instead on “the spatial settings and social itineraries that are established through their usage” (Cook and Crang, 1996:148). Cook and Harrison (2007) and Cook (Cook, 2004) have since ‘got with the fetish’ in the case of hot pepper sauce and papaya respectfully. Stassard and Whatmore (2003) have also shown us the performative, provisional and open-ended character of what they term the “metabolic mode of ordering” of alternative food networks. And Ingold (2007; 2010), drawing upon the process philosophies of Deleuze and Guattari, similarly recognises the power of a more open-ended style of following when reflecting on the methodological challenges of encountering material as “matter-flow”; that is, material in movement, flux or variation. As Deleuze and Guattari posit such “matter-flow can only be followed” (Deleuze and Guattari 2004: 451). Accordingly, Ingold asserts “a simple rule of thumb: to follow the materials” (Ingold, 2007:9).

These studies follow in a way that begins to emphasise sites and states of continual transformation and possibility rather than sites and states of ultimate stability. More open-ended modes of following things contrasts with traditional single-sited and bounded ethnographies, and dominant Euro-American methodologies more generally, which would have difficulty in understanding such emergent cultural formations produced through, across and in-between different locales. Further, they would struggle with tracing the complex relations across diffuse time and space that make such cultural formations fluid, processual and multiple. As such they permit a baroque type of knowledge practices or a rhizomatic form of storytelling.

Therefore, the de-mystifying or de-fetishizing approach to following things holds a number of limitations and can be blind to the movement (and mutability of) things themselves. In other words, there is not only an issue around what is followed but also how things are followed. Following things in order to de-mystify them may be taking too naïve and simplistic a view of what it “is” that they are following and how it gets produced. Following things in a more open-ended mode, by contrast, holds a number of advantages. It permits the type of fractional ways of knowing that were highlighted as important in the previous section. A more open-ended style of following, in veering away from seeing things as already assembled, singular and stable, also allows us to recognise the inherent multiplicity, fluidity, vibrancy and mutability of objects as they move. In other words, it is not enough to merely move with the object through physical space, but we must also follow in this more open-ended mode if we are to attend to some of the many complexities and mobilities of these objects.

That being said, and staying faithful to the principles of a fractional mode of knowing as advocated in the previous section, following, even in a more open-ended manner, can also help probe mobility as displacement through Euclidean coordinates and it can tell us something of who or what moves when and how. It can also help describe how object relations get translated, stabilised and locked-in to distributed networks. Just because we adopt a more open-ended comportment does not mean we cannot apprehend at the same time stable patterns of movement or use packaging as a probe to see the scripts built into technologies and how these help produce relatively ordered systems. Provided we are aware of the ontological politics involved in presenting these different accounts both forms of following can be achieved.

In sum, following things provides a flexible method which allows the researcher to connect and juxtapose different conceptual approaches in order to build a detailed and nuanced picture of the object(s) of enquiry. It can also take the researcher to surprising places in the process. However, this methodological flexibility is relative and highly dependent on the object(s) that one studies. The next section will examine the constraints of moving with packaging as they were experienced in this research.

2.3.1 Where to go, can I even get there and does it matter if I can't?

I will describe the challenges specific to each of the methods of data collection used in this research, and the strategies used to overcome them, in more detail in the following sections, but there were a number of more general challenges that

significantly shaped the research that merit discussion. Specifically, the twin effects of resource constraints (of time and money) and restrictions on gaining access to sites and knowledge went some way in dictating where I could go, what I could find out and what methods of data collection I could use.

The first challenge encountered when following food and drink packaging, then, was in trying to figure out where to go. Latour asks researchers to follow the things themselves wherever they lead and to “go slow, don’t jump and keep everything flat” (2005:190). But such approaches to following presume indefinite resources of time and money. It was not possible with the limited time set out in the research plan to explore every avenue and every one of packaging’s multiple relations. These issues are, of course, exacerbated by: the exploratory and open style of following adopted; by the dissolution or collapsing of dichotomies, such as scale, which can be used to delineate the boundaries of research; and by the desire to provide a broad picture of packaging’s mobile life.

Law and Mol (2002) admit that no single text can be everywhere. But if this is the case then we are confronted with the very important (and political) questions of where to go and when to stop. Other researchers deploying the method of following things have also worried not only of where to go but also over what exactly to follow and whether to attempt to delimit the study or not. Ian Cook, for example:

A good following story has a clear focus. Like a chicken. That never goes out of sight. But anything and everything that’s in and around it (throughout its conception, birth, life, death and travels) could become part of that story. But where exactly are the beginnings and ends of such a story? And where are the edges (Miller, 1997)? Do we want or need to delimit them? How ‘(un)disciplined’ should these geographies be? This kind of research can involve exciting but risky ventures. And it can do your head in. So many things that aren’t supposed to go together in theory come together in practice (Cook, 2006:657).

Ian Cook goes on to highlight the limited examination of the consumption of the food he has followed and those of others who have followed food. I certainly encountered similar anxieties over where to go and what exactly to follow. A single text cannot be everywhere as Law and Mol (2002) remind us. Decisions needed to be made at every turn during the course of this research, with some aspects of the mobile life of packaging being included while others were excluded. Furthermore, these decisions matter because they enact packaging and its mobile relations differently. In other words they perform an ontological politics.

I found the work of Alvesson (2011) useful in dealing with these issues and anxieties of where to go. Alvesson developed a mode of analysis that he calls “reflexive pragmatism”. Pragmatism involves postponing fruitful avenues for investigation in order to use the material already attained for the best possible purposes given that time, space, patience and resources are not unlimited. Reflexivity is also required given that choosing certain paths or avenues of investigation over others has important ramifications; it implicates the researcher and the research in an ontological politics that need to be foregrounded and reflected upon.

However, the investigation of packaging’s mobile relations was restricted in more ways than simply limits to time and money. Additional restrictions were encountered through the uneven power relations between myself and those elites who governed access to certain sites and information. Soon into the data collection phase it became apparent that access to certain key sites would be difficult and so being co-present with packaging as it moved across certain settings would be impossible. For instance, moving with packaging from raw material to the shop floor would have meant criss-crossing a number of sensitive sites, from paper mills and oil refineries to food processing factories through to the “back stage” of the supermarket or shop. Initial attempts at negotiating access with those who had the power to permit access to these sensitive sites proved resource intensive and ultimately unsuccessful. And with the very real possibility of further negotiations failing again, the research tactics were changed early on.

Such restrictions might be thought of as constituting, to use the words of Tim Cresswell (2010), an uneven politics of mobility between the researcher and that which was being researched. Furthermore, these restrictions in access and the impossibility of a frictionless journey with packaging across all of these settings significantly changed the design of the research. Initially, it was proposed that I would move with packaging as it entered into and out of different contexts and relations of production, distribution and consumption through a type of multi-sited ethnography that would closely resemble those advocated by Marcus (1995). Not all sites were to be visited, that would have been unpractical, but at the very least I wanted to observe packaging at other sites beyond those moments of packaging and packaged food consumption and use. It was anticipated that being co-present with packaging as it moved would enable me to write “thick descriptions” of packaging relations in different settings, allowing me to apprehend the multiple and changing relations that both transformed the packaging but

which also performed and transformed the spaces and associated relations it came into contact with (e.g. factories, food, distribution chains, regional supply centres, design studios and packaging testing laboratories). Being co-present would have enabled me to immerse myself into these situations and would allow me to detail the connections with multiple others and to get a sense of the wide range of mobilities within which packaging is entangled and helps shape.

Further, it was thought that being co-present would have added validity to the accounts being presented. As Geertz comments on the advantages of ethnography:

The ability of anthropologists to get us to take what they say seriously has less to do with either a factual look or an air of conceptual elegance than it has with their capacity to convince us that what they say is a result of their having actually penetrated (or, if you prefer, been penetrated by) another form of life, of having, one way or another, truly 'been there' (Geertz, 2004:238).

The particular type of knowledge produced through co-presence has been highlighted as important by technoscience scholar Donna Haraway (1988) too. Haraway has argued for an embodied and situated mode of knowledge production. She seeks a position in between a disembodied and disempowering objective view from nowhere and "a kind of epistemological electroshock therapy" that "lays us out on the table [negotiating table] with multiple personality disorder" (Haraway, 1988: 578). Her alternative is a specific and particular type of embodied vision made possible by the always already partial and unfinished knowing subject. Its unfinishedness being precisely what makes possible the connections that allow us to see, caringly, from another's point of view. This is the type of objectivity advocated by Haraway.

Such epistemological positioning clearly resonates with the baroque knowledge practices detailed earlier in the chapter. Especially when Haraway notes that this type of embodied vision or partial perspective should not be "an allegory of infinite mobility and interchangeability but of elaborate specificity and difference" (Haraway, 1988:582). But crucially such ways of knowing, according to Haraway, must be embodied and made possible by partial and unfinished knowing subjects. Yet this is made more difficult when the researcher is not co-present.

I used instead desk-based research methods to follow packaging as an alternative to co-present thick descriptions of packaging on the move. At first glance, desk-based documentary research might seem inferior to co-present "mobile ethnographic" modes of following. How, for instance, can one know and write caringly and of specificity and

difference beyond co-present ethnography? How to develop a sensitivity to the impersonal non-human forces operating inside and outside of bodies when the researcher is not there (Bennett, 2010)? And while desk-based research certainly forms part of multi-sited ethnographies, they are usually an added extra to the embodied presence and thick descriptions of the specificities and details of the situation. However, there are a number of points worth discussing here.

Firstly, it is worth mentioning that writing about a pervasive and mundane technology inevitably brings into the fold one's own feelings, affects and experiences of the object under investigation. Reflecting upon the feelings, experiences and heightened awareness of the object(s) that get developed through the course of research might be considered forms of autoethnography or an "autoethnographic sensibility" (Butz and Besio, 2009). But these feelings also resonate with the sorts of embodied and affective knowledges advocated by Bennett, Haraway and others. In researching packaging and packaging on the move I found myself caringly being drawn to any mention of packaging in the media or any number of mundane encounters with these objects. By following, then, I was not only following in the sense of tracking the circulations of packaging across the globe but, as Bennett (2010) notes, I was becoming aware of the impersonal nonhuman forces operating outside and inside of my body. While I have not described these experiences in the research, my changing positionality and care directed towards packaging was useful for the interviews. Those who worked with packaging tended to share an enthusiasm for packaging. Thus in the interview situation I found myself passionately discussing aspects of packaging with experts which, at times, helped provide the specificity and detail I looked for.

Secondly, as Merriman (2012; 2014) points out, it is not obvious that being co-present with packaging as it moves through different sites would have provided a more "authentic" or better description of its mobile life. Indeed, underlying the popular "ride along" and video ethnographic mobile methods agenda, according to Merriman, is an implicit suggestion that "being there" is tantamount to grasping a fuller or more authentic description of the mobilities of people. Consequently, co-present "mobile ethnographies" have gained a privileged place in the field of mobilities studies. Yet such methods tend to privilege mobility and deal poorly with moments of stasis or pause. Furthermore, many excellent accounts of mobility in the humanities have been created through methods other than those which rely on co-presence while moving. As Merriman argues, a wide range of methods such as desk-based research, content

analysis and historical analysis can be just as important in discussions of mobile experiences and practices. The same could be said for providing accounts of moving objects. Co-present multi-sited ethnographies, therefore, do not have to be the only method used to follow things. Thirdly, and as Merriman also points out, co-present ethnographies might not allow the researcher to excavate the rationales behind policies, infrastructural regimes or regulatory mechanisms (2012:15). If these were to be included as a way of contextualising co-present ethnographic descriptions they would require using similar methods as those used in this research.

A fourth and very practical point relating to the research design adopted here is that desk-based research can, in certain respects, offer a great deal more flexibility and ease of mobility, albeit virtually and imaginatively, with the object than co-present observation. At a very practical level these methods can place less strain on the limited resources of time and money than co-present ethnographies that either tends to fix researchers at bounded sites for extended periods or constrain them to certain routes. Therefore, I could “visit” more sites than if I had used co-present ethnographic methods.

Accordingly, desk-based documentary research was the main method of data collection used to follow food and drink packaging. These desk-based methods, however, were complimented with fourteen “expert” interviews with a range of people who designed, regulated and worked with packaging. Expert interviews were included in the research design to capture expert perspectives which could then be added or indeed compared with the achieved documentary data. One aim of the research design was to look for tensions and inconsistencies in the data, to generate the sorts of fractional knowledge and multiplicities of packaging that I wanted to follow, and the expert interviews helped achieved these aims. A further rationale behind using expert interviews to compliment the desk-based research methods was to pin point the techniques by which multiplicities became gelled into singularities, which was only alluded to in some of the documents analysed. This could have, of course, been attained through a more narrowly focused co-present set of multi-sited ethnographies concentrating on thick descriptions of packaging as it gets enacted in practice, but adopting such resource intensive methods would have meant fewer accounts of packaging’s mobile life would have been provided. Three focus groups were also included to capture consumer perspectives of packaging and again complemented documents that specifically talked of the use and demand for packaging and packaged foods. It is important to stress at this stage, though, the balance of the research design.

Desk-based methods constituted the first and most important method of data collection with expert interviews and focus groups being used to compliment this data.

It is important to also acknowledge that despite the apparent methodological advantages stated above, there is still a danger that the research lacks the specificity and detail required for the baroque mode of knowing that I had wanted to pursue and this is a limitation that must be highlighted from the outset. Breadth has been achieved at the expense perhaps of depth. Consideration must give given also as to whether this study might still be an ethnographic investigation. It could be argued that insomuch as I was not co-present with packaging over time as it moved that this research design constitutes more of a multiple-case study design rather than a multi-sited mobile ethnographic study. But the term multiple case study is perhaps not appropriate either. According to Yin (2003) a key distinction between ethnography and (multiple) case studies lie in the fact that the latter rely heavily (or more heavily) on theory and previous literature that helps shape the key questions, purpose, main units of analysis and the logic underpinning the analysis. It can be said that this research is compatible with Yin's definition of a (multiple) case study design given the extent to which this study was shaped by the theoretical commitments developed in the field of STS and by debates within mobilities studies. However, while these literatures and theories certainly gave shape to the project they did not determine it in any way. There was always an exploratory spirit going forward and in this way the research resembles the adventures encountered through ethnography. For example, just as when in the course of ethnographic field work an observation or event might yield a fruitful avenue for further investigation, so too did encounters with documents and interview material, at times, open up new avenues for research.

Yin also argues that a large amount of prior desk-research is crucial to the successful implementation of any case study work given that the case must be bounded by unit of analysis (see Yin, 2003 p. 26 on this point). In this research on the mobile life of packaging a large amount of prior research went into selecting the unit of analysis (packaging) and in beginning to define possible research boundaries. As set out in the introductory chapter, for example, the justification for not looking at some aspects of packaging's mobile life – most notably packaging as waste, as recycled raw materials and as a platform for marketing – was partly a result of preliminary reviews of the growing body of literature examining these topics already. Nevertheless, and despite this early scoping of the project, there was still much to be explored, especially when

the objects being followed are understood as being multiple, fluid and held together by numerous absent present relations.

To summarise briefly, there remain powerful forces that can restrict where one goes, how to get there and what can be found out. Arguably, all research is shaped within these conditions of power and findings are coloured accordingly. But when following things that are distributed across multiple and highly regulated spaces the problem of access seems to become more acute as the number of sites and thus potential instances of resistance get multiplied. Nonetheless, there continue to exist opportunities to retain a degree of flexibility, freedom and mobility when following things like packaging, despite these restrictions. And while the accounts generated might differ from co-present ethnographies the data is no less valid. The following section will now outline the challenges specific to desk-based documentary analysis before doing the same for each of the other complementary methods of data collection used when following food and drink packaging in this research. Additional aspects of positionality in relation to each method, as well as the practices, logistics and reasoning for choosing each will also be discussed.

2.4 Using Documents

The main method of data collection used in this research was a review of documents and texts in the university library and on the internet. Consequently, the use of documents constituted a fundamental part of this research both guiding preliminary research questions and then refining them as the research progressed. These documents ranged from academic texts on the food system or technical texts on packaging technology to social histories of the food system and contemporary media articles on certain events through to policy documents on packaging and packaging trade association online magazines and websites.

In order to identify relevant documents I relied very much on what previous authors who have followed things suggest. In the first instance this involves finding out as much as you can about whatever it is that you are following (Lash and Lury, 2007), or, to quote Harvey et al. (2002) “to follow one’s nose”. Similarly, Latour (1987; 2005), and also Ian Cook (2006), talk of following the connections wherever they lead and so I proceeded to follow connections from one document to another. This would take me back to the past and around the world, building up an archival record of cases on various aspects of packaging as I went. It is worth mentioning, though, that these

journeys were tempered by the reflexive pragmatism mentioned in the previous section. This meant core areas of concern were identified early on, forming the basis for the four substantive chapters that follow. Therefore, paths of research narrowed as the texts that only loosely related to these core concerns were not followed. So, while these processes of identifying and selecting texts as part of desk-based research may, at first, have seemed far from systematic and even somewhat chaotic, they gained coherence over time through their ability to speak to the core research concerns over packaging and its relations to mobilities.

I treated each document as performative in its own way. However, while no one document was privileged over another, as each text was understood to construct and assemble its own realities, it was clear that some were more powerful than others. Some documents examined as part of this research constituted immutable mobiles that played a part in stabilising and fixing object relations. The most powerful documents, in terms of their performativity, were those that were connected to and underpinned by vast calculative or bureaucratic apparatuses. These included technical documents on the science and technology of packaging, policy recommendations on aspects of packaging and marketing reports of consumption and use. Moreover, while these texts often claimed to simply state “facts” it was apparent from further research that these facts were carefully assembled in order to create certain kinds of packaging realities or to stabilise particular sets of relations. They were, in other words, working as immutable mobiles and were deeply implicated in an ontological politics.

Documents were also used to examine the histories of packaging (and its associated mobilities). These can be divided into academic texts on various aspects of the history of food systems and contemporary media articles encountered in online archives that relate specifically to key events of interest for this research. As mentioned in the introductory chapter technologies, materials and objects have trajectories, they are conditioned by historical circumstances and become path-dependent. As a result history matters in trying to make sense of packaging relations today and it matters for articulating a nuanced politics of mobility (Cresswell, 2010). It is important to go back and see how relations emerged, were experienced, stabilised and/or changed historically and this requires engaging with primary and secondary historical documents and materials. We might add, therefore, that historical ethnography, or what Burawoy calls the “archaeological revisit” (Burawoy, 2003) constituted an important component of this methodology. A historical ethnography, according to Diane Vaughan (2004), is: “an

attempt to elicit structure and culture from documents created prior to an event in order to understand how people in another time and space made sense of things ...” (Vaughan, 2004:341). Like Burawoy, and Diane Vaughan, I too used documents to dig into the past to deliberately re-create history “in order to identify and then track the processes that connect the past and present” (Vaughan, 2004:341).

Using primary or secondary historical documents also forces us to confront the multiplicities, uncertainties and fluidities of packaging and packaging mobilities. For example, Latour discusses the use of historical material as one way of revealing the so-called agencies of the non-human (Latour, 2005). Following things into the past sometimes makes it possible to better grasp the socio-technical controversies that may have, over time, receded into the background. As Latour suggests the use of “archives, documents, memoirs, museum collections, etc., to artificially produce, *through historians’ accounts*, the state of crisis in which machines, devices and implements were born.” (Latour, 2005: 81 emphasis added). Others have also followed relations into the past in order to highlight absent presences (e.g. Callon, 2004; Law and Mol, 2001a; Moreira, 2004; Callon and Law, 2004). And even within the field of mobilities research, greater attention is being placed on the histories of mobility as a way of tracing embodied sensations, dispositions and cultural practices and to understand the politics of mobility (Merriman, 2012:70; Cresswell, 2010; Cresswell, 2006a)

However, a degree of caution is required when dealing with historical materials and especially when sourcing historical materials online. For example, care must be taken over the dangers of bias and unwarranted selection when drawing upon historical evidence. This may perhaps be less of a concern when the researcher seeks to re-interpret a single document, like Diane Vaughan’s examination of the 1986 Presidential Commission report on the Space Shuttle Challenger Accident (Vaughan, 2004). But when a project incorporates and combines many different documents in order to provide multiple accounts of objects and to trace leads wherever they may go more care is required.

Therefore, it was deemed necessary in this research to at least follow some basic guidelines to make the research process more reflexive and to avoid the dangers of bias and unwarranted selection in the use of historical primary and secondary documents. Thies (2002) outlines a number of common-sense tips for managing bias when sourcing from secondary material. These include: starting from the most recent sources and

working back; being aware of political, organisational and disciplinary culture on the historians' work; being aware of presentism and the simple reporting of facts; and never relying on one historian's account of an event (Thies, 2002). In terms of managing unwarranted selectivity in secondary sources, Thies advises that the researcher must: get to know the case well to avoid misinterpretation from a failure to fully examine the literature; they must recognise the limits placed on historical evidence from the context provided by the historian; and not limit the search for evidence to those historical studies that fit the theory you are working with (Thies, 2002).

While certainly useful, Thies's guide to historical analyses is underpinned by the assumption that there is a single truth to be revealed or a single truth that can have many different interpretations. It is not, therefore, compatible with understandings of multiple realities enacted in the past and present that may or may not fit together to produce coherent explanations. Nonetheless, at a very practical level these reflexive, pragmatic and seemingly common-sense guidelines have strengthened the research.

After reviewing each document notes were written up which were subsequently coded according to emerging themes for further analysis at a later stage. And although documents and desk-based research constituted some of the first explorations into the world of packaging and mobility, these archival records were interspersed with expert interviews and focus groups in a relatively non-sequential order. The journey might, therefore, be said to have started in the middle (Law, 2002) but also finished in the middle.

2.5 Expert Interviewing

One aim of this research was to show how packaging stabilises and scripts the movements of food and humans. A second aim was, conversely, to proliferate accounts of packaging in order to highlight its mobility in terms of its instability, fluidity, multiplicity or becoming-flows. This latter aim required attending, at times, to the details and specificities of how packaging was continually being enacted or crafted in different settings. Interviewing experts helped achieve both these aims.

Packaging cannot speak for itself, but it does have spokespersons. Given the challenges of accessing certain sites and thus not being able to personally observe packaging as it moved, interviewing the spokespersons for packaging was seen as a good alternative option. By spokesperson I mean those who research and work with packaging and who worked at the sites that I could not access and who could, therefore,

talk on behalf of packaging. The selection of these spokespersons, or as they will be termed from now on “experts”, was not pre-determined but part of an on-going research design that fed off earlier desk-based research or previous interviews.

It was necessary to start with a few scoping interviews to prompt a journey with packaging that had already started with the desk-research. These included interviews with an academic with expertise on the food system and a representative from a non-governmental organisation that published a report on environmentally sustainable forms of retailing, consumption and packaging. These initial scoping interviews provided an opportunity for a straightforward and systematic attempt to gather basic information on packaging and on its mobile life more generally (Bogner et al., 2009). Subsequent interviews mostly involved chasing up and clarifying details from prior documentary and desk-based research and these initial scoping interviews.

Designers of packaging constituted some of the first experts to be interviewed soon after this initial phase of the research. Three designers were interviewed in total. Focusing on the designers of packaging and packaged food is important given these are important actors who are tasked with building “scripts” into the technologies. To quote Akrich:

Designers thus define actors with specific tastes, competences, motives, aspirations, political prejudices, and the rest, and they assume that morality, technology, science, and economy will evolve in particular ways. A large part of the work of innovators is that of "inscribing" this vision of (or prediction about) the world in the technical content of the new object. I will call the end product of this work a "script" or a "scenario" (Akrich, 1992:208).

Interviewing designers, then, constituted a way of exploring the extent to which packaging *designs script mobile* behaviours and experiences and indeed the mobilities of food. The decision to select packaging designers as interviewees at this early stage was also based in part on Latour’s (2005) suggestion that a way of gaining insight into the activity of objects is to go to where these objects are forged. Harvey Molotch (2003) also followed this logic when he began by interviewing designers on his quest to find out about “where stuff comes from”.

Still, the data generated through the initial scoping interviews and subsequent interviews with packaging designers opened a number of avenues for investigation. Thus while starting off narrow the sample of experts interviewed quickly broadened to include two industry representatives and lobbyists, one marketing professional, one director for packaging for a large multinational food manufacturing firm as well as two

scientists and two engineers. All these were interviewed on account of their expertise on different aspects of packaging that correspond to each chapter of this thesis. There were fourteen expert interviews conducted in total for this research with each interview being transcribed and coded for further analysis.

Such a broad-based sample, of course, multiplies not only points of view but also multiplies and renders more complex the enacted realities of packaging. However, by comparing different accounts of packaging I could not only tease out the strategies various actors used to enact particular versions of packaging, but I could also glimpse the outline of the molecular mobilities of packaging, its instability, vibrancy and fluidity in different situations. I was able to see how multiplicities were created and then, sometimes, gelled into singular and coherent narratives about stable objects.

The interviews and questions asked were, therefore, very different. Although, a theme that was pursued in the interviews with those who worked with packaging on a daily basis (primarily those working in the food/packaging industry and scientists who tested packaging) revolved around asking questions about their situated everyday work practices (what they did and how they did it) in order to trace how packaging was enacted. But I shied away from conducting interviews based solely on these mundane details thinking that some of the participant/informers would have thought it some sort of joke, especially the high-level or elite participant/informers. Apart from this one theme, then, each interview varied considerably in terms of what was asked. The interviews could, therefore, be defined as informal and relatively unstructured interviews based around different core themes/concerns of the research. As a result I felt little need to create some form of overarching or universal interview guide from the outset. Even so, the topics and sub-topics needed to be probed in each interview situation were given careful consideration and extensive work was done to tailor these provisional guides in advance of contacting the interviewee. These provisional thematic guides were informed by the on-going desk research, which, incidentally, also often constituted the means for acquiring the contact details of the participants.

It is worth adding that mobility was not a central part of these conversations. The primary task of these interviews was to find out as much as possible about packaging and about the practices that enacted packaging. It was anticipated that issues relating to mobility (broadly defined) would emerge from this data, which they did. This

was not entirely a guess either; preliminary desk-based research had already pointed to a number of mobility issues that were implicated in the core concerns talked about.

On some occasions experts provided contradictory accounts of the same packaging phenomena. When contradictions in the data emerged this was most often related to a controversy. Since looking for multiplicity and fluidity were crucial aims of the research and of the interviews more specifically, and since multiplicity and fluidity are likely to be found in precisely those areas where contradictions and sensitive issues emerge, so asking after these contradictions and controversies was of crucial importance. However, many experts were unwilling to talk about controversies. This usually was because the topic impacted directly on the profits of businesses or, on other occasions, it could be because an issue was not yet fully concluded, closed off and/or stabilised and thus part of on-going investigations. Nonetheless, a number of strategies were deployed to facilitate access to this type of sensitive information. Firstly, the interviews were held on the basis that all responses would be fully anonymised. I was also aware of how the interview setting could influence the type of conversations that I would have and how this might also impact the quality of the data. I had hoped for a more informal conversation that would highlight aspects of packaging that might be less forthcoming in a more formal office or work environment. Therefore, I sought, where possible, to interview outside of the participant/informant's work place. This type of setting was chosen to encourage conversations about sensitive issues but also, as Latour (2005) advises, to encourage the participant/informants to describe packaging as free from interpretation or consciousness as possible.

Other strategies that were deployed to encourage the "right" type of conversation included asking participant/informants to talk about other processes, operations and/or organisations of which they had some knowledge or had some experience with previously. This would allow me to gather information that would not otherwise be disclosed if it was sensitive to current work practices.

At an early stage of following packaging I realised that gaining access to these "experts" was not as difficult as negotiating access to sensitive areas where packaging moved. But accessing experts was not an entirely straightforward and problem-free process either. I drew upon a number of strategies outlined in the literature on interviewing elites to help me with recruitment (see Herod, 1999). Firstly, and as pointed out already, I accessed contact addresses through various reference works which

included those named authors on reports and documents that were encountered whilst conducting desk-based research. Other methods of recruitment included searching on business links sites such as “Linked-In” where one former packaging designer was recruited.

Certainly gaining access to these elites or experts can be easier in some ways than accessing non-elites or non-experts as they often form part of organisational structures and communication networks that make them easily identifiable and communicable. Many of the experts interviewed as part of this research could be easily placed in positions within organisations ranging from academia, to scientific research institutions, NGOs and trade associations and their contact details are publically displayed on websites, reports and documents. This facilitated selecting the “right” expert for what I needed to find out at that particular time in the research.

But not all those interviewed had their contact details publically available and some were harder to recruit than others, especially difficult were those experts currently working for large multinational corporations. In these cases the use of informal contacts and networks as “gatekeepers” was an invaluable way of accessing these particular experts whose access was further restricted by my explicit desire to conduct the interviews outside their place of work. Furthermore, having a gatekeeper through informal contacts would not only facilitate the recruitment process but, as Herod (1999) notes, it provided ready answers to the “how did you get my contact details?” question (1999:316).

In many respects, then, the selection of interviewees was opportunistic as I tried to get a broad grasp of the mobile life of packaging from multiple angles. And as noted above it was only after conducting the interviews and after transcription, coding and preliminary analysis did I start to explore the links with mobility.

Each of the interviews (14 in total) displayed variegated complex dynamics and there is not the space to go into each event in detail here, but some aspects warrant discussion. The power dynamics in each interview situation played out differently as the research progressed. There were certainly instances where the uneven power relations between myself, as interviewer, and those being interviewed meant access to certain information was flatly denied. However, as a consequence of my own evolving position from knowing relatively little about packaging and the packaging world to knowing much more, and from gaining experience in conducting interviews, I was eventually

able to wean more information. In some instances this was due to having selected a more appropriate person to ask for certain information. My evolving positionality and expertise also meant that the interviews moved from being broad and general at the start of the data collection phase to being much more specific, focused on topics that related directly to the core concerns identified.

Herod (1999) draws attention to this changing positionality in expert or elite interviewing when he critiques the dominant view of the interviewer as always being positioned as the outsider/non-expert. I certainly did not experience the interviews as being so dichotomous and neither were they particularly homogeneous in terms of the dynamics. In an interview with a representative of a packaging trade association, for instance, the conversation was dominated by politically contentious issues that he wanted to talk about/convince me of. In this case I played the game of devil's advocate probing on these issues and more. This probing and somewhat confrontational style of interview, however, was only possible as I had already attained some knowledge on these issues. The interactional dynamics in this interview situation therefore resembled a masculinised battle for control (Alvesson, 2011). Other interviewees simply "cut off" certain controversial topics highlighting the persistent and very real uneven distribution of power in those particular interview settings. Others, who had certain grievances with some aspect of packaging and/or the food system led to a much more relaxed conversation and a co-productive style of knowledge making. In these ways the interviews constituted complex sites of knowledge transfer and production.

A final point regarding the definition of expert is worth discussing. Meuser and Nagel extend the definition of the expert to include any key stakeholders who are "actively involved in shaping public affairs" (Meuser and Nagel, 2009:19). This contrasts with narrower definitions of an expert and expert knowledge as being part of professional, functional elites. The idea that expert knowledge is held by a privileged few has been challenged over the last decades by those who argue that knowledge is often negotiated and contested between the expert and: lay person (Wynne, 1997), counter-expert (e.g. Beck, 1992), the public (Fischer, 2009) and policy makers (e.g. Jasanoff, 1990). So too in this research a degree of balance was required with regards the sourcing of data. Therefore, in addition to "expert" interviews, a number of focus groups were conducted as a way of enquiring after the relations between packaging, food consumption and mobility. After all, those who *use* these technologies may also be considered, in some ways, "experts" and spokespersons.

The focus groups were also built into the research design in order to avoid presenting a technologically deterministic account. As Akrich points out “technical objects define a framework of action *together with* the actors and the space in which they are supposed to act” (1992:209). If one examines the accounts of designers alone (broadly defined as all those implicated in the production of packaging) then little is understood of how these scripts get (re)configured or enacted in use. Therefore it is necessary, as Akrich outlines, to follow the negotiations or move constantly between designer/producer and user, “between the designer’s projected view of the user and the real user, between the world inscribed by the object and the world described by its displacement” (Akrich, 1992:209).

2.6 Focus Groups

Focus groups were chosen to provide a balanced account of how packaging is shaped through the negotiations between producers and users of packaging (or consumers of packaged food). These methods generate insight into how the scripts imagined by designers and producers of packaging match with how they are used in (user) practice. As such interviewing consumers provides yet another account and thus another reality of packaging’s mobile life. The data gathered would also feed into the primary aim of the project which required understanding how the consumption and use of packaged food shaped the patterns and practices of everyday human mobilities (the second part of the thesis).

Focus groups were chosen over individual interviews with consumers partly as a result of the convenience of the method inasmuch as it helps generate large amounts of rich data relatively quickly. However, the data generated would also provide situated descriptions and details as to the shared and unique ways in which packaged food to-go are used and how their use fits into wider routines and practices of everyday life. It was anticipated also that focus group discussions might also provide insight into the ways in which people were affected not only by packaged food but also by the packaging.

There were two focuses of discussion corresponding to what would eventually become two distinct chapters. One theme centred on how the participants used convenience packaged foods for breakfasts and lunches on work days and how this might reverberate across other times and spaces of the day. The other theme concentrated on how the participants used packaged food on the go. The decision to focus on the consumption of packaged food to-go as it is consumed on the move is

obvious given that this research is concerned with the mobile life of food and drink packaging. However, the motivation for choosing to focus on the consumption of to-go food in the relatively immobile setting of the workplace is less obvious. The decision to focus on this aspect of packaging's life came about through prior desk-based research and reviews of historical materials that pointed to dramatic shifts in the eating practices and the time-space patterns of everyday life. Furthermore, market research surveys pointed to a significant growth in the breakfast and lunch packaged foods to-go market. Superficial explanations as to why these types of product have become so popular rested on the time-pressures of everyday life. This data also showed how increasing numbers of workers are remaining immobile at their desks over lunch and increasingly eating breakfast there too. Moreover, mobilities research, as mentioned already, is open to examining contingent stillness and immobility as well as mobility. As a result this area represented a fruitful area of mobilities research.

It is more typical for researchers to conduct focus groups as a way of complimenting survey research conducted at a later date. For instance, focus groups can help with survey design and sample selection. However, this research has gone the other way by starting with existing survey research and then working back, conducting focus groups to provide more detail and context than that provided in market research surveys and other marketing literature. Yet focus groups provide a number of additional advantages.

Focus groups offer socially legitimated occasions for participants to engage in what Bloor et al. (2001) term "retrospective introspection". They argue that focus groups hold an advantage over ethnographic methods in that normative assumptions and shared meanings may be more easily revealed compared to the much slower and progressive process of accessing or uncovering these normative assumptions and shared meanings through co-present observation. In other words these assumptions and meanings are only ever alluded to in the chaos of everyday life within which the ethnographer is immersed and yet within the focus group these can be much more clearly articulated and foregrounded. We might add that the commentaries provoked through retrospective introspection are just as valuable as other methods for glimpsing the embodied sensations, dispositions and emotional intensities and practical engagements with technology. Indeed, as people together discuss how they engage with and use technology in practice so they can be prompted by others into commentating on the "immaterial" symbolic and shared meanings ascribed to packaging (although see

Latham and McCormack, 2004 for a discussion on the false dichotomy between what might be considered the material and the immaterial). While attending to the symbolic and shared meanings of packaging was less of a concern in this research than the actual uses and embodied practices that these technologies enabled, these are nonetheless deeply entangled. Indeed, the symbolic and shared meanings ascribed to packaging might even be re-worked and re-considered a form of practice itself (e.g. Whatmore, 2006). As a result inquiring after shared meanings and ways of representing packaged food to-go is important in providing an in-depth understanding of everyday (mobile) practices (see also, Cresswell, 2006 on the importance of the representational *and* the non-representational for mobilities research).

Another related advantage of the focus group is its ability to generate data more organically, that is, to generate data which is closer to how it happens in everyday life rather than the more artificial setting of a one-to-one interview. This is another reason why focus groups were chosen over in-depth interviews with consumers which have been used in other studies examining the minutiae of everyday relations between mundane technology, practice and time (Southerton, 2003; Shove and Southerton, 2000).

Focus group discussions may also tease out and highlight the contingencies of situated and technologically mediated user practices, especially when differences in routines and practice are encountered. These differences were important as, according to Kitzinger (2004), differences and contestation are said to generate especially rich data. Many of the described practices echoed and confirmed what was stated in the survey data. But through comparing and contrasting the subtle differences in accounts and claims as they unfolded in the focus groups it became possible to contextualise and situate these practices within the everyday mobile lives of the participants and to see how what might appear at first as homogenous practices were, in fact, practised differently.

In seeking appropriate data from the focus groups it was crucial that those recruited would have had regular experience in using the types of packaging technologies (to-go packaging) that I was interested in. In order to ensure that this was the case, and thus make success more likely, I relied upon market research data that suggested that young (under 35), London-based workers were most likely to use these technologies. This social group then became the primary target for recruitment. An

additional focus group composed of young workers from Newcastle upon Tyne was also held partly to explore differences and similarities between the discussions. The sample also required recruiting those who were currently employed in order to enquire after how they ate at work. While no formal criteria with regards to the type of worker/employment was established, the majority of the participants were office workers working a more or less flexible 9-5 schedule. There were, however, two who worked in retail and another two participants who were teachers.

There were no other selection criteria based upon different dimensions of social differentiation – class, gender, ethnicity and so on – other than these. But again what seemed on the surface a relatively homogenised sample turned out to be highly diverse in terms of everyday practices and routines. These differences then provided the basis upon which to examine the differences and similarities in shared understandings and symbolic meanings as well as practices and behaviours.

It is worth briefly talking about my positionality in relation to these focus groups. Fortunately, as a young researcher who had worked and studied at various locations across the country, I already had a number of informal contacts based in London who fitted the profile of recruit I was seeking. Moreover, friends, acquaintances and peers who participated in the focus groups in turn helped recruit friends and acquaintances. This meant recruitment was not as challenging as it has been for some researchers who have tried to recruit strangers by adverts or letters (Bloor et al., 2001). Furthermore, the topic was not deemed particularly sensitive and so the participants had few reservations about attending so long as it did not conflict with other commitments.

However, in spite of these favourable recruiting conditions I still struggled to recruit the 10 people per session that I had aimed for initially. The three focus groups ended up consisting of two groups of eight and one group of five as some who were asked to participate pulled out at the last minute or could not make the date set. Rather than re-negotiating another time and date that would suit everyone else a decision was made to go ahead with the three focus groups anyway.

The two focus groups that were held in London were on the Saturday and Sunday of the same weekend so as to avoid conflicts in work schedules and time limitations brought about during typical work days. Not all participants worked Monday to Friday but the majority did and so holding focus groups on the weekend seemed the

best possible way of ensuring that most people would turn up. The same logic applied for the design of the Newcastle focus group which was held on a Saturday.

The venues included the living room of a friend who was also a participant and a reserved room in a bar owned again by an acquaintance and participant. In Newcastle upon Tyne the focus group was held at my own house. However, the choice of venues, the form of recruitment and the relatively close ties amongst the participants themselves, while providing a number of advantages, as stated, also presented significant challenges when conducting the focus groups.

I had to work hard to overcome the tendency of the group discussions to become less formal and to veer off topic. There is debate around whether a highly structured guide or a more open ended guide should be used in focus groups. Bloor et al. (2001) suggest that focus group questions or guides should not be too structured as one of the main advantages of focus groups is spontaneity and an organic conversation held in a “naturalistic” setting. Sticking to a well-defined structure may constrict the potential for spontaneity or momentum towards conversations that open up new ways of thinking about the topic. But conducting focus groups where the participants are not complete strangers can also generate data that approximates the “natural setting” where social interaction occurs. Given that many (but not all) of the participants interviewed in focus groups did know each other I opted for taking a more structured approach thinking that the limits of having more structure were outweighed by the tendency of the groups to interact in a more “natural” way.

With these considerations in mind, a series of themes and a strategy over how the discussion would be directed was thought through before the focus groups as a way of managing the tendency towards informality amongst participants who knew each other. I was aware that while the focus was on seemingly “simple” topics of the mundane aspects of everyday life these were, in practice, highly complex matters. And so, as a way of encouraging the “right” discussion, and after a general introduction to the topic, I began by asking the focus groups participants to take five minutes to briefly sketch the activities of a typical week or typical day (participants could choose either or both). This sketch was used as stimuli for both getting participants to start thinking about the topic of everyday eating practices, travel and daily routines as well as providing stimuli for me to prompt discussion, if needed, at a later stage.

The discussion moved from talking generally about the consumption of fast food and food to-go (what is consumed normally, where, how often, under what circumstances and why) to talk more specifically about consuming packaged food on the go. The conversation then moved on to talk about how these technologies are used at work and how this fitted into everyday temporalities and spatial orders. The focus groups ended with a summary of what had been said and asked for any other contributions. This data fed back into a series of expert interviews as well as providing data for the second part of this thesis on *Packaged Food Consumption and Human Mobility*.

While the focus groups provided rich data, it is important to also consider the drawbacks of such a method. Despite the rich commentaries with regards to the ways in which packaging and packaged food affected the participants, these accounts relied upon the memory of the participants of their own situated everyday practices through retrospective introspection. While interactions between participants did prompt a set of commentaries over the embodied practices and emotional intensities felt through interaction with these technologies there is no doubt more that could have been grasped through complementing these with other methods. Nonetheless, observation by itself would not necessarily have been better and in any case observed behaviours would have placed greater restrictions on the breadth of data I could gather.

Focus groups, along with the other two methods of data collection discussed in the previous two sections were, therefore, deployed to follow food and drink packaging and trace its multiple mobilities. This combination of methods was deemed to be adequate for achieving the project aims and was compatible with the different conceptual approaches adopted. The data generated through each method built upon each other to provide a broad and nuanced picture of the mobile life of food and drink packaging. The research design was also developed as a way of incorporating both romantic and baroque knowledge practices. In other words, to provide accounts both of how packaging enables the movements of food and humans across scales and through Euclidean space-times as well as more nuanced accounts of the molecular mobilities, vibrant materialities and fluid assemblages within which packaging is entangled and shapes. The methods chosen allow us to attend to the multiple ways in which packaging is enacted in different situations from the design studio to its consumption and use at work or on the go. The desk-based research and expert interviews also afforded a way of tracing the ontological politics involved in enacting packaging as a singular entity. In

sum, the multi-method, processual research design permitted a fractional way of knowing a complex mobile world and complex objects that are both stable/singular and in-flux and constant motion.

Part 1. Packaging and the movement of food

Chapter 3. Packaging and the distribution, processing and the “embodied mobilities” of the food system

3.1 Neglected technologies in the study of food chains, networks and miles?

It was mentioned in the introduction that packaging constitutes a vehicle that enables the movement of food. A great deal of attention has been paid to the movement of food which is unsurprising given we live in the era of globalised food networks and intensive regional food mobilities (Coe, 2004). In 2010 foodstuffs alone represented 24% of all tonnes transported in the UK (DfT, 2011). Consequently, a large body of work over the last decade and a half has sought to develop tools to better ascertain the environmental impacts of the production, distribution, consumption and disposal of different food chains (Pretty et al., 2005; Carlsson-Kanyama et al., 2003; Hertwich, 2005; Goodman et al., 2012). Closely linked to this literature are those studies which more narrowly concentrate on the transport and distribution stages of the lifecycle and which attempt to quantify the carbon emissions generated using the distance food travels as a proxy for measuring and comparing the sustainability of different food systems (Jones, 2001; Smith and Smith, 2000; Coley et al., 2011; DEFRA, 2005 see also many articles from *The Journal of Food Distribution Studies*). The growth in studies which attempt to measure the distance food travels has arisen in conjunction with ethical and political preoccupations over the distance food travels. Terms like “food miles” (Paxton, 1994) have emerged and caught public attention putting pressure on food manufacturers and retailers alike to re-configure supply chains and to offer more locally sourced foods.

However, while the concepts of “food miles” and “local food networks” have been useful in shaping political discourse and ideologies around food (DuPuis and Goodman, 2005; Hinrichs, 2003; Coley et al., 2011), their use as theoretical constructs from which to measure and compare the environmental impacts between different food suppliers and networks is limited. Coley et al. (2011), for instance, have instead begun to address the “embedded energy” attributed to food products (that is, the sum of all energy required to produce foods or food services such as the lighting, refrigeration and heat used in the food containers as well as the transport generated through distribution and, crucially, purchase and consumption). These concepts are deployed as a way of disrupting the idea that local food networks are necessarily more environmentally benign than perhaps larger scale, dominant agri-industrial operations. For instance the

environmental sustainability of locally sourced organic vegetable boxes is greatly diminished once one takes into account the miles driven by a customer to pick up these products (Weber and Matthews, 2008; Coley et al., 2011).

Therefore, it can be argued that the miles travelled by packaged food and its components are not sufficiently captured by many of the studies that attempt to measure and compare the distances food travels. Furthermore, and critically, none of the literatures above investigate or talk about the packaging which is a vital component of both industrialised and local food networks alike. Work that has looked at various foods and food components from a network perspective has usefully broadened the scope of food research and, in many cases, drawn attention to the typically vast array of components of food (see, for example, a number of studies in the collection on the *Geographies of Commodity chains* edited by Hughes and Reimer, 2004). “Many far-away places are crucial to food”, as Abrahamsson and Mol (2013:278) have shown in the case of Hawaiian Pizza. Similar findings have been encountered in the cases of hot pepper sauce and Papaya (Cook, 2004; Cook and Harrison, 2007). John Law (2007) has also examined the mobilities of components for animal feed and the implications these mobilities had for the disaster in agriculture known as Foot and Mouth Disease. But few have paid attention to the packaging. Yet packaging constitutes the vehicle within which food (and animal feed) travels. It thus plays a critical role in configuring and mobilising the systems of food production, which make possible more or less mobile practices of food consumption. It is a “logistics technology” that helps produce spaces and circuits of flow (Cowen, 2013). In the opening provocation of this thesis it was highlighted how packaging is a neglected technology in the study of transport and travel research. Packaging, however, may also be considered a neglected technology in the study of food miles, global food commodity chains and food networks. This chapter aims to rectify this neglect of packaging by focusing not only on how these mundane technologies are implicated in the movement of food but are also very mobile themselves.

Accordingly, packaging is followed through three different and yet interrelated settings. The first section examines the role standardised packaging plays in enabling the efficient distribution of food. The next section then looks at how standardised packaging fits into highly industrialised, automated and very mobile food processing operations. This includes looking at the mobilities of part and pre-prepared packaging destined for fast food stores and other food chains whose operations are often just as

industrialised and automated as the manufacturers of pre-prepared food. In both sections features such as “dimensional consistency” are highlighted as being crucial both to ensure the smooth flow of products off the factory line but also to ensure their smooth flow from factory to warehouse, regional distribution centre, or store. The packaging and packaged food are, in other words, analysed as immutable mobiles that help extend complex food networks.

However, packaging is mobile in other ways too. The third section is inspired by Ingold’s (2007) call to “follow the materials” and concentrates on the flows of oil, gas and wood pulp which are the key ingredients for the two most popular broad categories of packaging materials, namely, plastic and paper. These material flows must be just as frictionless, uninterrupted, patterned and anticipated as the flows of packaged food processing and distribution. Any disruptions to these raw material flows would mean the whole packaged food system ceases to function. Yet these mobilities, on one level, raise questions over the environmental credentials of some packaged foods. While much attention has been paid to the distance food travels as mentioned above, little is said of the distances packaging and its components travel. We might then start to think about the “embodied mobilities” of food as a way of incorporating these complex mobilities associated with the food system but which remain largely absent from accounts of food networks, chains, or miles.

Following on from this third section – and after a brief account of the entangled social histories and cultural attitudes of packaging materials – the final section begins to open up the molecular mobilities of packaging. We can articulate packaging as a site of continual transformation rather than stability and we can re-conceptualise the food processing and distribution networks and even cultural attitudes to certain types of packaging outlined in the previous sections as fluid assemblages. When packaging is viewed from this alternative processual perspective it becomes possible to grasp the agentic potential of packaging both as commodity and as raw material. Put differently, it allows us to see packaging’s potential liveliness and its capacity to disrupt. The first two sections draw on technical literatures on food systems and, to a lesser extent, on literature on retail organisation within the discipline of economic geography. Each section in this chapter also relies heavily on data taken from expert interviews on various aspects of the food systems and with those who work with packaging. Let us begin, then, by looking at packaging and its relations to food distribution.

3.2 Packaging and food distribution

If one wishes to understand the importance of packaging for the distribution of food one has only to look at the case of the tin can. The canning process invented by Nicholas Appert in 1809 was a direct response to a competition created by Napoleon Bonaparte to find a way of feeding his armies whilst on campaigns across Europe (Hine, 1994). The tin can thus meant food could be more easily transported to roaming armies. Canned food also helped sustain armies in the trenches during WW1 where it was made acceptable as a form of packaging (Carolan, 2011; Johnston, 1976). These encounters with canned food would go some way to making it acceptable amongst the civilian population in the interwar period. However, for the purposes of this section we will look specifically at how packaging has shaped and continues to shape the networks of food distribution associated with modern-day retailing. Dorothy Davies, writing in the 1960s captures the significant changes in retail and distribution driven by packaging:

In all food distribution the trend is unmistakably in the direction of some form of factory processing of the commodities to make them less perishable, more standardised, more easily handled, branded and pre-priced. The canning industry is improving the quality and variety of its goods every year. Cheap polythene has revolutionised the packaging and semi-preservation of many fresh foods, from ready cut joints of meat and ready sliced half pounds of bacon, to branded cakes, kippers, ground coffee and small cheeses...non-returnable paper cartons may soon put the milk roundsman along with the bread roundsman among the vanishing figures that once rendered consumer services (Davis, 1966:286).

Wrigley et al. (2005) have more recently shown that a key feature of the retail transnational corporation, which include the major supermarket retailers, has been the simultaneous extension of both sourcing and distribution. Food components arrive from across regions and nations (although see Coe, 2004 on the degree to which food networks are globalised), and are then moved to a vast number of localised stores. The structure of retailing thus presupposes a great deal of food transport and these journeys are afforded by the packaging. As a packaging designer interviewed with a designer for this research says:

And when you do a design for a bottle you start with the dimensions of the lorry. So what diameter does my bottle have to be to max out the number of bottles I can fit on a lorry. So that is my bottle diameter, what capacity drives its height, is it strong enough to withstand the pressure in it and I build my line upwards from that. So just massive engineering is around packaging. (personal communications, May, 2012)

This quote highlights a number of crucial features of primary (and secondary and tertiary) packaging. First, the primary packaging is designed to protect the product during distribution. Packaging designers do not arbitrarily select which materials they

use or their thicknesses. These decisions are based on a set of calculations that seek to balance between the (imagined) forces that will be exerted on the packaged product through distribution and the costs incurred through using more of the material or different materials altogether. These calculations are inferred from numerous trials or “challenge tests” undertaken in laboratory experiments. The technical names for these experiments include compression tests, tensile strength tests, Mullen burst tests and peel tests as well as package vibration tests. These determine the degree to which any given material in any given quantity and in any given form can withstand certain forces. Some of the instruments for such testing sold by Texture Technologies are shown below in figures 1, 2 and 3.



Figure 1 “Tube roller”. Photograph. n.d. Texture Technologies Website. Reproduced by kind permission by Texture Technologies Ltd.



Figure 2 “Coefficient of friction sled”. Photograph. n.d. Texture Technologies Website. Reproduced by kind permission by Texture Technologies Ltd.



Figure 3 “Miniature tensile grips”. Photograph. n.d. Texture Technologies Website. Reproduced by kind permission by Texture Technologies Ltd.

A number of instruments have, therefore, been developed that can replicate the different forces a package might be expected to go through on certain journeys, although much can now be done using various computer aided packaging design software that can replicate these tests virtually. The data from these tests, whether simulated physically or virtually, is passed to regulators and designers who can then make decisions as to what type and how much of a material to use when producing standards or designing packaging products. At the same time decisions over the type and amount of material to use in packaging are also shaped by wider forces of economic rationalisation. As one expert notes in talking about the decisions involved in designing paper board packaging:

When the mill makes its board, it makes different thicknesses and different stiffness. So you use the minimum amount of fibre for every package to protect...(pauses to veer off topic)... So that the cardboard that the sandwich box is made out of maybe the same cardboard that a chocolate box is cut and made out of. But they will be different thicknesses, different stiffness. (personal communications, April, 2012).

The last two quotes illustrate how designers, and even those material scientists involved in the structural engineering of packaging, must follow packaged food imaginatively as it moves along distribution chains, anticipating the points where the packaging may come under stress and compromise the integrity of the food. These risks, which are calculated based on data from the tests done in the laboratory, are balanced against the higher costs of making packaging thicker and more secure. Clearly these measurement networks work to generate mobile and immutable inscriptions which then lead to the standardisation and immutability of the packaging and, ultimately, of the packaged food itself.

However, the quote at the start of this section outlined another crucial feature of packaging design for packaged food distribution, namely, its role in enabling more products to be packed onto a container and thus making the transport of goods more (economically) efficient. Hence, the form and dimensions of many types of packaging are designed around the secondary and tertiary containers that transport them. Designing packaging in this way is vital for the efficient use of space and serves to reduce the transport costs of food. Levinson (2006) argues that the development and standardisation of what might be considered the ultimate package – the shipping container – facilitated the process of globalisation by increasing the efficiency and reducing the costs of moving goods (see also Cowen, 2013). It may also be argued that advances in the design of packaging around the shipping container, lorry container, the pallet as well as the food it is carrying has also helped extend the networks and improve the circulation of goods, and of food in particular, across regions, states and the globe.

Still, other elements must be combined with packaging designs to help shape the movement of food and configure food systems. As Bourlakis (2011) notes, from the early 1980s British retailers began to operate their own regional distribution centres as well as their own fleets of vehicles to service their stores under the principle of “just-in-time” delivery. These investments contribute to a “networked embeddedness” of retail operations (Wrigley et al. 2005). In addition, logistical improvements came about through a number of changes in the transport systems including the continued development of the motorway system, the introduction of temperature controlled vehicles and changes in regulation that increased the maximum weight and dimensions of lorries on the roads. Furthermore, the centralisation of distribution has been shaped by the need to use store space more intensively on account of increasing sales volumes and rises in site costs.

Packaging designs are, therefore, one element of a delicately balanced series of relations that have together produced emergent packaged food movements and we should not try to reduce the increase in the distance packaged food travels entirely to advances in packaging design alone. Nonetheless, these interrelated changes in the food system would not have been possible without simultaneous improvements in packaging and packaging design.

Another crucial feature of packaging that has enabled the efficient distribution of food is the barcode which has helped digitalise the supply chain. The introduction of the

barcode onto the surfaces of primary, secondary and tertiary packaging has enabled these organisational changes in the food system. Consequently, electronic data on packaged food has proliferated creating immutable and highly mobile information on packaged food which has, in turn, permitted regional distribution centres (and retailers) to act at a distance (Latour, 1987).

By allowing retailers to collect data on individually packaged products at the point of sale the barcode has: improved stock control (less stock-outs and/or over-stocks); facilitated better range planning and allocation of products to branches; improved re-ordering; enabled better monitoring of new lines and promotions; reduced paperwork; and, facilitated faster through-put at checkouts (Hogarth-Scott and Parkinson, 1994; Bourlakis, 2011). Various business planning software applications are linked up with individually barcoded packaged products and batches to permit real-time monitoring of stock which is then linked electronically to send orders once stocks of a certain product reach specified levels. Invoicing and delivery schedules can, correspondingly, be organised much more quickly and efficiently than paper-based counterparts in a system known as Electronic Data Interchange (Cowen, 2013). This has meant products are now pulled along rather than pushed through the supply chain in what is termed an “efficient consumer response initiative”. Efficient consumer response initiatives have intensified the mobilities of packaged food with re-stocks to distribution centres and stores happening sometimes twice daily. As Bourlakis (2011) mentions some “British grocery multiples can now supply their shops with fast moving lines within hours of the order being transmitted” (2011: 34). An expert on food systems, interviewed as part of this research, similarly describes the electronically mediated ordering systems associated even with fresh convenience food like sandwiches:

The food industry is the most sophisticated distribution system in the world and this country leads the rest of the world in terms of food logistics. We have orders coming electronically, let's take the sandwich industry for example. Buckingham foods down in Milton Keynes supply all of the sandwiches for xxxxx in the UK, just as an example. One of their customers is xxxxx. They receive that order at about midnight. Which is the aggregate number of sandwiches of each type that they need replenishing by the next day, okay. That is then broken down by what they want delivered to each regional distribution centre around the country so there are about 12 loci for that. So they will receive an order by product line by regional distribution centre they want delivered at six o'clock the next morning, they receive it at midnight. And these sandwiches are made up during the night, some of them are made up pre-midnight in anticipation, prediction of orders but the balances are made up between midnight and three in the morning when they leave Milton Keynes to arrive at the RDCs for about six so they can get onto vehicles and be delivered to store in time for opening. (personal communications, February, 2012)

The digital coding of packaged food and the implementation of efficient consumer response systems like that described above have transformed the relations between food, packaging and the spaces within which they move. Dodge and Kitchin (2004) recognise that the mobilities of people are bound up within a coded infrastructure of “networks of mobilities, interactions and transactions that bind them together across scales” (Dodge and Kitchin, 2004:173-174). The same might be said of the coded infrastructure that surrounds individually packaged food and which help bind these individual products not only to wider networks of food mobilities, interactions and transactions but also to the space of the computer screen in a logistics department of a retail headquarters where motive forces or frictions can be increased or decreased at the push of a button (e.g. Cresswell, 2010:28).

Advances in packaging and barcoding have not only shaped digitally mediated food supply chains or efficient consumer response systems. This relationship is not entirely unidirectional. The digitally mediated food supply or efficient consumer response systems also work to shape packaging design and innovation. As Louis noted in his discussion on packaging in the new millennium in 1999, the implementation of electronically generated and “just-in-time” orders from retailers, and the more frequent deliveries these generate, necessitate more “modular packaging” to ensure efficient truck loading and “packaging strong enough to allow safe transportation of mixed loads” (Louis, 1999:5). These developments contrast with the example provided above of packaging being designed specifically for a tertiary container. Today, increasingly, packaging must adapt and fit with many other different packaged products. And as the ranges and unit sizes of packaged foods and drinks increase dramatically so the ability to manage these complex inventories through the integration of information technology in food retail logistics becomes ever more necessary.

Barcoded primary, secondary and tertiary packaging has also meant different firms, as well as the departments within firms, can better interchange electronic data in order to improve co-ordination between various parts of the supply chain and distribution. Crucially, electronic data interchange systems have reduced the order lead times between stores, distribution centres *and* suppliers. As Cowen (2013) reminds us, Wal-Mart has the largest civilian satellite network in the world and relies on real time IT connection between itself and its suppliers. However, the rapid lead order times now demanded require manufacturers and suppliers to integrate expensive Electronic Data Interchange systems into their business processes. This, arguably, has driven out smaller

scale producers who cannot afford or justify such expenditure and, therefore, cannot integrate their operations electronically with the retailers (e.g. Wrigley et al. 2005:448). Moreover, the costs for failing to deliver on time and at scale are high. An expert on food systems again:

If Buckingham foods deliver, I think it is an hour outside the anticipated delivery window they get fined. If they deliver three hours late than the anticipated delivery time at a regional distribution centre the vehicle is turned round and sent back to the suppliers full of sandwiches labelled for that customer which cannot go to anyone else. They are also charged for the vehicle cost of delivering and returning and they are also charged for loss of profits for all of those products that didn't make it onto the shelves. So the financial disciplines and penalties in the supply chain are a huge. So inventory goes back to the supplier, the supplier always has to be prepared with inventory to supply their customers, even at three hours' notice. And so the cost is being pushed by the retailers' right back to their suppliers. (personal communications, February, 2012)

Such uneven power balances have dramatically impacted supply networks and inter-firm dynamics as they make it increasingly difficult for any actors other than large scale manufacturers to work with large retailers or convenience store multiples and their regional distribution centres. The high costs generated by digitally integrating operations and by adhering to strict rules and temporalities that govern the food system, and the high penalties for not delivering packaged foods on time, mean that the production and distribution of food is being consolidated and concentrated within fewer and yet bigger players. Such trends have important implications for the movement of packaged food as it gets delivered from large manufacturers to large regional distribution centres and then on to a complex network of various shops, stores, kiosks and cafes spread out across extended distances. Such accounts provide strong evidence also of a politics of packaged food mobility with some (electronically tagged) packaged foods forming part of large and powerful food retail networks whilst others cannot.

This is not particularly new information and the growing concentration of power and the complexity of the food system has been well documented both within the discipline of economic geography (Wrigley et al., 2005; Coe, 2004) and elsewhere (Freidberg, 2009; Steel, 2009; Roberts, 2008; Nestle, 2002; Harvey et al., 2002). But what is not mentioned in this literature is how the organisation of food systems has been facilitated, to a large extent, by the packaging and its digital markings. The evolution of packaged food has been crucial to the consolidation and organisation of a very mobile food system through rendering packaged products increasingly knowable, calculable, immutable and combinable. In many cases this has meant food now travels greater distances from manufacturer via distribution centre to retail store. But the role

packaging plays in the distribution of food constitutes only one way in which it shapes food mobilities. As hinted already, the sites where packaged food is processed and manufactured also constitute nodes of intense (and interrelated) mobilities too.

3.3 Packaging and food processing

As noted in the previous section, the organisational structure of retail relies upon stable and efficient flows of foods along (embedded) distribution networks which are enabled by the packaging. But the precision of seamlessly coordinated movements of packaging, food and packaged food in time and space through the plant is crucial to the successful functioning of product lines and the efficient distribution of packaged food. The following quote from a packaging executive gives some idea, firstly, of the speeds of these processes, here he talks of developing a product line using flow wrap, similar to those used to package breakfast cereal bars:

The flow wrap is a flow wrap is a flow wrap there are a little manufacturers of flow wrap equipment, there are huge manufacturers and it depends whether you want to run a line at 700/min for 15 years or whether you want to run at 300 per minute for three years depends how much risk ... (conversation quickly turned to another topic). (personal communications, May, 2012)

Food flows into, through and out of these plants at great speeds, interlinked and tightly coupled with a number of packaging functions such as filling, capping, labelling and palleting processes. In addition to the flow wrapping of snack bars there exist highly automated, fast and tightly coupled assembly lines that combine multiple ingredients and packaging components into a much more complex finished product. In any case both of these automated systems require a high degree of standardisation in packaging design, otherwise they cannot work efficiently. For instance, the packaging of sandwiches has become increasingly automated, as noted in one conversation with a food technologist below:

The people making sandwiches will feed them into a machine that will take this blank of cardboard with printing one side, that machine will fold it, put the sandwich in it, seal it, put a date code on it, label on it put it into whatever secondary or tertiary packaging and it will then be distributed. (personal communications, April, 2012).

Automated container filling can either be sealed or unsealed and are regulated by “electronic eyes” that can sense the weight or count the number of components placed inside a package. As the beams of light or the magnetic/electrical fields scan the package, the computer records the exact contents. This, however, may be verified by a master controller of the line who periodically checks the accuracy of the computer. Such innovations have made automated packaging more accurate, faster and more efficient,

but these machines are designed and often built around precise dimensions, weights and compositions of packaging.

The standardisation in the form of packaging or what is more accurately termed the “dimensional consistency” of a packaging line matters a great deal for product feeding too. Product feeding can be either manual or automatic but container positioning is crucial for ensuring the accurate insertion of food or liquid into packaging under automated filling systems which help increase the production rate of packaged food. Thus the movement of containers need to be perfectly synced in time and space under the nozzles, or mechanised arms, that insert foodstuff into the package. Yet the success of this synchronisation is contingent again upon the degree to which the package is standardised.

Automated filling systems include in-line fillers and rotary fillers. In-line fillers are generally single lane but can have more than one lane. Containers are backed up in-line and stopped before reaching the filler station. A specific number of containers are then allowed to move onto the filling station. The movement of containers through an in-line filling system are, therefore, intermittent. In other words, the line is stopped periodically while containers in the filling section are filled. Fairbanks (2008) notes how the size and shape of containers are important in determining the number of containers that can be filled; he points out that usually sixteen stations would be the maximum amount of containers that can be filled at once and that more than this amount is usually not cost effective. Moreover, in-line filling systems can be more difficult if the containers are not straight edged, as the positioning of the containers under the filling stations must be precise as detailed in the previous paragraph. In the jargon of the filling industry, a container flowing through the in-line system, must have “consistent dimensional control”, that is to say, containers must have some consistency in how they back up and fit together. Lack of consistency in this regard has important implications for the positioning of other containers and ultimately the accuracy of insertion of food into the container.

The size of the container is also important for maximising the “valve utilisation” (the proportion of time which the valve is open and pouring or spreading food into a container). Fairbanks (2008) points out that valve use is typically low in in-line fillers as they often stop intermittently but, of course, other factors such as container diameter

and unit filling time are also taken into consideration when quantifying the valve utilisation.



Figure 4 “Cup filler”. Photograph. n.d. Taken from Serac Packaging Solutions website.

The other common filling format is the rotary filler (figure 4). Rotary fillers are usually faster and more efficient than manual or in-line automated filling systems. Here containers move towards a feed screw, which places containers into a larger main rotary, with an identically placed wheel of dispensers above. The motion in these filling systems is continuous as containers flow onto the main rotary and subsequently get filled with liquids as they circulate. They then arrive at the dispensing screw, which is the same size as the feed screw, which allows them to be smoothly carried away. The number of filling heads on a main rotary varies but can be up to 80 valves. Again the package must be consistent in size and shape in order to smoothly fit into the slots, get filled and to smoothly flow through the system.

These de-scriptions (Akrich, 1992) of automated filling systems show how crucial consistency and the design of the size and shape of packaging are for the smooth flow of food through the filling and packaging process. Packaging designers must take into account these aspects of the mobile life of food and drink packaging. Moreover, packaging designers must travel with the packaging as it moves through the factory and interacts with these non-human machines: the packaging must be designed for mobility inside as well as outside the factory.

However, building these automated lines incurs high capital costs and long-term investment decisions meaning the packaging designs upon which these lines are initially configured can endure for relatively long periods of time. In other words, packaged food lines can exhibit a high degree of inertia. This inertia can explain why some controversial packaging designs and processes remain in use today such as voluminous and tainted (from the CFC scandals of the 1980s and 1990s) foamed polystyrene packaging or the plastic sandwich package (as opposed to the paperboard versions that are perceived to be more sustainable). As a materials engineer puts it:

Lines exist, they have been fully amortised; if you are going to put in a new system, a new line, the capital costs increase and maybe you don't want to do that. (personal communications, February, 2012)

Another expert referring to his previous role as a designer in the brewing industry comments on the endurance of packaging designs given entire lines must be configured around them:

...in the brewing business we came up with a new beer bottle and we put in a new line for it..... So when you built your bottle you don't change anything in a hurry. (personal communications, May, 2012)

And while some packaging machines have been designed to provide more flexibility in terms of the size, shape, composition etc. of the packaging, merely re-tooling these machines can constitute a significant cost.

This machine here (points to the packaging), every plate is about ten grand so to make one packaging line it costs about £20,000 in tooling. (personal communications, April, 2012).

Consequently, the automation of food processing inevitably brings a degree of inflexibility in design across packaging lines. The high costs and risks associated with in-house packaging operations mean some food manufacturers choose instead to outsource their packaging operations (Twede, 2008). For the most part, those designs which are perceived as more experimental and risky will be contracted out to specialist packaging firms in order to provide more flexibility in terms of the ability to discontinue lines and to create new lines with less risk on investment. In many cases a single filling and packaging company will act in sole partnership with a single food manufacturer in an integrated system from the point of processing and packing to the point of sale (Kirwan, 2003). This, of course, means that either the packaging or the food must be moved in order to be combined, contributing to the overall mobilities of the food system. However, in some cases packaging companies have mobilised their

entire operations and machinery so as to be able to go to the manufacturer and package on-site (Louis, 1999).

In these integrated systems both the contract packaging firms and the food manufacturers are highly reliant and interdependent on each other. They form embedded inter-firm networks. For the food manufacturer much trust is placed on the packaging firm again to deliver on time and at scale. For the contractor there are often strict requirements, specifications and delivery times that must be met and if these are not fulfilled heavy fines are incurred, as per the contracts to deliver ready-to-eat sandwiches as detailed in the quote above.

Outsourcing the packaging operations is also a normal practice for fast food chains and other industries that do not pre-package and pre-prepare food but offer made-to-order meals. These chains rely on what are known as the “packaging convertors”. During the process of packaging conversion machines are used to fold, shape, and seal or, in the case of plastic packaging, blow mould or extrude standard containers. These are then palletted and delivered to stores, warehouses or distribution centres across regions. In some cases bulk, pre- or part-prepared packages are imported internationally.

Fast food and casual dining chains will often hold long term fixed contracts with their packaging convertors meaning both converter and food chain are as dependent on each other as those food processors who outsource their filling and sealing operations. Furthermore, in many of the interviews with packaging designers it was made clear that power was unevenly skewed towards the large and powerful food chains who demand, once again, precise deliveries of packaging at scale and at specified times. Such requirements can be difficult for smaller converters to handle as one packaging designer, who worked for a relatively small scale but innovative packaging firm, elaborated upon when speaking about the difficulty of working with larger food companies:

And I don't think it went ahead for various reasons. First, because McDonald's was probably scared relying on ***** to design and make all of this because McDonald's works like this: they need to make sure that whoever provides them the packaging has at least two sites because if one gets set on fire they've run out of packaging. Because board takes about 6 to 8 weeks order, there is the printing time. (personal communications, April, 2012).

Later in the conversation it was revealed that large fast food companies may not necessarily deal with the convertors or packaging companies directly but may go

through a third party to source their packaging. These intermediaries (or, better said, mediators) can further complicate the networks of packaged food provision and provide a barrier to innovation and change in packaging. From an ANT perspective these third parties must also be translated in order to enable innovation in packaging. One example of a resistance to change that emerged in the expert interviews held as part of this research illustrates how a new, much more efficient packaging design (in terms of the transport costs and storage) was rejected not by McDonalds but by Perseco Consultants Ltd. who were in charge of procuring packaging for McDonalds.

...this here paper package is much better than a clamshell when it comes to weight and stacking and because the thing about packaging is also stacking and storage. We did a briefing with McDonald's they were looking for us to change the clamshell design, so they were looking to us to change the idea of a clamshell design so they wanted us to look at a new idea of the clamshell, a hybrid, between a wrap and a clamshell. Because, you see, clamshells come in boxes, they already come erected; they're not folded, so they take up a lot of space and storage. The way it works with McDonald's is that they have a procurement company called Perseco and they are based in America. And there is some sort of like politics, they get paid by pallets or containers I'm not quite sure and I remember thinking at the time that going to flat packaging makes so much more sense, twenty clamshell stack and twenty of these (drawing my attention to the two different designs). Twenty of these is nothing okay. So I think there was not only the cost issue but also something to do with if they gave McDonald's more boxes it means they give them more money. But it could be that I was in mistaken. There are what we designed which I'll show you it's a hybrid like this... So imagine you have a whole clamshell and instead of a whole clamshell you have one strip of board to give enough structure so you put the sandwich in here and close it. (personal communications, April, 2012).

Such accounts illustrate, once more, the entangled politics (of mobility) surrounding existing and new packaging. When coupled with the standardisation required for production and distribution (not to mention the forces of consumer expectations detailed below) it is no surprise that most new packaging ideas or concepts fail to materialise (i.e. do not get enrolled and translated). From another perspective, however, these processes show how certain types, designs and standards of food packaging become incorporated as an element within path-dependent food systems.

3.4 Material flows

The previous sections outlined the ways in which packaging has enabled the efficient, industrialised and highly automated processing and distribution of food. The tightly networked interlinking of various components of the food system means that designs of food packaging can display a considerable inertia. Packaging is designed around these food systems and the food systems are designed around the packaging. However, the network interlinking of components does not begin and end at the plant or the (lorry/ship) container. The material composition of packaging is also networked

with mobile food systems and generates its own historical path-dependent trajectories of raw materials.

Plastic and paper are the dominant materials used for the vast majority of packaging today. These represent very broad categories of packaging material, with plastic alone having thousands of varieties. Nonetheless, over 80% of food and drink comes packaged in either of these two broad categories of material. The following sections provide a brief overview of how food came to be packaged in these ways.

3.4.1 Mobile plastics

Today plastics constitute some of the most pervasive materials used in packaging with approximately 50% of all food packaging in Europe being made from this class of material (Coles et al., 2003). There are many different types of plastic that are permitted to be used in packaging applications but polyolefins (such as polythene and polypropylene) are the most widely used, at least in Europe.

Polythene asserted itself as an unexpected yet promising new discovery made in 1933 at the laboratories of the Imperial Chemical Industries (ICI), in Huddersfield, Britain. Polythene was left as condensation after a high pressure reaction between ethylene and benzaldehyde and was described at the time as “a tough yet flexible material” (Reader, 1975). But as Reader (1975) notes in his detailed history of ICI, the executives did not know what applications this material could possibly have at the time and certainly did not foresee the pervasive use of this material as packaging for food. In addition to its toughness and flexibility, polythene was also water proof and so it was initially used to coat communication wires for the military during the World War 2.

The key raw ingredients of polyolefins, such as polythene, are oil and gas. But these were not the first precursors for higher alcohols used to create polyolefins. The first higher alcohols used in the production process were refined from molasses and produced by UK-based industries. However, a decision by the British government in 1945 to remove subsidies for the industries that made higher alcohols from molasses and then to remove the duty on oil and gas imports meant the chemical industries in Britain who produced polythene at that time (only ICI in Britain, with DuPont in the US) switched suppliers for raw materials. This change in the policy landscape led to new deals being proposed that say something of the emerging influence of global networks of oil production (c.f. Bridge, 2008; Unruh, 2000) at the time. For example, deals such as that proposed between ICI and the Anglo-Iranian Oil Company (AIOC,

later British Petroleum, BP) in 1958, which would have meant that all naphtha (higher alcohol) required to produce polythene at the massive new Wilton chemical plant on Teesside would have been sourced from the AIOC's refining facilities in Iran (Reader, 1975).

While this particular deal fell through in its final stages, the example serves to illustrate how the upstream trajectories of packaging were changing during this period. Oil and gas were becoming increasingly important raw materials for packaging and many other applications. It was the period when the carbon economy was growing and becoming increasingly locked-in to a path-dependent trajectory (Unruh, 2000). The establishment of oil and gas supply co-evolved alongside the development of chemical plants and packaging factories built to use their outputs. In terms of mobility, these interlocking processes have served to entrench global oil and gas movements over the last half century. However, while the raw materials may travel a great distance to arrive at the chemical processing plant, once they arrive the distances travelled are much less. As a materials engineer illustrates:

- If you are running an oil refinery you have certain things coming in, oil and things like that, and certain things going out. You can't just vent your waste gases into the atmosphere you have to find something to do with them. So generally you try and find something else to do with what you are producing. You try and pass your waste onto another company. So that has been happening since there have been oil refineries.

- And where are these (chemical) factories based?

- Next to the oil refinery! If you go down to Teesside where there was some refinery and chemical production you'll see the factories just expand outwards with other factories around them. So the chemical industry is like a community its... think inputs and outputs, so one factory may generate a lot of steam because they have a hot process and the waste steam is then sold onto a neighbouring factory. (personal communications, February, 2012)

3.4.2 Mobile Paper

Paper or paperboard constitutes another huge proportion of the packaging used to wrap food and drink, representing approximately one third of the total packaging market (Coles et al., 2003). Many different varieties of paper packaging exist including kraft paper, sulphite paper, greaseproof paper and glassine. Paperboard is thicker than paper and white board is the only type of paperboard used for direct contact with food.

Paper products have been produced and consumed in the UK and Europe for many centuries. However, the accelerated use of paper as packaging began as a result of the growth of manufacturing during the 19th century. During this period an important

innovation that made the production of paper packaging more efficient was the shift from the labour intensive process of producing one sheet at a time from rags to mass producing paper from wood pulp (Coles et al., 2003). Such was the success and efficiency of this process that almost all virgin paper and paperboard today is derived from wood pulp. The pulping process turns the wood pulp mostly into water leaving around 10% of short cellulose fibres. The cellulose fibres are then turned into massive reels of paper and paperboard which, once bleached, get transported to the printers and then to the packaging convertors (or food plant) to be split up into sheets and sent to the packer to be wrapped around food.

However, the supply chains of the paper industry have become much more global as well as vertically integrated in the last decades (Twede, 2008). Whereas the plastic packaging industry has many converters who source their resins from chemical plants, paperboard, by contrast, is usually produced and finished by those who log and pulp the trees. Often only minimal conversion is then required by the manufacturer or packer.

UK legal requirements dictate that that any paperboard material that comes into contact with food must be virgin. This means recycled paper cannot be used in these types of packaging applications. This ensures the constant circulation of virgin paper and paperboard packaging emanating from the pine forests of Scandinavia, a leading region in the production and manufacture of paper and paperboard. Depending on cost differences, one expert told me, paper and paperboard may also be imported from North America.

3.4.3 The “embodied mobilities” of packaging

What these brief insights into the upstream mobilities of packaging materials highlight are what might be termed the “embodied mobilities” of packaged food. The embodied mobility of a product might be similar to the “embodied energy” now attributed to many commodities, like cement, which is usually measured in terms of the carbon emitted throughout the lifecycle of these commodities including, at a minimum, the carbon emitted from extraction of raw material, manufacturing and transportation (Hammond and Jones, 2010; Bordigoni et al., 2012; Hammond and Jones, 2008). Leaving aside the issue of whether these figures can be accurately calculated and the various assumptions that underpin such calculations, the “embodied mobility” of a product would simply be the transport dimension of these coefficients.

As noted in the introduction to this chapter, Coley et al. (2011) have usefully broadened the scope by which we can understand the movements of food by attending to the embedded energy of foods, including factors such as the energy used in the movement required to purchase items. Such factors have been largely ignored in previous investigations and quantifications of carbon emitted or miles travelled in different food chains. But following Coley et al.'s (2011) line of reasoning we might add that the mobilities generated from food packaging may also constitute a missing factor in studies that look at the environmental impacts of local food networks. These “packaging miles” may problematize the apparent localness and sustainability of farms and food companies marketed as such if the packaging used is the same as other more mainstream food products. This is especially the case where such farms and food companies operate on much smaller scales and thus necessitate regular smaller deliveries of packaging.

So, while much is made of the transparency of so-called alternative food supply chains (Marsden et al., 2000; Renting et al., 2003) less is said of the transparency of the component supply chains that make these complex technologies possible. Yet often the components of these alternative and more or less distant food supply chains are just as complex and hidden as those used by the large industrialised food companies. A small number of researchers have attempted to explore these “upstream” dimensions of short, alternative and industrialised food chains respectfully (Ilbery and Maye, 2005; Böge, 1995). Yet there remain opportunities to examine what might be considered the “embodied mobilities” of components of food, such as packaging. Existing work that has compared and contrasted various alternative, local and conventional industrialised food networks and, more specifically, those that have been concerned with looking at the distance food travels, often do not take into account these complex “upstream” mobilities that form part of the “final product”. Yet, without these complex upstream mobilities, practices such as picking your lunch up on the way to work or buying a sandwich on the airplane would be impossible.

3.4.4 Entangled social histories and cultures of packaging

The idea that knowledge of the “embodied mobilities” of packaged food might problematize the image of packaged food highlights the importance of cultural attitudes towards packaging. Generally seen as more biodegradable, and thus more environmentally friendly, white board and other paper materials have been steadily replacing plastic in a number of specific packaging applications, such as cups and

sandwich packs, even though the extent to which paper is actually more environmentally benign compared to some types of plastic is debateable (Hocking, 1991). Nonetheless, the positive cultural perception of paper and paper board, compared to the negativity surrounding plastic packaging, can re-configure the networks and flows of packaging and packaging raw materials. As a food technologist mentioned when talking of recent changes in packaging:

But I think the biggest examples of food-on-the-move packaging changing is your sandwiches from plastic and cardboard. You just wouldn't get any plastic packaging sandwiches anymore; they are trying to recreate the Deli. Because you can buy sandwiches in a brown paper bag that has come from a factory set up. I mean I've been working there 5 years and that's a good example. Brown paper is instantly associated with something that is recyclable.

- So could you see many more packaging lines turning to paperboard?

- there are certainly views to go that way as it offers different benefits to people. They see it as green, more organic. But does it protect the product as well? No. (personal communications, February, 2012)

However, plastic has not always been viewed so negatively. Bijker (1995b) highlights the importance of cultural perceptions for the success of the synthetic plastic Bakelite invented in 1908 and which heralded the era of synthetic plastics. Polythene, the most used type of plastic packaging today, also formed part of a wider campaign by the chemical industry to promote plastics.

The promotion of plastics, in general, had started well before the post war era and the subsequent crisis of oversupply of polythene in the market. The Du Pont chemical company based in the US had hired advertising executives to promote plastic as a key material for new ways of living and to position it as a material of progress. Du Pont sponsored The Wonderful World of Chemistry exhibition at the Texas Centennial event in 1936, for example, with slogans such as "Better things for better living...through chemistry" (Meikle, 1995:134). Iconic plastic packaging devices such as Tupperware (made from polythene), patented in 1949 by Earl Tupper, would go on to make plastic more acceptable to the consumer. Tupperware was used to package some premium food products such as Red Rooster cheese as well as some non-food items such as tobacco and in 1956 Tupperware was selected for an exhibit in the Museum of Modern Art (MOMA) in New York on the best designs of the 20th century (Clarke, 1999). Earl Tupper was an important and tireless promoter of plastics. He mentioned in 1949, for example:

“With the end of the war [polyethylene] was another young veteran that had accelerated from childhood to a fighting job... It had done its job well but like all you vets returning from the wars it had never had civilian adult experience” (Tupper, 1949 cited in Clarke, 1999)

Freidberg (2009) also notes that amongst the US growers of ‘fresh’ produce, packaging entailed progress as well as patriotism as exemplified by the quote from J.H Collins in Volume 17 of *Western Growers and Shippers* (1945):

“Fresh produce is the last great packaging job that remains to be done. It will be difficult but you can bet it can be done! For it is progress – and American.” (Collins, 1945 cited in Freidberg, 2009)

A US survey of 2,367 US housewives in 1947 indicated that 64% said they would prefer their products pre-packaged and pre-priced. The figure was higher at almost 75% in cities far from where the produce was grown. We might assume that similar processes were happening in Britain. Once plastic and plastic food packaging in particular had become not only acceptable but desirable – its cultural life rendered stable – so the path-dependencies that generate contemporary patterns of raw material mobility today could also become further locked-in and stabilised.

That being said, we must be careful not to reduce the dominance of plastic packaging to cultural changes alone. Instead these changes were part of the petro-chemical-packaging *system*. Changes in the material culture of plastic and of plastic packaging, after all, are closely linked to the expiration of the patent for the polythene production process in 1952. This meant that a large number of new chemical plants were built in the 1950s to produce polythene which reduced its price and forced industries to find new markets. Food and drink packaging was one sector where demand was seen to be almost inexhaustible (Meikle, 1995). These changes were also accompanied by the growth in the production and supply of oil and gas through the 1960s and 1970s. Nevertheless, the path-dependencies and entrenched mobilities of polyolefin production necessitated simultaneous changes in the cultural attitudes towards plastic. So, not only were new types of plastic packaging physically moving but they had also to move (affect) consumers.

3.5 Packaged food systems as assemblage

This chapter has clearly shown that advances in packaging have facilitated and even permitted the industrialisation and automation of very mobile food systems. In the preceding network analysis it was shown how standards in packaging are created through challenge testing ensuring that the packaged food remains immutable as it

travels through time and space. At the same time packaging is often designed around the containers which transport them and in some instances the containers are designed around the packaging. In addition, it was shown how the pervasive use of barcoding over the last decades has made the increasingly frequent circulations of packaged food knowable and controllable. The electronic tagging of products on the primary, secondary and/or tertiary package facilitates the identification of their contents permitting faster movement through ports, warehouses, depots, distribution centres and retail spaces. It was argued that as a consequence of this digitalisation of the food system, enabled by the packaging and barcodes, the food system has been converted into what (Dodge and Kitchin, 2004) would call another “code-space”. These processes ensure the regular, repetitive and anticipated flows of packaged food.

This chapter also focused on how packaging facilitates the mobilities of food processing plants. It was shown how the components of the manufacturing plant are set up around the packaging. Standardised designs of packaging thus permit the smooth, regular and anticipated functioning of automated and industrialised processing operations. The smooth and anticipated flow of inputs and outputs in turn permits the regular and anticipated delivery and distribution of packaged food. Indeed, the degree to which the production, distribution and purchasing of food are entwined makes it difficult to think about these processes separately. However, and importantly, all of the developments mentioned above have not only accelerated the speed of packaged food production but have also meant that food distribution networks have become more extended over time, contributing to the overall increase in the distance packaged food travels.

The previous sections have demonstrated how both plastic and paper have historically asserted themselves into the political economies of food production creating stable networks of global commodity circulation. Most types of packaging and packaged food networks would cease to exist if not for the regular and anticipated movements of raw materials and these have been historically entangled with cultural attitudes towards materials or what Shove et al. might call the “social life of materials” (Shove et al., 2007). The term “embodied mobility” was also introduced as a way of conceptualising these “upstream” commodity mobilities. These mobilities of packaged food have certainly been omitted from the research on food mobilities. More surprising still is their omission in the literature that looks at food networks or which attempts to

measure “food miles” which tend to focus solely on food and its distribution from farm to fork.

In following packaging as a raw material we can begin to get a sense of its continual formation and constant material transition (Ingold, 2007). However, packaging, in many respects, is never stable or already assembled. Moreover, thinking of packaging as always already in-process has implications for how we understand the manufacturing plant and the distribution of food. We might frame these as fluid *assemblages*.

The frame of assemblage might allow us to better understand the complex array of technologies, materials, bodies and cultures that are implicated in holding packaged food systems together. We might then view food processing as an on-going economic event held together by a series of situated sociomaterial practices. For instance, from a performative perspective the food manufacturing plant might be viewed not as a rather immobile and fixed site – a site of sunk investments, of relatively immobile infrastructure and a station where the flows of raw material inputs are temporarily immobilised only to be assembled into packaged food and then sent across an extended food network – but as a site continually in process and shaped by multiple fluxes and flows. In this sense the plant is itself in some sense mobile, being continually assembled and disassembled through the flows of raw material inputs, people, electricity and information, finished food products, wastes and information. It is these flows that breathe life into and mobilise what might have been considered “immobile” infrastructure and buildings necessary for food mobility. The food manufacturing plant may, therefore, be thought a site of continual becoming or as ontologically mobile (Law and Singleton, 2005); a shifting set of relations rather than a fixed and bounded site. Mobilities scholars have talked of the airport in these terms. Airports may be seen as fluid and constantly changing places being re-composed as people, objects, materials and information flow into and out of these hubs. As Adey notes of the airport “Tables may be replaced. Walls may be knocked down. Shops rebuilt and refurbished. Flooring replaced. A new restaurant added. Extensions completed” (Adey, 2006:82). Similarly, human body-minds, materials, pollutants, information and orders are continually (over)flowing in and out of food manufacturing plants, and changing them in the process. Likewise, within these turbulent plants, food packaging machinery is often being recalibrated, changed, new parts added, fixed or new lines introduced or taken away. For example, automated and semi-automated lines can run 24 hours with little

need for changeover and cleaning of machine components, however, other lines may only run in 30 minute production runs, especially for high risk items, specialised products or relatively low volume production runs (Fairbanks, 2008). Seen from this perspective the food manufacturing plant and packaging machinery seem far from stable and immobile but rather dynamic, fluid and in a process of continual becoming and transition.

Furthermore, the notion of assemblage, as outlined in the introduction, recognises the *autonomy* of parts and the vitality and agency of matter to assert itself, disturb and disrupt. This way of thinking of packaging and the food system is far removed from the relatively stable reading presented in the previous sections. This of course would require attending more closely to the situated sociomaterial practices as they unfold during packaging's journey as it transmutes through the food system (from raw material to packaging to packaged food). Greater attention could be paid to the repair work, monitoring and containment of crisis that continually erupt at these various sites (Swanton, 2013; Gregson et al., 2010b). Or, alternatively perhaps, it would require finding a case when packaging does not perform the role ascribed to it. When the packaging gets stuck in the machine. When it might not fit neatly into the container. When it leaks. All of these are instances which brings the agency and vibrancy of packaging to the fore.

Understanding packaging as a vibrant matter can be important for grasping the (often sudden) changes and complex politics of mobilities which surround them. Frictions can be identified. As Swanton reminds us in the case of the steel plant "continuous production processes rarely flow smoothly" (Swanton, 2013:283). The seemingly engrained mobilities and powerful networks have the potential, after all, to be disrupted.

One example can be found in the demise of celluloid. The emergence of celluloid during the latter decades of the 19th century went some way to replacing ivory and other expensive and rare plastics (Bijker, 1995b) and had some limited packaging applications for tobacco, cosmetics and medicines and even some sweets wrapped in celluloid film. Yet the supply of camphor which was required to produce celluloid was precarious (Meikle, 1995). Camphor came mostly from Japan, Formosa (now Taiwan) and China. But deforestation in Japan and China made Formosan camphor the only source which was monopolised by the Mitsui and Company, an agent of the Japanese

government. Restrictions in the supply of camphor would mean the mass production of celluloid was threatened. Moreover, attempts to grow the camphor laurel tree in Florida failed. An ANT reading of this event would suggest that the camphor laurel tree in Florida failed to be enrolled into a new celluloid production network. Nevertheless, the friction in the supply of camphor, as well as an increasingly negative cultural perception surrounding celluloid products, given items often burst into flames (Bijker, 1995b), draws attention to the vibrancy of celluloid (and the camphor laurel tree). It points to the cascade of becomings that meant celluloid could no longer be used as packaging.

Hawkins (2012) also highlights the vibrant capacities of packaging in her examination of the new publics assembled over the association with plastic bottles and oil through a water filter company advertisement. Bottled water companies work hard to make invisible the co-presence of oil and gas in the practices of consuming bottled water and for that matter any other food to-go packaged in polythene or polypropylene. We might speculate upon how knowledge of the “embodied mobilities” of the “final” products at the point of consumption may provoke the emergence of new publics assembling over new matters of (mobility) concern. Such tensions would bring to the fore packaging’s potency, vibrancy and agency. Existing work has highlighted the powerful role of (ethically charged) knowledge in the coordination and governance of supply chains (Barrett et al., 2004; Hughes et al., 2008). However, such knowledge, in the form of images and narratives, could also serve to re-configure and disrupt packaging and packaged food networks. Tensions could arise if food products that are positioned as local or more environmentally sustainable than others come packaged in polythelene, which, as this account shows, is neither local nor particularly environmentally benign.

The food miles movement that came to the fore during the 1990s and early 2000s (beginning, arguably, with Paxton, 1994) is one example of how these tensions can at times work to re-configure or threaten food supply chains. However, similar matters of mobility concern may be assembled over specific types of packaging and the miles generated through their production. Under these circumstances, the packaging would cease to be merely inert passive vehicles but would become lively objects; the stuff of politics. Such processes could suddenly problematize, politicise and de-stabilise wider packaged food systems, networks and chains and re-direct their mobilities and rhythms of production. As it stands these “embodied mobilities” are, for the most part, hidden. The connections between the mobilities of oil/gas or wood pulp are not readily

disclosed. It is in the interests of food manufacturers to render these stories invisible. More recent matters of packaging concern have instead been assembled around issues of biodegradability, and this has had a notable impact on the material flows of plastic and paper packaging, with paper replacing many plastic packaging applications.

As mentioned such performative ways of thinking the economies and networks of the packaged food system show a more open, transitory and disruptive life of packaging. Yet we must not lose sight of the romantic visions of stability, singularity and apparent immutability of packaging and the components of the food system that permit movement, as evidenced in this chapter. The precision of seamlessly coordinated movements of packaging, food and packaged food in Euclidean times and spaces is crucial to regulating and enacting the rhythms of packaged food production and distribution. Momentary stability and singularity in the form and composition of packaging is hugely important for enabling this precision and reproducing these intensive, precise, patterned and anticipated micro-mobilities of the food processing factory and macro-mobilities of food distribution. Similar stabilities will be addressed in the next chapter on packaging barriers and food safety. However, attention will also be paid to the fluidities and vibrancies that erupt and disrupt the stable flows of packaging and packaged food.

Chapter 4. Controlled mobilities or porous barriers?

4.1 Introduction

The previous chapter looked at packaging as a vehicle that helps move food and at its role in facilitating increasingly automated and industrialised food processing and efficient food distribution. It also focused on plastic and paper packaging as they flow as raw materials which opened up a discussion on re-thinking these networks in a more performative way, as in-process, and as materials having the capacity to disrupt. This chapter shifts the focus to examine packaging as a barrier. Much attention is paid to barriers as well as mobility in mobilities studies. And while packaging can be thought a highly mobile entity, especially as a vehicle for transporting food or when in the form of a raw material like oil, it can also mark a border or barrier that encircles and encloses food and, through its standardisation, entire food systems. These processes of enclosing transform packaged food into the stable category of “safe food” and food systems into “safe food areas”. This is set in contrast to those foods which come differently packaged or even unpackaged. These latter types of (un)packaged food are often classified as unsafe or risky.

Moreover, these barriers and their corresponding classification systems have important implications for the physical mobilities of packaged food across regional borders. Some jurisdictions only permit the movement of certain foods if they are packaged in particular and standardised ways. For example, in the UK, packaging standards are based upon a European Community (EC) directive on Articles and Materials Intended for Contact with Food. This legislation details which articles and materials are appropriate to wrap particular commercially available foods and which are not, and this regulates and restricts the flows of packaged food and packaging across and within European regional boundaries. This directive has been based on a large number of previous European directives which have for some time sought to harmonise how certain foods come packaged, beginning with the 1976 European Economic Community directive which attempted to limit the use of vinyl chloride monomers in plastic packaging (European Economic Community, 1976; European Commission, 2007). These standards also form the basis upon which private companies, such as supermarkets or chain stores, regulate or restrict the movement of food into their retail spaces.

We are left, then, with different yet interrelated territories – the region, the nation state, the retail space, the inside of the package – all guarded by various barriers or borders. These can include trade barriers which restrict the types of packaged food that can enter a certain jurisdiction. They can also include barriers to entry into the territory of the retail space and thus access to certain markets. And finally, at the level of the individual packaged food, we have barriers that separate the territory of “safe” food inside the package from the “unsafe” outside. These barriers, along with the historical path-dependencies discussed in the last chapter, work to further stabilise the form, material composition and trajectories not only of packaged foods but also of packaging itself either as raw material or converted product.

This chapter begins by detailing how these borders or barriers are constructed and defined. This means following packaging into the reference laboratories that make visible and measurable packaging’s barrier properties. Measuring the barrier properties of packaging in these reference laboratories involves running tests to see the extent to which, and under different circumstances, any given packaging barrier will preserve and protect (or not) the food inside. The results of these tests are then used to classify and categorise packaging and packaging materials according to its barrier properties which are eventually used to determine shelf lives and to create food packaging standards, trade barriers, and supposedly safe food territories.

Yet this jump from the locality of the reference laboratory to the creation of “larger” scale “safe food territories” and regional food packaging standards requires further examination. Therefore, the second part of the chapter traces the mechanisms by which packaging barriers get enacted outside of the laboratory. Of course, one element that must remain the same is the packaging itself and so echoing the previous chapter there is a requirement for standardisation in terms of the material composition of packaging. If the material composition of the packaging was not standardised the “safe” food system would no longer function and the claims made inside the laboratory would have no meaning outside. This requirement for standardisation in material composition has further entrenched the path-dependent and patterned material and commodity flows and so is implicated in packaging mobilities.

In addition to identical and immutable packaging so a number of laboratory techniques and practices must also be carried over into the food systems in order to ensure stability, consistency and safety in the packaged food system. These techniques

and practices include on-going monitoring and recording of packaging and of packaged food as it moves through the stages of manufacture, distribution and retail. As Hinchcliffe et al. (2013) note the creation of barrier systems or the “will to closure” – the will to draw borders and to control flows of anything undesirable across map-able terrains – is characterised by registration and number which permit, amongst other things, the calculation of risk probabilities over different aspects of food safety. This surveillance and statistical mapping helps enact the differences not only between different types of packaging and packaged food but also between regions with different food packaging standards and regulations. These practises and the proliferation of inscriptions serve to further stabilise and homogenise packaging whilst also reproducing and directing the mobilities of certain types of packaged foods and their components, as we saw in the last chapter. Furthermore, echoing Swanton’s (2013) performative analysis of the monitoring and maintenance practises that hold the steel plant assemblage together, we might add that the food system is held together by and subject to the same continual monitoring and maintenance.

There are, however, limits to these closures. The final part of this chapter, therefore, opens up the topological complexity of packaging and examines a number of controversies surrounding supposedly safe packaging, packaged food and barrier systems. These controversies reveal porosity in packaging barriers as well as multiplicity, uncertainty, fluidity and vibrancy of packaging more generally. These controversies lead us to question the strict divisions drawn between different types of (un)packaged food and what might be considered safe/unsafe food regions. Furthermore, and contrary to what has been outlined in much of the last chapter, such controversies render packaging and its components lively elements that can threaten or play havoc with the food system. Put differently, this liveliness of packaging materials can dramatically disrupt and re-shape the supposedly stable and entrenched mobilities of packaging, packaged food and their components across and within regions.

4.2 Defining barriers: the trials of food and drink packaging

One of the primary functions of packaging is to act as a barrier preventing some elements from getting in and others from getting out. The following exchange with a packaging executive illustrates the importance of this feature of packaging:

What are the most important factors that are guiding packaging design today?

-in my organisation product safety. Always product safety, product safety, product safety. And I guess most packaging companies will tell you the same.

-what you mean by product safety?

-does the packaging ensure the product is safe to consume when the consumer buys it? Is it sealed properly? Can contaminate get in? Do you know when it left the factory? And in to-go packaging such as coffee cups, it's a cup, the coffee is made in-store, but in things like sandwiches has anything been able to get into that product from the point it left the factory? Is its barrier correct to protect the product from the environment? So a sandwich has got an awful lot of moisture and, is the moisture that needs to move through the packaging moving through the packaging without preventing bugs and beasts getting in and at the right rate so you don't end up with a soggy sandwich or a stale sandwich, and we've all had a soggy sandwich or a stale sandwich and they're horrible. So it gets interesting. (personal communications, April, 2012)

As this exchange shows designers of packaging and packaged foods must address a number of questions that relate to food safety and the barrier properties of the packaging used. But answering these questions and selecting the “right” packaging, with the “right” barrier properties, requires making visible, knowing and measuring the movement of such things as moisture, contaminants or the “bugs and beasts” that are trying to get in. This depends on the work done in yet another region: the laboratory.

Facts and numbers produced inside laboratories are the result of a battery of tests that make visible and measurable these micro-mobilities. Through the surveillance practices of the laboratory codified measurements and classificatory schemas are created that distinguish appropriate from inappropriate packaging according to its ability to maintain or stabilise the sensory, chemical, physical and microbiological characteristics of food.

The factors that affect the sensory, chemical, physical and microbiological characteristics can be further divided into intrinsic and extrinsic factors. Intrinsic factors refer to the properties of the “final” product whereas extrinsic factors relate to those factors the “final” product encounters as it moves through the food chain (Kilcast and Subramaniam, 2000). Thus the intrinsic factors include: water activity or available water in food, Ph value of food, redox potential (rate at which oxidation happens), available oxygen in food, nutrient content of food, natural micro flora and initial microbiological loads in or on the product, the biochemistry of the product (enzymes, chemical reactants etc.) and the types of preservatives used in its processing. Extrinsic factors, by contrast, include: the time-temperature profile during processing, storage and distribution; composition of atmosphere and headspace pressure in package; relative

humidity, exposure to light and environmental microbial counts during processing, storage and distribution; subsequent heat treatment; and consumer handling.³

Interactions between intrinsic and extrinsic factors can stimulate or inhibit a number of microbiological, chemical, physical or temperature related processes which can significantly change the food and drink contained within the package. In order to slow down or avoid these changes food manufacturers have deployed a range of methods to control as much as possible these interactions. These techniques or methods are known in the industry as creating “hurdles”. One vital hurdle is the packaging of food, for instance. Others include applying high or low temperatures to the food during processing or storage, changing the PH levels, modifying water availability or modifying the atmosphere of the packaging (Leistner and Gorris, 1995; Leistner, 2000).

No single hurdle in isolation will make a product safe or ensure its quality but when a number of these techniques are applied together they become much more effective. Similarly if one hurdle is missing the whole food safety system may fail. Nevertheless, it may be argued that some hurdles are more effective than others insomuch that if they are missing food will change much more quickly. The packaging used, for example, is often crucial for the control of most intrinsic and extrinsic factors and interactions.

It is useful, for this discussion at least, to re-think of intrinsic and extrinsic factors in terms of their (micro)mobility. After all, each factor involves control of the physical mobility of different elements (water vapour, gas, microbes etc.) through the packaging barrier. When thought of in this way, the barrier properties of packaging attain a greater significance, being as they are physical barriers which control the physical movements of many micro-elements either into or out of the food.

We can now return to look in more detail at the type of testing done at the laboratory. Whereas in the last chapter it was mentioned that packaging is tested in laboratories to ascertain its strength and integrity through simulated distribution, different types of packaging are also tested in the reference or contract laboratories to define their ability to prevent mobile contaminants getting in and other micro-elements getting out. The results of these tests are then used to categorise packaging and packaging materials in terms of their ability to control and regulate the (mobile)

³ Taken from Kilcast, D. & Subramaniam, P. (2000) *The stability and shelf life of food*. Boca Raton: CRC ; Cambridge : Woodhead. P. 1-10

intrinsic and extrinsic factors that affect food safety and quality. For instance, different packaging may be compared for its ability to control various intrinsic factors such as its ability to reduce water escaping, to maintain PH values, to reduce the rate at which a food oxidises or to reduce the capacity of nutrient loss. Different types of packaging may also be tested for their effectiveness at regulating various extrinsic factors such as the degree to which they protect food from exposure to microbes during processing, storage and distribution, the degree to which it protects food from light exposure, and/or the degree to which it can maintain a consistent atmosphere inside the packaging.

Similarly, packaging tests may also form part of wider challenge tests of packaged foods. Here experiments optimise different variations and combinations of hurdles in order to determine the “safe” shelf life of a product under different initial conditions. If testing for the ability of a packaged product to support the growth of dangerous pathogens the tests must take into account factors such as the level of challenge inoculum, method of inoculum, duration of the study, sample analysis, and storage conditions.⁴ But these tests also require that the packaging is identical to that used in commercial settings.

The tests include bacterial or microbial count which establishes how effective the packaging barrier was at preventing the movement in or out of these micro-elements. A number of methods are deployed to count microbes or colony forming units ranging from simply counting these under a microscope to more sophisticated spectrometry methods.

Other forms of testing and measurement performed inside reference laboratories that directly test the packaging include the testing of the migration of chemicals into food from packaging. These tests can again be thought about in terms of mobility. To ascertain the rate of migration of chemicals into food from packaging scientists may again use methods of mass spectrometry. The most common mass spectrometry method – gas chromatography-mass spectrometry – involves dissolving the package or food simulant into a solvent which is then heated to render the solvent into a gaseous state and then injected into a column. Each particle travels at different speeds and this process serves to separate particulates. Once separated an electric charge is applied

⁴ See the US Food and Drug Administration website for details of the typical requirements for challenge testing:

(they are ionised) which enables scientists to read the molecular weights on a computer screen and therefore detect the migration rates of different particles.

These tests and measurements of the sensory, chemical, physical and microbiological characteristics of food and packaging are important for distinguishing and classifying different types of packaging. But these tests and the decisions that render packaging safe or unsafe rely upon further tests looking at the toxicity of certain pathogens or chemicals that migrate onto food.

The aim of toxicology testing is to create a reference or critical limit any given contaminant to determine its harm to animal or human health. The standard procedure for setting the critical limit of any given contaminant in food is usually achieved through animal testing. Here scientists can isolate the compound under investigation, expose it via diet or introduce it intravenously and trace its movement into and through the animal. These are most often rats or mice. These animals are then monitored to ascertain any “adverse effects”. The adverse effects are often measured through observation of the animal, through extracting blood samples or by dissecting organs to measure the rate of absorption of the contaminant into the body. These findings from animal testing are then extrapolated to estimate the limits, which when exceeded, may constitute a danger to human health. These limits then provide the benchmark from which to test the effectiveness of different types of packaging and other hurdles.

Again, these forms of toxicological testing may be usefully re-conceptualised as tracing or following various mobile entities whether a chemical moving from packaging to food or as a toxin moving through an infected animal. Indeed, inasmuch as these tests trace and detect more or less mobile elements, they may be viewed as types of “mobile methods” or in some cases “multispecies (mobile?) ethnographies” (Lavau, 2013; Kirksey and Helmreich, 2010:555-556). After all, in all of the tests mentioned above a substance or element is being traced through space and time, albeit over relatively short distances and more or less short times. These can include tracing the mobilities of microbes as they spread across the surface of food, gas as it escapes from inside the package, particulates as they travel along the chromatographic column or toxic compounds being followed through animals. All elements or entities entail some form of movement, either escaping from food, ingression into food or migrating from elsewhere and so on. One here is reminded of the molecular ways of thinking mobilities as outlined in the introduction. The laboratory, then, is a site where “molecular”

mobilities are revealed and objectified; a series of mobilities that can be controlled to greater and lesser extents by different types of packaging barrier. And through these processes the packaging barrier properties get defined.

Yet while the work that goes on inside laboratories happens at an almost molecular level, the data that gets produced has effects that can reverberate across much larger scales. Alternatively put, the molecular mobilities produced at the laboratory can have huge effects on the macro-mobilities of packaging and packaged food. Knowledge of these mobilities, and knowledge of the ability of different packaging to control or stop them, gets conjoined with classificatory schema that establishes, through legislation, whether one type of packaging or packaged food can move into certain territories or not. As one packaging designer puts it:

- It's all about complying with legislation. Or if you've got corporate norms beyond that so be it. (personal communications, April, 2012).

Therefore, the knowledge generated at what may be considered local and yet very mobile laboratories and lab experiments help create enclosures around food which also help enclose territories at much larger national and regional scales. This interconnected closing off of different territories across multiple scales relates to what Hinchcliffe terms the “will to closure” – the desire to limit the flow of undesirables across territories and bodies. And the boundaries that govern these enclosures strongly shape the trajectories and routes of packaged food and their components.

However, in order for these knowledges to travel and to travel well, and for claims regarding the barrier properties of packaging to have any meaning outside of the laboratory, packaging and packaged food must be accompanied by texts, statistics and various documentation that details these barriers properties, making them easily visible, readable and, importantly, knowledge of them mobile. The next section will look more closely at these immutable mobiles that take the form of texts, statistics and documentation, emerging from the laboratory and elsewhere that work to enact these enclosures.

4.3 Enacting barrier systems

Whereas the previous section looked at how barriers are defined inside the laboratory, this section examines the practices, techniques and immutable mobiles that enact these barriers outside of the laboratory. An early study by Bruno Latour (1983) outlined a number of processes required for the laboratory findings to make any sense

or have any impact outside of the laboratory. Latour used the example of the techniques used by French microbiologist Louis Pasteur and colleagues as they defined the anthrax disease and produced its cure in the form of a vaccine. The first stages involved isolating, cultivating and making visible the anthrax bacillus. The scientists could then mimic the outbreak of anthrax disease in the laboratory by inoculating animals with the virus. Through working with these materials on a daily basis and over time scientists could then create a vaccine that could replicate the variation of virulence on a much more frequent and micro-level scale in the laboratory.⁵ Together these initial processes captured the interest of a number of groups like veterinarians and French farmers whose cattle were dying of anthrax. To use the terminology of ANT, these initial processes worked to enrol more and more actors into this particular actor-network.

Similar laboratory techniques, practices and methods have been detailed above in the context of scientists who work to define the barrier properties and the safety of new packaging and new types of packaged food. Indeed, Pasteur is widely seen as the father of microbiology – a science which is hugely important for the production of safe food and the science upon which many of the tests detailed in the previous sections are based. For example, in the previous section it was shown how scientists seek to isolate and make visible the micro-elements and their movements in order to later define the barrier properties of packaging. But what happens in the laboratory means nothing if it cannot be scaled up and moved beyond the laboratory walls. Latour notes how Pasteur faced similar problems, namely, how to extend the network beyond a small group of interested actors.

According to Latour, there are two important interrelated processes required in order for the laboratory findings produced inside the laboratory to make any sense outside. The first is that certain practices and aspects of the laboratory must be extended. The second related process for laboratory findings to make sense outside requires the continual surveillance in order to verify that they work or not.

Latour details, for instance, how the predictions made in Pasteur's laboratory would only hold once the farms used for the field trial were transformed to resemble more the laboratory. So provided a number of laboratory practices were respected – the trial farms were to be cleaned and disinfected, inoculation gesture set, results timed and

⁵ Latour is careful to point out that the creation of the vaccine was not caused by the actions or thoughts of an individual genius scientist but came about as a result of the practical know-how gathered over time by scientists working in the laboratory and through working with these materials.

recorded and so on – it was claimed that the farmers would be free of the anthrax that had been killing their cattle. These practices and techniques were then extended to all other farms who wished to be free of anthrax after the success of the trial.

In addition to transforming the farm, Pasteur also relied on various statistics-gathering institutions in order to verify that the vaccine that he handed out “all over France” was indeed working. From charting and mapping the disease one can see (from a centre) how the anthrax disease is distributed and how this differential distribution relates to the differential distribution of the vaccine. It is only through these statistics gathered in the headquarters of the agricultural institutions when it can finally be said that the roll-out of the new vaccine is the “cause” of the decline of anthrax.

Accordingly, for the predictions made in the reference laboratories with regards the capabilities of certain types of packaging to control unruly and dangerous mobilities to hold true so the food system needs to be transformed to look more like the laboratory and appropriate surveillance systems in place. Both these factors that help extend the laboratory beyond its walls and thus enact packaging barriers are brought together through implementing quality assurance/risk management systems such as HACCP (Hazard Analysis Critical Control Point).

HACCP systems have transformed the food system making it look more like a laboratory. It requires, firstly, that manufacturers describe the production process and final product in detail, which includes interrogating the “packaging system” used. This is meant to reveal what are termed “critical points” that must be monitored continuously as a way of being able to trace (and prevent) problems that may emerge. However, the identification of critical points including, for instance, the type of packaging system used, must be based on “sound science” (Mortimore, 2001:212). HACCP procedures can also include measuring the integrity of the “final” packaged product by sending samples to a contract laboratory. The results are then used to verify the probability that all the final packaged products meet the specifications outlined by the factory or customer; practices which further blur the lines between the food system and the laboratory.

HACCP systems often force food manufacturers to use exactly the same packaging as that tested in the laboratory. Without identical packaging the predictions over food safety or quality as claimed inside the laboratory would simply not hold. In this sense packaging can be thought of as one of Latour’s “immutable mobiles”

insomuch as it helps stabilise relations between the laboratory and the food system over time and space. Of course these relations are stabilised in more ways than by using identical packaging. As mentioned in the previous section without a number of other conditions in place the “hurdle” or barrier properties of the packaging would not be very effective for some foods, even if the packaging is identical. So consistent time-temperature profiles must be maintained across the food system, the food itself must be identical, light exposure consistent and so on.

HACCP systems then re-enforce this homogeneity by reemphasising and codifying mundane practices associated with good hygiene practice as well as continuous monitoring and recording of the critical points in the production process. Practices which, once again, resemble the monitoring and surveillance practices performed in the laboratory.

HACCP systems emerged primarily as a response to the perceived inadequacies of government inspectors who would come only occasionally to test food products (Busch, 2004). However, it has now been extended to include packaging manufacture. As the Food Safety Alliance for Packaging (FSAP) who recommend implementing HACCP systems in packaging manufacture detail:

Food Safety starts at the packaging supplier and continues through consumption. Packaging suppliers, especially those with direct product contact and/or printed materials, are important Food Safety partners. (FSAP, 2010:2).

Consequently, packaging is now increasingly monitored and recorded as it moves through different settings. Packaging might be probed in storage to check for contamination or it might be checked at the production stage to ensure the correct quantities of certain materials are present. The inscriptions generated through HACCP procedures during the manufacturing and distribution of packaging get translated into or take the form of immutable “declarations of compliance” that must accompany, by law, all batches of newly manufactured packaging in Europe. HACCP inscriptions produced through packaging manufacture thus permit a greater degree of traceability in the food system than was once possible and this traceability often determines where packaging (and the food it eventually contains) can go and where it can be used.

These techniques of surveillance, from the packaged food product through to the packaging manufacture, help verify and reproduce homogenised “safe food areas”. These processes again relate to what Hinchcliffe et al. (2013) have termed the “will to

closure” which are governed increasingly by number. As Hinchcliffe et al. (2013) and Law (2006) have shown when faced with more complex epidemics involving the mobilities of viruses, microbes and prions, governments have sought to enclose a greater number of areas where success is measured in terms of the ability to make visible and control the flow of these undesirables across territories or “map-able terrains”. HACCP procedures, as a series of prescribed actions and through the production of immutable inscriptions of packaging and packaged food form part of this “will to closure” and the associated “barrier systems”.⁶ These processes help enact packaging barriers systems on much larger scales beyond the level of the individual packaged food. To put it slightly differently these processes allow larger barrier systems (packaged food areas) to be built upon smaller barrier systems (packaged food), but the differences in scale are somewhat misleading given both are so intertwined.

The proliferation of inscriptions and statistics generated through HACCP principles and their extension across many more parts of the food system therefore works to connect what happens in the laboratory at the testing stage with the world outside of the laboratory. In the processes aspects of the food system are transformed to look more like the laboratory. Packaging barriers figured as texts and numbers can easily travel unchanging to the desks of government law makers (or other statistics gathering institutions) who then codify and translate them into regional or national standards or barrier systems that close off these territories. The data generated is also used to monitor and verify the tests in the laboratories and for legislators to “see” the effectiveness of different barrier systems.

The effectiveness of packaging as a barrier is, therefore, created through various statistics that are gathered throughout its mobile life. After all, knowledge of packaged foods’ immutability is often only possible through the inscriptions that circulate with it. The inscriptions generated at the laboratory, as seen in the last section, are only one form of the countless texts that follow packaging. And while texts generated in the laboratory constitute important benchmarks and powerful texts used to create legislation on packaging they are only made meaningful once combined with and mediated through the multitude of HACCP data being produced on a daily basis from packaging and food processing plants as well as from shops and supermarkets. Put another way, HACCP

⁶ Hinchcliffe et al. talk mainly of barrier systems in the context of biosecurity and in terms of the structural integrity of buildings, fences, their regular maintenance and general design to prevent the incursions of pathogens, but the same term is applied here to talk of the barriers that packaging creates between its safe inside and unsafe outside.

statistics are used in combination with the inscriptions and numbers coming from tests run in laboratories in order to verify (or challenge) the effectiveness of existing or new types of packaging. In this sense these texts on packaging constitute immutable mobiles that, as Latour reminds us, are objects which have the properties of being *mobile* but also *immutable*, *presentable*, *readable* and *combinable* with one another (Latour, 1987). This continual surveillance and production of countless immutable mobiles associated with packaging also constitutes an important way in which barrier systems get enacted beyond the laboratory.

Such ways of thinking about packaging not only resonates with Bruno Latour's (1987) notion of an immutable mobile which holds steady and stabilises wider network relations, it also chimes with Mol and Law's (Mol and Law, 1994; see also Mol and Law, 2001a) discussion of the relations between network and regional topologies. As the previous paragraphs have shown it is the complex and overlapping measurement networks (and the circulations that constitute these networks) that helps create and differentiate packaging or safe food regions.

However, these statistics also govern the movement of packaging and packaged food. Furthermore, those objects that do not participate in these complex measurement networks can be excluded from entering into regional spaces like the UK jurisdiction or even within the walls of a supermarket. The existence of these complex measurement networks, therefore, works to regulate packaging and packaged food mobilities. For instance, the implementation of HACCP standards and procedures has been shown to unevenly impact smaller food manufacturers (Busch, 2004; Nestle, 2010; Taylor, 2001) who may not have the resources available to continuously monitor processes. The same might be said for smaller packaging manufacturers. These smaller scale producers may not have the ability either to make visible or fully control micro-movements or molecular mobilities of food components. And this inability to know and control the movements of these micro-mobilities has important repercussions for the flows and directions of their products.

The same barriers apply to many types of innovative packaging which have not yet been incorporated into these complex measurement networks. As a material engineer mentioned when talking about the difficulty of rolling out potential innovations in packaging such as introducing recycled material into the manufacturing processes:

Because one of the recycling routes is to incorporate used materials into a new product, there is a lot of resistance from people in the (food) industry with manufacturing standards to use recycle as part of their process. You have to do a lot of testing work to convince them that it's good, it's worthwhile. Because they have threats from litigation all the time if they do something wrong. (personal communications, February, 2012)

Any new types of packaging intended for contact with food material must first flow through the obligatory passage point of the laboratory measurement network and this journey is costly, as a scientist who works in a reference laboratory points out:

...testing costs hundreds of thousands of pounds so you need to have a good business case for changing the packaging. (personal communications, April, 2012).

Yet it is only by participating in these testing and measurement networks that innovative packaging systems and new barriers can get enacted beyond the walls of the design studio or the laboratories of material engineers. As a consequence, threats of litigation, the high cost of introducing new packaging and the high costs associated with complex systems of surveillance lead to a rigidity of both packaging and food systems. As competition gets eliminated so both packaging and food industries become more concentrated, industrialised and homogenised. Many do not see this as a problem, for example as one expert put it: “packaging, it works, it works really well”.

However, for others who are concerned with packaging waste or with the vast unrenewable resources that are used to produce packaging (as seen in the last chapter) these barriers to entry for other innovative packaging presents a significant problem. It would seem sensible to re-use much of the waste packaging, and in some cases this does get achieved (with glass and tin, for example). But to re-configure all packaging systems to become closed loop systems would require large amounts of testing, as pointed out again above. Furthermore, achieving closed loop packaging systems would dramatically re-shape the trajectories of packaging as waste as well as the raw materials used to produce it in the first place. But without extensive prior testing and subsequent legislation permitting such practices, these ideas will remain ideas and not realities.

Where innovations do get rolled out these are more often geared towards extending the shelf life of food by increasing the complexity of packaging and improving the control over the mobility of various micro-elements. As a materials engineer with years of experience in the packaging industry puts it:

We've gone from a lot of, how shall we say, simple packaging – glass bottles for milk, paper wraps and things like that...wax paper maybe – to more specialist systems. The Styrofoam trays with meat in them are now packaged under nitrogen... so you've tried to extend shelf life of packaging by improving its permeability but also excluding

oxygen and water vapour from the material itself to start off with and that has required us to develop better seals...the glues have changed, a lot of packages are heat sealed so there is no need for glues because the glues have to be compatible also. (personal communications, February, 2012)

An expert on food systems, also with years of industry experience, notes how:

Because essentially what happens is that if you can combine the properties of different plastics to provide a net result which combines the benefits of those two types of plastic without the drawbacks of only one of them you can then extend the shelf life which is the holy grail for the food industry of any perishable product. So essentially what people are trying to do is take any food products that have only been pasteurised and extend the shelf life by improving the barrier properties of the package they are in. (personal communications, April, 2012).

Accordingly, the borderlines which enclose the inside of the package have supposedly become even better at controlling flows at this micro-level. Yet knowing about these improvements requires and relies upon ever more sophisticated, specialised and vast measurement and surveillance systems such as those detailed in the previous paragraphs. And participating in these systems is difficult, expensive and often beyond the reach of many smaller operations. In this sense the standards surrounding packaging and packaged food, which rely upon the necessary supporting documentation and participation in measurement networks, create a politics of packaging and of packaged food mobility insomuch as they circumscribe, re-route and direct their movements.

However, the fairly stable account of how measurement networks interact to create standard barrier systems that entangle the enclosed space of inside the packaging with the enclosed spaces of “safe packaged food” areas may be somewhat simplistic. There are limits to thinking in this way. Barrier systems may seem, at first glance, immutable and stable, but they do generate controversies and uncertainties that render these objects and networks more fluid and changeable. For example, the interactions between scientific networks and the policy networks that create standards and policies do not follow a linear and unidirectional path. Facts do not simply get produced and followed by recommendations which are then formulated into legislation or standards. Standardisation and knowledge making are mediated through two-way or circular interventions where questions and problems can get defined by policy makers or other interest groups (see Hinchliffe, 2001 for an examination of the intersection of indeterminate policy and science in the BSE crisis). The final section will now look at some of these fluidities, multiplicities, uncertainties and vibrancy of packaging, packaged food and barrier systems more generally.

4.4 Fluidity, multiplicity and vibrancy in food and drink packaging

Statistics suggest that foodborne pathogens still breach the barriers of secure and supposedly “safe” packaged food systems despite improvements in the barrier properties of complex packaging. A report cited by Nestle (2010) from the Institute of Medicine at Washington DC estimated 91 million cases of food poisoning per year in the US, and in the UK an estimated 9 million cases of food poisoning are reported each year (BBC, 2013b). As Nestle (2010) points out, though, these statistics on foodborne illness are uncertain. While outbreaks are always reported individual cases are not and so the actual incidences of food poisoning may be much greater than those reported. Further, as Nestle (2010) has argued, it is the very organisation of the food industry, enabled by packaging, which has increased the scale and risk of microbiological foodborne illnesses. Paradoxically, then, packaging designed to make food systems safer may in fact be making them unsafe by enabling the current configuration of the food system which generates significant risks.

While almost all packaged foods have the potential to carry pathogens it is those which are unprocessed or minimally processed that constitute the greatest risk. But again, such systems of fresh, minimally processed foods only exist because of advances in packaging that have extended their shelf life. To repeat once more a section from a quote cited above:

So essentially what people are trying to do is take any food products that have only been pasteurised and extend the shelf life by improving the barrier properties of the package they are in. (personal communications, April, 2012).

Minimally processed fresh foods also constitute a growing proportion of the food to-go market that will be the main focus in the next two chapters. The fact that most convenience food to-go is fresh makes it more risky and makes the packaging systems used that much more important. Increasingly centralised and automated convenience food production systems have multiple uncooked or unprocessed food components flowing into and through manufacturing plants, being combined and re-combined to produce wide ranges of fresh yet highly differentiated products. Such forms of organisation provide opportunities for cross or re-contamination across product lines. The centralisation of these food processing operations coupled with the scale and complexity of the distribution networks means a batch of food contaminated with pathogens can be spread across much more extensive geographical areas and may infect many more people. Indeed, a 2009 AMCSF (Advisory Committee on the

Microbiological Safety of Foods) report highlighted an outbreak of listeria in the UK during 2009 which was associated with a “particular national chain of convenience store” (ACMSF, 2009:10).

Packaging might then be considered a vehicle for mobile pathogens as it not only allows riskier food systems to exist but also becomes the literal vehicle which enables these pathogens to move so extensively. A European Community report on listeria corroborates this idea that packaging might be the vehicle for the mobility of certain pathogens when it states:

It has been suggested that prepacked foods may be more critical in relation to human *L. monocytogenes* risk than foods without packaging (Teufel, 1994). Because of the ubiquitous nature of *L. monocytogenes* the physical handling of foods may lead to contamination of food products. Therefore it could be speculated that packaged food not heat treated in the final package and with a long shelf life could represent some of the more critical food groups (European Commission, 2008:27).

Centralised, pre-packaged convenience food systems with extensive distribution networks may, therefore, be encouraging the spread of dangerous pathogens such as listeriosis, meaning the packaging which enables these systems might, paradoxically, be both barrier and vehicles for pathogens. It perpetuates what might be termed the “mobile risks” (c.f. Kesselring, 2008; Cidell, 2012b) of the food system and such events raise questions over the supposed immutability of packaged food.

Apparent advances in packaging have also constructed entirely novel (mobile) risks. As Busch (2004) points out, technologies of food processing such as canning, which have been around since the turn of the 19th century, have “created” botulism. Packaging gives the botulinum bacteria the time needed to produce the deadly toxins which make food unsafe. Rendering food immobile or incarcerated in a package for extended periods enables toxin formation and allows other bacteria to multiply and exceed safe thresholds. In these instances the immobility of food afforded by the packaging facilitates the mobility (or spread) of pathogens (or their toxins) over the food itself. Extending the life of food – one of the primary purposes of packaging – may thus simultaneously create new microbiological problems, again blurring the lines as to whether packaging makes food safer or unsafe.

Yet certain actors (e.g. the food industry) seek to hide these multiplicities, fluidities and uncertainties, especially when these have implications for packaged food mobilities. For example the Chilled Food Association (CFA) and the British Retail Association (BRA) vehemently opposed a guidance document published by the Food

Standards Agency in 1995 which asked retailers to change its shelf life guidelines for chilled vacuum or modified atmosphere packaged foods stored at between 5-10°C from 10 days (the so-called 10 day rule) to 5 days. The decision to change these guidelines was based on a report by the ACMSF which was itself based on a review of 31 references from the literature (mostly challenge tests) on the production of neurotoxin by nonproteolytic *C. botulinum* within 10 days at $\leq 10^{\circ}\text{C}$, predictions from computer models and an unpublished industry challenge test data (Peck, 2006).

While keeping products cool and/or reducing the oxygen in the headspace of a packaging either through modifying atmosphere or by removing atmosphere altogether certainly restricts toxin formation or the mobility of some bacteria, it does little to inhibit the toxin formation of certain strains of the botulinium such as non-proteolytic *C. botulinum*. Non-proteolytic *C. botulinum* is psychotropic meaning it can produce toxins at temperatures lower than 10°C so chilling foods at temperatures at or below 10°C is not an effective hurdle for controlling non-proteolytic *C. botulinum*.

The CFA and BRA then co-sponsored a 255 page document to counter the claims made in the document by highlighting the low statistical probabilities of such events occurring based on past experience. The aim was to reproduce a single and stable narrative not only about the shelf life but also about the packaging system in general. The document constituted one example of a strategy used to efface multiplicity. At the heart of these concerns, though, was the impact such a change would have on packaged food mobilities. For example, the CFA website states that implementing the change in shelf life for these particular types of packaged foods “would have had a detrimental effect on chilled foods making the production and distribution [i.e. mobility] of most chilled foods impractical” (CFA, 2013). While the packaging is clearly implicated in this controversy there is little or no discussion of how it may help create or exacerbate these problems. The packaging is black-boxed, enacted as a stable element working quietly and unproblematically in the background.

Unsurprisingly, the CFS/BRA document advocated good manufacture practice or HACCP quality assurance systems in order to mitigate non-proteolytic *C. botulinum* outbreaks. However, even this measure is highly dependent on the variable cultures of safety within organisations (see Law, 2006 for his account of the variable cultures of safety between abattoirs in the foot and mouth disaster in agriculture). The solutions proposed in the CSA/BRA document, and packaging’s enactment as a safe technology,

are, therefore, only as strong (and as singular and stable) as the variable cultures of safety in the organisations that are meant to implement them. At a more corporeal and performative level the functioning of HACCP systems may collapse if something as mundane as the worker who keeps these lively matters at bay has a bad day and fails to wash his hands or takes the wrong measurement.

Consequently, the multiplicities of the food system and of packaging are effaced by some actors, like the food industry, who attempt to peddle a narrative of a safe and stable packaged food and impenetrable barrier systems in order to maintain the entrenched circulations of food and packaging. Documents like the BRA and CFA sponsored report, and the multiple strategies to efface multiplicity within the report, provide a way of simplifying what is in fact a highly complex and finely balanced set of on-going fluid relations. They also work to hide the inherent multiplicity and fluidity of packaging which can make food safe but also unsafe and can work as a barrier to and vehicle for mobile pathogens. These are different versions that are not merely differences in perspective but are actually made real through different method assemblages and practises. Packaging or packaged food is thus not always stable but often mutable, changing as its relations change.

However, while this latter example may have shown the relatively successful strategies used by industry to efface multiplicity and avoid controversy maintaining, in the process, the entrenched and regular patterns of food and packaging mobility that form part of their (on-going) economic organisation, there are many examples where this has not been the case. The next section will look at a different type of mobility or “mobile risk” associated with packaging and packaged food and its implications for the movement of packaging and packaged food.

4.4.1 *Chemical migrations*

Sarah Whatmore (2006) in talking of “materialist re-turns” in human geography has drawn attention to the changed relationship between science and society. In particular, and drawing upon the work of Michel Callon, she has noted how impromptu ‘hybrid’ forums can “swell in the face of new technologies – like GM or mobile phone masts – gathering to them all manner of concerned citizens and/or consumers; seasoned advocacy groups; scientific dissidents and the like that can change the commercial and regulatory fabric of such technologies.” (2006:606). Gay Hawkins, in talking of the plastic bottle also refers to the “hybrid forum” as a site “where questions about matter,

politics, nature, science and more proliferate” (2011:539), not through deliberative negotiation but “via the affective force of what Bennett (2004) calls ‘thing-power’” (Hawkins, 2011:539). The controversies examined in the previous section may be thought of as “hybrid forums”, but they have had little commercial or regulatory impact. This section, by contrast, will focus on a hybrid forum that has been assembled around BPA – Bisphenol A, a chemical component of plastic packaging. This hybrid forum has had significant impact not only on the regulatory and commercial fabric of food packaging but also on the interconnected mobilities of packaging and packaged food.

It is worth noting, firstly, that such issues are not particularly new. Anxieties over the contamination of food with chemicals can be traced back to the birth of an industrialised food system. Indeed, chemical contamination in general could be seen to constitute a “modern risk”; that is, one that cannot be effectively delimited spatially, temporally or socially (Beck, 1992). Only with sophisticated equipment and similar measurement networks as those deployed to detect and trace microbiological risks can these other mobile risks be detected or constructed. The chemical contamination of food also relates to a shift in concern from food adulteration to food safety; “from searching for those humans who deliberately and knowingly tamper with food to searching for non-humans that taint the food supply” (Busch, 2004:164).

Nonetheless, interest over the migration of chemicals from packaging into food has grown over the past few decades. As mentioned in the introduction to this chapter the first sign of any European wide legislation on the migration of chemicals from packaging into food was the European Economic Community directive 142/76 on the approximation of the laws of the Member States relating to food contact materials and articles which contain vinyl chloride monomers. In the next decades a growing number of UK government sponsored reports were commissioned to detect and trace these chemicals. By the mid-1990s, for example, surveys were released to determine the concentrations and migration rates of benzene from plastic packaging into food. The then Ministry of Agriculture Farming and Fisheries (MAFF) recommended manufacturers to “reduce as much as possible the concentrations of this chemical” in the packaging (Ministry of Agriculture Fisheries and Food, 1994). The relatively recent crisis of BPA migration from packaging, then, can be situated within this broader historical context.

Bisphenol A is widely used to harden plastics and as a sealant for tin cans and around 6 billion tonnes are produced globally each year. BPA was first used as synthetic oestrogen injected into animals or given to women to counteract various “women’s problems” (Vogel, 2009). However, it was not until the mid-1950s when this chemical was commercialised for use in plastics manufacturing and synthesized as an epoxy resin used as sealing for tin cans. Chemists at Bayer and General Electric found that when polymerised, BPA formed a hard plastic known as polycarbonate. Since the late 1950s BPA has been used in a wide range of applications including a wide range of packaging materials including sports bottles before 2012, baby bottles, lining for tin cans, and many hard plastic containers.

As Vogel (2009) points out, the chemical was assumed safe by the authorities and industry given exposure levels are generally very low and it is metabolised quickly. Tests conducted during the 1970s could not establish a link between BPA exposure and cancer risk from high-dose exposure. However, these studies did not examine the transplacental effects from mother to child or the potential for developing various hormonal carcinogenesis. Moreover, these early studies did not pay attention to the non-linear relationship between dose and response of chemicals like BPA and it has been suggested more recently that low doses of BPA may actually have a greater effect than once thought.

An influential study published by a group of scientists in 1997 (Nagel et al., 1997) was the first to suggest low-dose exposure of BPA to male mice foetuses significantly increased the prostate weight relative to control males. This study fuelled further debate within the scientific community over the risk of BPA and led to an enormous number of new studies that examined the effects of low-dose exposure of BPA in mice and in humans. As a response to these studies a chemical and plastics industry sponsored report published in 2004, and an updated version published in 2006, used a “weight of evidence” assessment to contest many of the claims being made.

In 2006, 38 experts on endocrine disrupters and BPA were convened to assess the literature on the risks of BPA. This event was coordinated by the Division of Extramural Research and Training and the National Institute of Environmental Health Sciences and a consensus statement was produced that declared concentrations of BPA found in the human body to be associated with a number of adverse effects. A final report published in 2008 conducted by the National Toxicology Program and the Center

for the Evaluation of Risks to Human Reproduction further stated that the “possibility that Bisphenol A may alter human development cannot be dismissed” (Kiss, 2011:14).

Soon after this declaration the Canadian government re-classified BPA as a toxic substance and threatened to ban packaging containing BPA. Retailers also moved quickly by offering alternative packaging such as BPA free water bottles and baby bottles. During this period the media played a role in amplifying BPA in packaging as an issue (Kiss, 2011). In the UK context campaigns such as the “no more BPA” campaign organised by Breast Cancer UK began to emerge.⁷ As public opinion shifted so too did the policy response in other countries beyond Canada and the US. In Europe, the Danish government used the precautionary principal to introduce, in July 2010, a temporary ban on BPA in food contact articles designed for children and infants. European legislation then banned baby bottles containing BPA in May, 2011 (European Commission, 2011) and the French government passed a law in November 2012 to ban BPA from all food and drink packaging from 2015.

The central controversy is not over whether BPA is hazardous to humans, it is well established within the scientific community and beyond that the chemical is toxic. Nor is the controversy over whether these chemicals migrate into food or not, they clearly do. The debate, rather, is centred on whether there are any adverse effects when levels of BPA are consumed below the tolerable daily intake levels as set by various national and international authorities. Nonetheless, what we are dealing with here is how, once again, mobility at a molecular level, of toxicokinetics, can reverberate to affect the movement of packaging components, packaging and ultimately packaged food across regions and borders. The gathering of actors within a hybrid forum can work to significantly re-shape the movements of packaging, packaged food and packaging components. As the Plastics Federation has recently added on the decision by the French government to ban BPA:

Industry is deeply disappointed to see the French government not respecting the existing EU rules for food safety, and will be considering all options as reaction to this decision. The French decision may result in a reduction, and not an enhancement, of French consumer safety, **and will create a significant distortion of the internal and international market for food contact goods in the EU.** (Plastics News, 2012 emphasis added).

Furthermore, what we are faced with in this case is the stark agency and vibrancy (or thing-power) of BPA and, in many respects, of packaging too. Certain

⁷ See <http://www.nomorebpa.org.uk/>

types of plastic packaging become or get figured as unsafe or even dangerous technologies given the uncertainties over the effects of BPA. It works to affect consumers, journalists, some government officials, scientists and even industry and lobbyists as the following quote from a lobbyist from the packaging industry begins to reflect:

...one of the great threats to all of us is some chemist in some obscure lab somewhere comes up with some half assed conclusion and suddenly it becomes a fact. It's very interesting because yes Bisphenol A is one of the so-called gender bending chemicals. However, there is ample evidence to suggest that if you ingest it gets in and out of your system within 24 hours flat. And so for the vast majority of the population it is not an issue at all... In fact if you were to ban Bisphenol A you are going to have more than 50% of all packaging off the shelves. It's going to be fascinating. (personal communications, May, 2012).

And when I asked a scientist working on BPA migration to comment she refused, but she did laugh and say: "nobody loves BPA these days" (personal communications, April, 2012).

BPA and certain types of packaging associated with this chemical have the capacity to interfere and disrupt fluid food assemblages and packaged food mobilities. But perhaps fluid is not the best metaphor to use here. Perhaps the metaphor of fire is more appropriate for three reasons. Firstly, the language being used by the lobbyist and the scientist in the quotes above denote passion and anger which are some of the characteristics used by Law and Mol (2001a) to talk of a fire topology. Second, the "suddenness" of facts emerging chimes with the abrupt and discontinuous movements that are associated with objects existing within fire space. Thirdly, the BPA crisis also signals an absent presence. Indeed, all of the risks talked about in this second part of the chapter might be considered to exist within a fire topology as they are all in many respects absent yet present. They are absent as these risks are not readily visible or easily sensed and therefore absent. Yet they are also made present through controversy, new scientific findings or media reports. As Bickerstaff and Simmons note "it is not...only through what can be seen or through other sensory impressions that technological facilities may insinuate their presence into people's experience but also by the absence of meaningful sensory 'evidence'" (Bickerstaff and Simmons, 2009:869). Such was the thrust also of Julie Cidell's (2012b) recent paper on the absent presence of risk in the transport of hazardous materials.

Furthermore, absent presences can be found in the laboratory networks that work to assemble this hybrid forum. As (Vogel, 2009) notes, assessment for

reproductive and developmental toxicity of BPA should draw attention to the dose selection, animal model selection, the age when animals are evaluated and the end points being measured following exposure to endocrine-active agents. These are factors which tend to or can be made absent from some risk assessments on BPA exposure even though they are present circulating as vibrant and potent documents from “some obscure lab somewhere”.

BPA and the packaging associated with it could be convincingly argued to exist within a fire topology. But it is not possible to say that packaging exists only within such spaces. Instead packaging is performed, interacts and overlaps within and across fire, fluid, network and Euclidean spaces. In the case of BPA it is apparent that new boundaries of packaged food trade are already being drawn as a result of this crisis as indicated in the statement above. And these new regions are the effects of de-stabilised yet not entirely discontinued food-packaging assemblages. Packaging and packaged food are too fluid to disintegrate completely. For instance, moves have already been made to produce and distribute BPA free substitutes for those articles banned by national or regional law; a BPA free plastic bottle is different from one containing BPA but at the same time similar. The plastic bottle still exists, in fact, multiple versions do. Components are replaced and new designs created which are similar but not the same. Far from dramatically ending the flows of packaged food, certain types of packaging have evolved and fluid assemblages continuously re-configured. Packaging may, therefore, be considered a topologically complex object(s). At once a fluid technology that can transform without discontinuity, and at the same time a vibrant matter evoking discontinuities, disruptions and passions.

4.5 Porous barriers, uncontrolled mobilities?

This chapter began by detailing how the barrier properties of packaging are constructed. To do this the focus shifted to the laboratory and to the tests and trials that packaging materials go through in order to determine or define their barrier properties. These tests can be re-conceptualised as types of non-human mobile methods in that they trace the movements of elements at (or almost at) the molecular level. Mobilities research is as much about barriers as it is about movement and thus studying these physical barriers and their (in)ability to impede or control the mobilities of various micro-elements constitutes a valid area of mobilities study.

The chapter then moved on to examine how these barrier properties that control the movements of various micro-elements get enacted outside the laboratory. Packaging systems form part of barrier systems and what Hinchcliffe et al. (2013) have called the “will to closure”. But packaging barriers only work provided large parts of the food system are transformed to resemble more the laboratories where the barrier properties of packaging get constructed. This includes extending laboratory practices and surveillance techniques which are written into codes on good hygiene practice, good manufacturing practice and quality assurance systems like HACCP. Of course, crucial to this is that the packaging itself is identical to that tested in the laboratory otherwise the predications made regarding the barrier properties and the safety of food would not hold.

But while there is certainly some stability in the barrier properties of packaging and the wider barrier systems within which packaging is implicated there is, at the same time, a degree of porosity. In other words, packaging can be uncertain and multiple inasmuch as it can act both as a barrier but also as a vehicle for harmful pathogens. This is especially the case given that advances in packaging have also enabled the consolidation, centralisation and increased complexity of the food system. As a consequence contaminated batches of food can reach much more extensive geographies and have the potential to infect many more people than in previous eras where outbreaks were generally more localised. Packaging in this regard can be seen as a rather fluid technology; an unsafe as well as a safe technology, more than one less than many. Some actors, like the food industry, try to enact packaging and barrier systems as singular, stable and safe food systems, but these can leak. John Law (2006) used the analogy of flood defences on the Mississippi to talk about the foot and mouth disaster in agriculture. Similar analogies can be made with packaging and their barrier systems. While building a dyke might give the appearance of safety, these can also exacerbate the flood when it comes. The leakiness of barrier systems (dykes) that are built up around the food system was seen in the cases of outbreaks of listeria as well as the statistics on foodborne illnesses.

A second example provided that showed the multiplicity and uncertainty of packaging centred on the chemical migrations from packaging into food. Again, since this issue is about the movement of chemicals into food it constitutes another valid topic for mobilities research. The specific focus was on the recent Bisphenol A (BPA) crisis in various types of plastic packaging. It was argued that this issue constituted a “hybrid forum” that dramatically re-routed and re-directed the flows of packaging, packaging

components and packaged food for international trade. The liveliness of BPA clearly plays havoc with strict binary divisions between what may constitute a safe package or safe barrier system and stirs the emotions of campaigners, packaging lobbyists, consumers and some government officials. Therefore, packaging might be thought of as a topologically complex object(s) that interacts and interferes with each other (itself) in complex ways with significant implications for the physical mobilities of many types of packaged food and their components in Euclidean time-space.

This chapter and the last have thus outlined a number of ways in which packaging shapes packaged food production mobilities. It has done so by shifting perspectives looking both at packaging's role in maintaining and sustaining stability and stable mobilities whilst also focusing on instances where its vibrancy and fluidity threatens this apparent stability. Packaging, in other words, forms part both of stable networks and of fluid assemblages of the food system. These previous two chapters have thus set the foundation for the second part of this thesis which examines packaged food consumption and human mobilities.

Part 2. Packaged Food Consumption and Human Mobility

Chapter 5. Food packaging and patterns of human mobility

5.1 Introduction

The first part of this thesis addressed the ways in which packaging has transformed, mobilised and, at times, disrupted the food system. But little was said of how these packaged food production mobilities influence patterns and practices of human mobility. This second part of the thesis addresses these concerns paying particular attention to what might be termed to-go packaged foods.

It is worth stressing, once again, that packaging by itself is not very useful. But when this technology is combined with food it creates a powerfully *convenient* composite technology which, in the case of the to-go convenience food system, has important indirect influences on patterns of mobility. Indeed, such mundane technologies which form part of to-go convenience food *systems* might even be said to shape the metabolism (Townsend, 2000), flows or rhythms of urban life. In order to see these links it is important, firstly, to understand that patterns and rhythms of human mobility are derived through engaging in spatially and temporally situated sociotechnical practices. The movement of humans is, therefore, the achievement or outcome of more or less planned and organised co-presence with people or with material objects. This can involve meetings for work, to sign contracts or to work on texts or objects and so on; meetings with family; co-presence necessitated for legal, economic or social obligations (see Urry, 2007:49, for example); or, as Peters et al. (2010) say, for something as mundane as a haircut. These all constitute every day and more or less obligatory and necessary *projects* which often presuppose *passages* (mobility) for their accomplishment. When scaled up to an aggregate level the accomplishment of these activities and their corresponding movements give rise to a particular urban metabolism.

Importantly, though, Peters et al. (2010) draw attention to the resources needed to coordinate and manage these everyday projects or obligations and the corresponding passages or mobilities. These resources may range from knowledge and skills to various materials such as mobile phones. To-go packaged food and drink, so it will be argued, constitutes another resource that plays a significant role in helping coordinate and manage everyday time-space paths, projects and obligations. In so doing they work to (re)produce the daily flows, rhythms and metabolism of social life. We will see how

important these technologies are for the coordination and management of everyday life through looking at their consumption at the event of eating at ones work desk in the city.

As well as understanding packaging as part of a system of to-go convenience food this chapter also draws heavily upon insights generated within time-geography which also uses the language of paths and projects. The notion of constraint is central to time-geographic analyses and helps explain the organisation of individual time-space paths. Hägerstrand (1975) identified three types of interrelated constraint. Firstly, there are *capability* constraints such as the biophysical needs of humans who need to eat and sleep or the capability of tools and environments to afford certain practices. Secondly, *coupling* constraints which are engendered by the necessary bounding together of humans with other humans or humans with tools in order to perform certain activities and achieve certain goals. Thirdly, there are a series of *authority* constraints which are the laws, rules and norms which regulate access and movement through time-space. These constraints together act as structural limitations on the times and spaces of practice and so dictate or impede movement through time and space. For example, work practices are often spatially as well as temporally constrained by a combination of capability, coupling and authority constraints, as was eating for most of history.

As Schwanen (2007) points out, influential authors who have drawn upon time-geographic insights have not conveyed the importance of objects and the material world and the influences these have had in shaping time-space paths (e.g. Harvey, 1989:211; Giddens, 1984). But leading figures in time-geography have more poignantly stressed the role of technology and the material world in coordinating, constraining and structuring the time-geographies of everyday life (Hägerstrand, 1976; Thrift, 1977; Pred, 1981). Indeed, even technologies as mundane as eating utensils have been implicated in patterns of social reproduction and associated (im)mobility through time and space, as Pred mentions:

Because social reproduction is inseparable from everyday labour and other practices, it is also inseparable from the reproduction of the material world of buildings, transportation facilities, eating utensils, tools, furniture, and other man-made [sic] objects (1981:6).

Coupling, capability and authority constraints are thus structured as much by the material world as they are by social norms and the biophysical attributes of humans.

A good deal of attention has been paid to looking at how ICTs have unevenly relaxed certain coupling, capability and authority constraints according to certain axes of social differentiation (Kwan et al., 2007; Schwanen et al., 2008; Schwanen and Kwan, 2008; Couclelis, 2009). Others have even talked of these technologies as constituting “time-space shifting devices” (Janelle and Gillespie, 2004; Janelle, 2012). But few have used time-geographic perspectives to research similar relaxations in constraints engendered by more mundane technologies such as packaged food. One exception is the study by Schwanen (2007) who investigated the time-space paths of a mother, her child and her child’s favourite toy, showing the dramatic re-configuration of the mother’s time-space path when she forgot the toy when leaving her child at the nursery and had to go back home to get it. Such vignettes shed light on the interrelated time-space paths of mundane objects and people.

Literature from another body of work drawing on a practice theoretical perspective has also looked at the time-space effects of mundane technologies, and even of convenience foods. Recent lines of investigation provide insight into the influence of new practices of eating on the temporalities of everyday life (Southerton et al., 2012; Cheng et al., 2007; Southerton, 2009). Much of this literature draws attention to the synchronisation and sequencing of food-related practices which shape and are shaped by the (shifting) spatialities, materialities and network configurations (co-presence) associated with food. These studies begin to explore how the provisioning, preparation and consumption of food interacts and gets coordinated with other practices in time-space. These investigations thus open up the possibility for exploring the interconnections between different types of technologically mediated food-related practices and daily travel practices. In addition, these studies provide a useful historical dimension to their work. Such historically inflected accounts, that follow changes and continuities over time, enables us to see how such embedded configurations of practice emerged, were made possible and how they have changed. This allows us, then, to think about how environmentally unsustainable configurations of practice may change in the future or, alternatively, point to the complexity and unpredictability of change.

Of particular importance for this chapter is the early work by Warde et al., (1998) that outlined how various convenience technologies interact with daily temporalities. According to these authors convenience technologies are deployed: to compensate for rigidities in time-scheduling imposed by other agents; to speed up movement of people through space or to bridge distances; and to store time or re-

position episodes. However, the improved capability to plan, flexibly move and re-position activities in time and space that various convenience technologies allow is said to encourage people to schedule more appointments and perform more activities, which then exacerbate feelings of harriedness and generate demand for yet more resources, more convenience technology and/or more mobility. Some of these relationships have been examined empirically and historically by, for example, looking at how the freezer has been re-positioned as a convenience device used to flexibly re-sequence food-related practices (Shove and Southerton, 2000). Similarly, Alan Warde (1999) has investigated how convenience foods are used in response to problems of scheduling created by the apparent increase in the complexity of individual time-space paths and thus wider de-routinization of societies. However, far from alleviating this complexity and de-routinization that engender feelings of harriedness, these convenience technologies may actually exacerbate the individualisation and de-routinization of societies precisely by permitting a greater degree of flexibility with regards to where and when people can purchase and consume food. The complexities that arise from this flexibility then generate greater demand for convenience as individual time-space paths become more complex and de-routinized. Put differently, Warde's account of convenience food is similar to Urry's argument that the autopoietic or self-organising system of automobility restructures time and space such that "it generates the need for ever more cars to deal with what they both presuppose and call into existence" (Urry, 2004b:27).

Nonetheless, the work on convenience technologies and practices clearly resonates with that of time geography in that both bodies of work: are concerned with different aspects of the everyday; make explicit the dynamic interaction and interdependencies between practices or activities in time and space; and both highlight, albeit to different extents and in different ways, the important role of technology and the material world in structuring practices in time and space. However, this chapter differs from this existing literature in a number of ways. Firstly, a greater emphasis is placed on the packaging technologies that make food convenient and which enable convenience food systems. Secondly, this research looks specifically at the use of these technologies in the workplace, a site which has been neglected in previous research on the temporal and spatial effects of food-related convenience technologies and the practices of eating which have tended to emphasise eating in the evening and use of food technology at the home. Thirdly, and perhaps most importantly, this research will analyse how these

mundane technologies, in de-coupling food from time and space, influence patterns of mobility. The literature on convenience technologies and the temporality of food-related practice has failed, so far, to link the implications of their findings with the physical (im)mobility of both food and people. Conversely, as mentioned above, while some time-geographic research has looked at the interactions between telecommunications technology and mobility none have yet looked at mobility in relation to food-related technologies or food systems.

The remainder of the chapter is in three parts. The next section will briefly outline the relevance of the event of eating at the workplace in order to examine patterns of mobility. The second part will then situate contemporary eating practices and the consumption of packaged food at work historically, looking at how packaging, food practices at work, the temporal and spatial organisation of everyday life and patterns of mobility associated with work have co-evolved. Providing this sweeping historical context will make the links between packaging developments, eating practices and patterns of mobility much clearer. The third part will then use evidence gathered from focus groups to examine in more detail how these technologies are implicated in the temporal and spatial organisation of everyday life today. In so doing the associated mobility influences will be teased out. The chapter will end by discussing to what extent it is possible to talk of packaging technologies as shapers of mobilities.

5.1.1 The relevance of eating at work for studies of travel

While examining food and drink packaging as it is used on the go may seem a good place to start for a thesis concerning the *mobile life* of food and drink packaging (see next chapter), the inspiration for studying such a mundane technology did not come from observing or using these technologies on the go. Instead, and counterintuitively, the inspiration to look at the mobile life of food and drink packaging came from consuming packaged food at the relatively *immobile* setting of the work desk and at the workplace more generally.

Certainly, food preparation and consumption at home are hugely important practices which continue to be ascribed much significance by many households today and contribute to patterns of mobility as family members move to coordinate in the evening time at home. But for many people one or two meals of the day are consumed at work. The workplace thus constitutes an equally important site for investigating the relationships between to-go packaged convenience foods, eating and temporality.

The workplace was, therefore, chosen as a site from which to explore packaged food consumption and its mobile relations for two reasons. Firstly, focusing on to-go packaging and to-go packaged foods as they are consumed and used in the workplace highlights how such apparently *immobile* and *mundane* technologically mediated events, like eating at one's desk, can have important ramifications for other practices in time and space and, therefore, shape everyday patterns of mobility. In so doing it builds upon the work of Warde (1999) who has examined the temporal and spatial implications of convenience food at home but not, as yet, linked these to patterns of mobility. In this way it could be argued that studying mundane technologies like packaged food at the workplace constitutes a valid site from which to examine patterns of mobility.

The second reason for choosing to focus on this case is that packaged food is increasingly consumed and used in the workplace. For instance, for the majority of workers who work a regular daytime shift, lunch is consumed at or nearby the workplace. Moreover, evidence suggests that the lunch hour has been gradually disappearing and more recently breakfasts have been re-sequenced and in many cases transmuted into snacks. As a result, many workers are now eating lunch at their work desks and an expanding proportion of the population are eating breakfast there too. A market research survey on breakfast habits conducted by Mintel (2011a) consisting of 2000 UK internet users found that "almost half of all consumers surveyed" said they do not eat breakfast at home with 26% saying they ate breakfast at their work desk. Another Mintel report (2011b), this time on lunchtime foods, similarly showed that, from a survey of 2000 internet users aged 16+, 25% ate lunch at their desks at least two to three times a week. The emergence of these eating practices has prompted some journalists to talk of a new culture of so-called "desk-fasting" at work (see The Independent, 2005; The Times, 2010) or dining "al-desco" (BBC, 2013a). Moreover, a vast convenience food infrastructure has developed in conjunction with these practices. New quick service restaurants such as EAT and Pret-a-manger, both of which have seen double digit growth over the past decade (Euromonitor, 2011), appear in business districts, high streets and travel hubs and offer ready-to-eat food packaged to-go. Similarly, the convenience store format of retail has also been gaining popularity. These are also located on busy high streets, travel hubs as well as in business districts and near offices. The convenience store sector as a whole has been undergoing long term consolidation with the total number of convenience stores actually falling, these largely being small independent retailers. Yet in 2011 convenience stores represented a 20.8%

share of the total UK food and grocery market (IGD, 2012a). For the major supermarket brands in particular (convenience multiples) the convenience store format has seen impressive growth from 2011 to 2012 of 9.6%, much greater than other store formats such as out-of-town. Symbol group retailers such as Premier and Spar UK have also seen impressive growth over the last decade (IGD, 2012b).

Convenience stores are defined partly by their size but also by the types of products on sale. These products include drinks, savoury snacks (crisps, nuts), confectionary (chocolate and cereal bars) and baked goods some of which have been offered by convenience stores and corner shops for generations. But more recently chilled ready-to-eat foods are also being sold such as pre-packaged sandwiches, fruit and salad bowls, and individually portioned and packaged cereals and muesli. These products now sold in convenience stores constitute normal breakfasts, lunches and snacks for a very mobile British population and, for the most part, come packaged in increasingly portable and ergonomic ways.

But while the scale of these convenience food systems and the packaged food consumption practices they engender may be increasing, the practice of eating at work itself is not new. The next section will provide a selective and sweeping historical overview of similar eating practices, and the packaging that enables them, in order to illustrate the patterns of mobility that they have shaped over time.

5.2 Decoupling food from home

Perhaps the most significant way in which packaging and packaged food to-go has shaped patterns of travel is by de-coupling food from home and making going home for lunch no longer necessary. It is only really possible to see this shift by taking a sweeping long-term view of the co-evolution of packaging, packaged food systems, eating at work and patterns of urban mobility. In so doing the profound influence that mundane technologies like to-go packaging have had on patterns of mobility will become much clearer.

It is worth noting, firstly, that convenience food is not by any means a new phenomenon. As Burnett (1989) points out some of the most significant changes in eating practices occurred during the period of mass industrialisation and urbanisation of Britain during the 19th century when overcrowded, urban populations had to rely more on commoditized food systems offering pre or part prepared foods. He notes how workers on very low incomes “were necessarily more dependent on commercially made

products (bread was the first, and most important ‘convenience food’) bought at shops and markets” (1989:61). And such foods were consumed at work during the industrial revolution. Indeed, before the factory reform act of 1831 imposed mandatory break times for workers in mills and factories across the country there were examples of food being consumed at work in very similar ways as it is today as the account of one young worker in 1831 highlights:

There was no time for rest or refreshment in the afternoon; we had to eat our meals as we could, standing or otherwise...you cannot take food out of your basket or handkerchief but what it is covered with dust directly (Burnett, 1989:47).

This excerpt from Burnett’s book on the social history of eating in England reflects not only a de-coupling of food from home but also a shift in the temporality of eating as it gets re-sequenced and compressed to fit around the harsh temporal rhythms and spatial constraints imposed by work. Importantly for this discussion, these flexible food-related practices which immobilized and sustained workers in these brutal work sites for extended periods were enabled by the use of simple packaging such as a handkerchief that allowed the food to be easily carried to work and protected until the moment of consumption.

Almost a century later, and after the reform act of 1831 made breaks mandatory, going home for lunch was made difficult not so much by demanding work schedules but by an apparently increasing friction of distance between home and work. Fish and chips was said to be one such technology/convenience product that was relied upon to overcome this mobility burden. As one Tyneside fish fryer remarked in 1917: “it [fish and chips] was particularly popular with those who were at a distance from their home” (taken from Walton, 1992).

However, the consumption of fish and chips was a highly classed and gendered activity. For example, the consumption of fish and chips by female mill workers in the North West was so pervasive that it was termed by some commentators as the “North West mill workers diet” (Walton, 1992). A quote from the Fish Trades Gazette again highlights the friction of distance, but also stresses the mobility burden experienced by working class women in particular:

A large number of warehouse girls and others make their midday meals frequently off fish and chips to save time and trouble involved in going home to dinner (Fish Trades Gazette, 6th Oct 1906, taken from Walton, 1992:144).

No explanation is given by John Walton as to why working class women in particular used these convenience technologies at work, but as the quotes above suggest the uneven mobility burdens could be one reason. Another could be that many male workers relied on the female members of the household to prepare packaged lunches, whereas a female worker could not rely on a male member of the household to do the same.

It is important, however, to also stress that the newspaper as packaging constituted an important element that enabled the fish and chip systems which, in turn, permitted food to be de-coupled from the home. The fish and chips would not get very far without the newspaper. The newspaper, as packaging, enabled individual portions of food to be easily carried or delivered, it acted as a proxy plate and it provided a limited degree of protection for the journey from point of purchase to point of consumption. It was a cheap material, made cheaper when collected and re-used from local households. But in enabling this particular convenience food system the newspaper as packaging imposed somewhat of a script on the temporal and spatial organisation of everyday life by de-coupling food from home and allowing workers, and many working class women especially, to stay at work. It is important, though, to not look for strict causalities in these cases. Newspaper packaged fish and chips certainly did not *cause* people to live further from where they worked but neither did living further from work, strictly speaking, *cause* the consumption of newspaper packaged fish and chips. Rather both elements interacted with each other to produce emergent temporal, spatial and mobility patterns.

That being said, while convenience foods like handkerchief-wrapped-bread or newspaper-packaged fish and chips permitted eating at work for some, for many others it was still common to go home for lunch. Leaving aside the dramatic transformations in both eating and work during war time Britain, eating outside of the home for lunch was, for much of the British population, still an infrequent practice throughout the first half of the 20th century. As Southerton (2009) points out after analysing the diaries of wives in 1937, lunch was considered the main meal of the day and was predominately consumed at home. However, as the examples above suggest, such practices were predicated upon people living relatively close to work and on the availability of (often unpaid) labour to prepare the meal.

During the immediate post war era evidence indicates that going home for lunch was still a widespread practice. Burnett (2004) draws upon national survey data to show that in 1958 six in every ten workers went home for lunch. One factor which influenced the practice of going home for lunch during this period was the relative immobility of large numbers of women who left paid employment as they were replaced by returning servicemen after the war (Zweiniger-Bargielowska, 2002). The wives of many male workers were not only available to prepare the meal but their relative immobility also facilitated the coordination of family members at midday. These practices of eating lunch at home, of course, meant disposable packaging and convenience food systems were used much less than today.

Nevertheless, the consumption of packaged food to-go at work, like newspaper packaged fish and chips, would open the way for and encourage later food consumption practices outside of the home and at work. These trajectories emerged alongside a number of other significant factors. From the 1960s, for instance, the number of women participating in paid employment began increasing. Not only did this make coordination (of the family) at midday more complicated but there was no-one available to prepare lunches at home. In addition fewer workers were living near to where they work (partly as a consequence of food being decoupled from home) and commuting distances lengthened due to processes of suburbanisation. As a result of these processes it was becoming increasingly normal to eat lunch at work. Burnett (2004) draws on another national survey to show that by 1973 only 33% of workers went home for lunch. A large number of workers had access to a canteen at work with many others bringing a packed lunch.

The apparent prevalence of canteens at work during the 1970s is indicative of the large, centralised manufacturing and state owned institutions that dominated Britain in the post war era. Work canteens were a legacy of legislation that made canteens mandatory but which was subsequently scrapped by the Conservative government in 1954 (Zweiniger-Bargielowska, 2002). However, this change in legislation and the privatisation and de-centralisation of industry meant work canteens gradually disappeared throughout the 1970s and 1980s. The work canteen was then replaced by the arrival of new lunches to-go made accessible, affordable and portable by developments in packaging.

One exemplary form of packaged food that is widely consumed for lunch is the pre-packaged sandwich. In 1981 Marks and Spencer's introduced its first pre-packaged sandwich — a salmon and tomato variety (McDonald, 2010). This event marked a further shift towards the outsourcing and privatisation of lunch. It also signalled the growing concentration, centralisation and commodification of the convenience to-go food system with large companies now starting to outcompete the small scale sandwich makers. Perhaps more important than the sandwich, which has existed for centuries, was the sealed plastic wedged container that allowed this lunch to be ready-to-hand and carried easily, facilitating the consumption of lunch beyond the home, cafeteria or canteen. Furthermore, pre-packaged sandwiches could be purchased and then wait, packaged, ready for consumption at another time in the day.

The continued expansion and proliferation of these convenience technologies (which are convenient in large part because of the packaging) meant that by 1990 only 14% of the working population went home for lunch (Burnett, 2004). The purchase of a pre-prepared and pre-packaged sandwich also meant workers, or their family members, no longer had to spend time in the morning preparing lunches which helped give shape to morning routines, changing what Peters et al. (2010) might call the routinized planning involved in “pre-travel”. The pre-packaged sandwich has, therefore, relaxed the traditional sequence of purchasing, preparing and then consuming lunch for many as these practices get fragmented into a disaggregated set of activities which can be carried out at multiple places and at different times. The capability of carrying and storing lunch at the desk has also gone some way to encouraging people to not even leave their desks at lunch.

However, transformations in packaged food and eating practice have happened in the morning too. Another exemplary type of packaged food to-go is the cereal or snack bar. The modern day cereal bar can be traced back to the introduction of Kellogg's Nutri-grain cereal bar in 1997, which was designed as a healthy product for “busy people who had missed breakfast” (The Times, 2012). These early cereal bars were, in turn, based upon the easily portable chocolate bar or snack biscuits that came individually portioned. But the cereal bar also built upon previous innovations at breakfast, namely, the breakfast cereal. Breakfast cereals had all but replaced cooked breakfasts by the 1970s in the UK. These transitions were driven by the powerful advertising apparatus of the cereal industries but also by convenience. The relatively

little preparation needed for breakfast cereals certainly helped ease the time-pressures experienced by many busier working wives and mothers in the morning (Burnett, 1989).

Cereal bars, though, have superseded the breakfast cereal in terms of convenience given this packaged product can be de-coupled from other materials and tools such as a bowl or spoon making them more portable and user-friendly. Furthermore, individually packaged cereal bars can be stored for much longer periods than bottles of milk or opened cereal boxes that begin to perish much more quickly once opened. Consequently, these individually sized portions of cereal bar can easily be stored at the work desk for greater convenience. The cereal, snack and energy bar market has continued to expand, growing 32% from 2005 to 2011 and was estimated to be worth £380 million in 2011 (Mintel, 2012a).

Both the cereal bar and the pre-packaged sandwich are two exemplary types of packaged food to-go that have gone some way to scripting new practices of breakfast and lunch consumption at work. They have also impacted everyday mobilities albeit in slightly different ways. The pre-packed sandwich has, over the long term, helped maintain and re-enforce the practice of staying at work over lunch and made it easier to eat at one's work desk. Notwithstanding the fierce competition from extremely efficient ready to order sandwiches from the likes of Subway (the largest fast food company in the world today), the pre-packaged sandwich continues to be a popular option for the British consumer and the market was worth an estimated £4.27 billion in 2011 (data from Mintel, 2012b). The introduction of the breakfast cereal bar has similarly allowed people to eat breakfast at their desk and this has re-configured morning routines that are organised around morning commutes.

It is worth stressing again, though, that the sandwich or the cereal bar would not have had such impacts without their packaging. Simple flow wrap has helped transform breakfast foods into a bar form and it is the flow wrap that protects, portions, renders more portable and storable these new breakfast snacks that are increasingly consumed at the work desk. Similarly, sealed polythene containers portions, protects and renders more storable and portable the sandwich. Without such mundane technologies the consumption of breakfast and lunch at work or at the desk would be made more difficult and this would, arguably, have wider reverberations across other routines, temporalities and mobility. The next section will draw upon focus group discussions to more closely

interrogate these issues and examine the influences that the consumption of packaged food to-go at work has on everyday mobilities today.

5.3 Eating packaged food at the workplace and the (mobile) organisation of everyday life

Let us begin with breakfast. It was clear from the focus group discussions that the way in which breakfast was practised was closely related to the rigidities of other practices in the morning, including the morning commute. These practices had to be organised around conventions regarding the start time of work which was more or less flexible for different workers. As one worker comments:

- I'd rather eat something small, I'll eat breakfast at my desk and I'll have something like microwave porridge or like these granola bars which I keep there... and I can get up and be at my work desk for 8.55am, because it only takes me half an hour to get ready if I don't have breakfast and it takes me half an hour to get to work. (Excerpt from Focus Group A)

Combining breakfast with work, evidently, contributes and amplifies other changes in the use and organisation of space and time elsewhere in the morning such as the time dedicated to commuting to work, to “getting ready” or to staying in bed. The quote above illustrates a finely balanced sequence and scheduling of activities in the morning that rely upon each other for the successful accomplishment of the morning routine. The commute, routines of sleeping, starting work at a particular time and doing certain practices associated with “getting ready” such as showering are temporally and/or spatially constrained. Breakfast, by contrast, has become a more flexible activity as it can be, and is, re-sequenced as a way of managing the tensions between other more temporally and spatially rigid practices in the morning. In the case above the pre-packaged granola bar constitutes one technology that is used to make breakfast more flexible. It also works to re-configure the work desk, converting it into a food storage and dining area.

These ways of provisioning, storing and consuming food can also give shape to the overall temporality of the work day, as is illustrated in the description of a typical work day from one of the participants below:

- I just think, I tend to finish a little bit later and I say okay just give up lunch and get it all done just sit down and hammer through it to finish at a reasonable time. And also I am always late every single day, I am just pathetic in the morning and because I'm late I can't really just say I'll have an hour lunch break. And I think well I started late so I might as well just carry on... I don't eat breakfast. I might have a snack at my desk like a chocolate bar (laughs) or something. Because I normally have lunch at 12noon or 12.30pm, really early. (Excerpt from Focus Group A)

Note how in this excerpt breakfast and lunch interact with each other to shape the temporalities of a work day. This shaping of the temporalities of the work day by consuming packaged food at the desk effects patterns of mobility in two ways. First, and counterintuitively, portable packaged food allows workers to remain *immobile* at their desks for longer which make them *mobile* in other ways. While not physically mobile office workers in the 21st century are nonetheless, for the most, part engaged in intense virtual and communicative mobilities with other colleagues and clients some distance away. So while multi-tasking in this way does little to influence the physical mobility of workers it does amplify and sustain the intensities and flows of information and virtual mobilities that underpin many work-tasks in the information economy. For example, many participants talked of how their jobs involved “reacting to the inbox or the office telephone” suggesting that immobility in physical space helped coordinate, synchronise and sequence tasks in time with more or less distant others. This particular form of multi-tasking – eating with virtual communication – helped facilitate the smooth sequencing and coordination of other complex tasks in time and virtual space.

Arguably, these intersecting (im)mobilities of people, information and communication are afforded by packaged food as much as the rest of the office set up inasmuch as they let workers stay connected to distant others. These ways of coordinating and organising tasks allow workers to manage and relax the temporal and spatial constraints imposed by the need to eat (capability) on the one hand and the need to coordinate with colleagues and customers (coupling) in time on the other.

The second, and perhaps more important, way in which the consumption of packaged food at work shapes mobilities relates to the ability of these technologies to manage time at work in order to finish at a “reasonable” or “appropriate” time . The extract above shows how managing time at work through combining eating with work (multi-tasking) and through fragmenting food-related practices allows workers to achieve this. In the example above the participant picked up pre-packaged lunches, either sandwiches or salads, on her way to work. The purchasing and consumption of these packaged foods permitted some degree of control over work time, allowing her to remain immobile for longer, which in turn allowed her to finish work at a reasonable time.

The consumption of packaged foods at work, and pre-packaged sandwiches in particular, was a common practice amongst other participants. In similar ways these

packaged convenience foods helped workers manage work time helping them finish at appropriate times, as the following excerpt also indicates:

- ... but I always used to do that I would pick up a sandwich on my way to work and then just eat it at my desk.
- I would just go out and sit in a car park or whatever
- but when I had flexi time it was the more I sat at my desk the more time I can actually have off so it usually took an hour to eat the sandwich because I would have just a few bites but that would let me leave early. (exchange from focus group B)

While the discussions centred around office workers and instances of immobile food consumption, it is worth noting that the use of packaged food, and packaged sandwiches in particular, helped so-called mobile workers (those whose job requires a great deal of travel) manage time “at work”. Consuming these packaged foods is not only restricted to those who work in an office or who have an office desk. The example below of a mobile worker who must sustain business networks over extended distances through periodic meetings highlights the importance of packaged food for managing and controlling time on these occasions.

- [Talking about buying packed sandwiches or salads] ...for me when I was driving around and might have to go up to Glasgow for a four hour appointment and drive home so I didn't want to stop for half an hour on the way there or on the way back because that means I get home an hour later... and yeah it's eating in the car but ... (excerpt from Focus group C)

Such examples of multi-tasking while travelling echoes the recent work conducted by Kenyon and Lyons (2007) on multi-tasking and the productive use of travel time. In this case, though, instead of using ICTs to perform work tasks or to socialise packaged food is used to save the time and effort in stopping for lunch; two different sets of technology with similar “productive” outcomes.

However, this ability to shape and manage the temporalities of the work day has a number of other influences on patterns of (im)mobility. In some instances, eating lunch at the desk constituted a strategy for dealing with unpredictable workloads in order to avoid finishing work late. Such strategies deployed in an era of unpredictable and variable workloads works to help routinize temporalities, and with high car ownership this might be seen to generate problems of congestion.

However, and as the discussions go onto reveal, it was apparent that managing time at work by consuming packaged food at the desk has significant reverberations on practices performed after work. The participants engaged in multiple heterogeneous

activities after work and this was one reason why workers wanted to finish work at certain times or even, in some cases, early. In other words engaging in these meaningful practices beyond the work context meant the hour or time of finishing work was seen as hugely significant for all participants:

- I can't finish late because I've always got something to do...
- ...yeah we do but then looking at this (points to a weekly schedule) I was writing this thinking this is so boring but then we do go out...
- ...but last week for example Tuesday night we went out for someone's birthday, Thursday night we went out for dinner then we had people back round here...
- ...yeah Wednesday was that...
- Yeah I definitely do something every evening, Mondays Zumba, Wednesday did we go to Westfield or something else?
- ...that's the thing your boring week doesn't really apply because on top of this I will be throwing in 1 million things that aren't routine; that you can't put on a weekly timetable.
(exchange from Focus Group A)

A “boring week” in which very little happens after work is viewed negatively. These narratives resonate with cultural theories on the late modern period which suggests an increasing concern with the aestheticisation and stylisation of life. As Featherstone (1994) points out identities can be made and re-made through the differentiated patterns of consumption at various spatial locations across the city (which in the example above includes the Westfield shopping centre, the gym or dance classes, bars and restaurants etc.). In addition, these activities undertaken after work require co-presence between people and between people and various material set-ups. And some activities serve to maintain personal relations or presuppose other strong attractions that render the practices meaningful. But they require being at certain places often dispersed and dotted across urban areas. It is worth noting, however, that the nature of the focus group participants, as young, childless adults, is important. Very different responses might be provided by families with children. Nevertheless, the evidence provided shows that in a similar way that multi-tasking through using ICTs can contribute to and amplify changes in the use and organisation of space and time elsewhere (Schwanen et al., 2008), so packaged food, by giving shape to the temporalities of work, plays a role in giving shape to an arguably more complex series of finely tuned and, in some cases, more de-routinized temporalities and spatial orders of everyday life outside of work. Consequently, activities performed inside of work serve to indirectly generate mobility not related to paid employment.

Paradoxically, then, while packaged lunches picked up on the way to work are seen to save time and travel involved in going home or even going out of the office for lunch, they simultaneously served to generate travel after work by allowing people to plan activities outside of work. The activities outside of work, as the focus group evidence suggests, can be disorganised and de-routinized, involving meeting with friends, cultural activities or spontaneous shopping trips. Warde et al. (1998) argue something similar when they talk of how hypermodern convenience devices may serve to further complicate the time-space paths of individuals and the de-routinization of society by affording the flexible re-scheduling of everyday activities. What Warde et al. (1998) and Warde (1999) do not take into account is the significant impact these so-called hypermodern convenience devices such as packaged food have for exacerbating mobilities outside of work.

However, the consumption of packaged food at work not only allows office workers to flexibly re-sequence and re-schedule time at work but also, in the context of retail sales, permits customers a much greater freedom in when and where they can shop. So while the majority of those who participated in focus groups were office workers with more or less flexible office work hours, some worked in retail and provided slightly different accounts of how they consumed packaged food. In the context of retail sales, for example, workers often had to remain immobile as did the office workers. However, these workers could not multi-task in the same way as office workers who were connected virtually to clients. Those working in retail had to be prepared to fragment their lunches (or breakfasts) depending on the requirements at any given time during the day.

- ... if my sales guys had an hour [for lunch] I would have kittens. But it is interesting when you see the nurse side of it [following on from a conversation about how nurses eat when on duty] because they will try to take a break but they will be constantly ready and I think that would dictate what you eat as well. Because I know a lot of the sales guys, 90% of the time, would choose something cold to eat because 'I'm off the shop floor but give me a shout if you need me'. If somebody comes in and I'll say can you give me a hand and they will drop their sandwich or wrap it up and go back to it later whereas if they get something hot it will get cold, they could stick it in the microwave but it's not nice and again it is time consuming so you find people's habits change around what line of work they do. (excerpt focus group C).

Packaging and particular types of packaged food, in these instances, have further contributed to the fragmentation of eating. In the case of working in retail, packaged food has helped shop managers manage any sudden, unplanned and unpredictable arrivals of customers coming into the shop as detailed above. Packaged food, therefore,

allows retail workers to remain immobile within the shop and constantly on-call. While the fragmentation of eating lunch and the use of packaged food in these cases did little to impact the physical mobility of the worker, it does permit a greater amount of temporal flexibility for their customers. Customers no longer need to schedule appointments nor are they constrained by shops closing for lunch. Customers' patterns of mobility are thus less regulated which contributes and encourages a personalisation of schedules which, when scaled up, is said to generate a more de-routinized society (Warde et al., 1998) and more disorganised patterns of mobility amongst the general population.

5.4 Packaging: a shaper of mobilities?

This chapter has provided evidence that packaging once combined with food, and as part of a wider convenience food system, significantly shapes the temporal and spatial ordering of everyday life and, as a consequence, shapes patterns and rhythms of (im)mobility in the city. It has done so by focusing specifically on the event of eating packaged convenience food at work.

The first section of this chapter talked of how packaging has helped de-couple food from home and that this has meant, over the long-term, that people go home for lunch less frequently. These strategies and tools for managing time and mobility can be traced back to when Britain was being industrialised. It was also shown how much later newspaper packaged fish and chips provided another tool to help with the increasing mobility burdens felt by some members of society. These historical snapshots highlight how, to use Cresswell's words, "elements of the past exist in the present just as elements of the future surround us" (Cresswell, 2010:29).

Accordingly, the second half of this chapter showed similar techniques, technologies and practices drawn upon to help manage and coordinate everyday time-space paths at play today. Through a detailed examination of eating packaged food to-go at work today it was shown how these technologies effect patterns of mobility in various ways. In terms of convenience packaged foods for breakfast, these technologies help manage tensions between temporally and spatially constrained routines in the morning, which are organised around and include the morning commute. It is hard to say whether morning commutes or the commute time/distance would change without these technologies, but certainly these form part of an emergent patterning of morning mobilities over time.

It was also shown how packaged foods consumed at the work desk exacerbate the complexity of individual time-space paths by, for instance, allowing people to accommodate more projects and activities after work: projects that required the coupling of these workers with other people or with objects in time and space. In an era of flexible working times workers can manage work time to either finish early or, more commonly, to cope with unpredictable workloads. Such instances of packaged food consumption effect patterns of mobility inasmuch as they permit workers to manage time at work, despite the unpredictable workloads, and so allow them to leave early or at a “reasonable time” in order to partake in activities after work that often require travel. Thus while the relatively immobile consumption of packaged food at work may not be readily present at the travel event it, nonetheless, exerts a significant influence on patterns of movement.

Focusing on the composite technologies themselves we may argue that packaged food and drink constitutes a form of time-space adjusting device which greatly shape the coordination and organisation of projects at other times and spaces and thus significantly influence patterns of mobility. But these devices are better understood as forming vital elements of wider convenience food *systems* which work to re-enforce the need or demand for such technologies precisely by restructuring time, space and patterns of mobility (e.g. Urry, 2004). Furthermore, these mobility implications were not addressed in Warde’s (1999) study of convenience foods nor in any subsequent publications. This research also differs from the work on convenience technology, food practices and temporality in that it takes as its primary focus the consumption of *packaged* convenience foods at *work* not at home. Yet the workplace constitutes a site where increasingly two meals are consumed and as this chapter has shown these seemingly mundane events reverberate and shape temporalities, spatial orders and patterns of (im)mobility well beyond the event of eating at the desk itself.

The consumption of packaged foods to-go at the workplace provided one site from which to explore these links and relations. There are, of course, many other instances and situations of everyday life other than the workplace or workday that could be investigated to highlight the indirect influences of food and drink packaging on patterns of mobility. But work is a significant and widely shared practice amongst large sections of the population and one that generates significant and more or less routinized patterns of mobility. It is also a site where one can find large volumes of food and drink packaging in use. Furthermore, it could be possible to explore many other different

types of work, work times, and work places to compare and contrast the ways in which packaged food is used in each. There was only a brief comparison of the ways packaged food to-go was used in different work settings with the majority of focus group participants working in an office environment and not being constrained to a strict 9-5 timetable.

There is one more point worth considering. Throughout this chapter we have suspended thinking about packaging or indeed the world as in-process. We have assumed that movement happens in a Euclidean container and that time can be measured objectively as discrete units. The limits of such an analysis are obvious and clearly the “immobile” setting of the workplace is mobile in more ways than simply a site of virtual mobility. It is constituted also by molecular mobilities, affects, and energy flows that render it unstable and indeterminate. The next chapter will focus on packaged food to-go consumed on the go and it will return to interrogate the molecular mobilities of packaged food as it happens and to investigate materiality from these more processual and affective registers.

Chapter 6. Another Passenger?

6.1 Introduction

In this chapter we turn to focus on packaging and packaged food and drink as it is used in the context of travel and everyday mobilities. Specifically it will look at the mundane material production of mobility from two angles. The first two parts continue to examine packaging actor-networks albeit stressing the meanings and symbolic importance of food packaging in the context of air travel and, to a lesser extent, as part of driving cultures. In this way the chapter builds upon the work in food mobilities and in particular the paper by Sarah Gibson (2007) who has provided a symbolic account of food on the move. However, these first two parts then lead on to a closer examination of the performativity of packaging and its role in the embodied *doing* of mobility. The aim of the chapter in general is to examine what Cresswell calls the “constellations of mobility”; that is, the historical coming together not only of patterned movements of individuals, as seen in the last chapter, but also of represented meanings and embodied practices of mobility.

The attention paid to the embodied practices of mobility in the second half of this chapter speaks directly to that strand of mobilities research that examines the felt, embodied and affective dimensions of travel (or stillnesses and pauses) and especially to that literature which attends to the materiality of travel from these perspectives. As mentioned in the introduction studies have focused on embodied interactions with things while travelling such as seats (Bissell, 2008), the clothing associated with early driving practices (Merriman, 2012), the fabrics and upholsteries of train carriages (Löfgren, 2008), and in some cases even food such as sweets (Watts, 2008). This chapter seeks to build on these studies by paying particular attention to and engaging with the mundane yet affective materialities of packaging and packaged food consumed on the go. Accordingly, this chapter speaks to a wider trend towards “re-materialising” geography linked, in turn, to shifts within the social sciences and humanities relating, on the one hand, to a growing concern with practice and performativity over purely discursive or symbolic accounts of social phenomena and, on the other, a re-direction of focus from interpreted meanings to affect (Whatmore, 2006). Consequently, more attention is now paid to indirect thinking and acting through the body and the relations these have with other bodies, including material things. In the case of travel these can be

embodied, technologically mediated and yet indirect experiences and sensing of movement between A and B.

Needless to say, attending to the performative and affective intensities and changing bodily states gathered through the unfolding events of mobility and travel are far removed from the abstract models and modes of travel which dominate transport studies and transport geography models. The traveller is no longer seen as a rational, atomised and enclosed individual. Instead travellers are assembled and re-assembled by flows; open, feeling, bodies (or assemblages) moving and being moved by various “techno-scapes”. Thinking performatively about materialities and mobilities, therefore, allows us to once again attend to molecular mobilities, to the often seething turbulence that characterises everyday life and certainly everyday mobile practices.

A processual and affective approach which builds upon a preliminary historical and symbolic account of packaging provides a much more nuanced understanding of the mobile life of food and drink packaging. So whereas the last chapter pitched the relations between packaging, packaged food and mobility at the abstract level of movement, this chapter instead seeks to attend more closely to the vibrant materialities of packaging; its “becoming-flows” and its relations to the becoming-flows that constitute the lived, felt, embodied and indeterminate experiences of mobility.

This chapter, therefore, argues that the consumption of packaged food, and how it comes packaged, constitutes moments of affective intensity that matter for our understanding of the everyday practices of travel. It does so not by concentrating on one particular mode of travel but by exploring the varied ways in which packaged food becomes entangled with many types of embodied mobile performances. Drawing on these more processual formulations we can begin also to interrogate the figure of the passenger/traveller. For instance, what exactly constitutes a passenger or traveller and where are its limits/boundaries? Adey et al. have recently invited us to move away from “imagining solitary individuals on the move towards considering the assemblages within which people on the move are sustained” (Adey et al., 2012:171). And passengers or travellers, as Laurier and Philo (1999) point out, do not end at the skin, they are not naked travelling subjects, rather they are (continually) configured through a wide variety of materials and technologies including boxes, bottles, bags, phones. Put succinctly, we can begin to interrogate the figure of the passenger/traveller as an effect

of the events and materialities to which they respond and in which they participate (Thrift, 2008).

In addition to interrogating the passenger/traveller assemblage, this chapter also builds upon Watt's (2008) distinction between the packed and unpacked spatial configurations of (rail) passengers. The packed passenger is configured for movement, for walking to the train or to navigate the tubes, buses and taxis of contemporary urban life; and the unpacked passenger is spatially configured with the tables and seats of perhaps longer distance trips, unpacking and arranging the objects of travel so that they are ready-to-hand. Clearly, food and drink packed and ready for mobility forms part of the packed passenger configuration whereas the unpacking of a lunchbox or the ripping open of a food or drink container may be associated more with the figure of the unpacked passenger. However, it will be shown how such dichotomies of packaged and unpacked passenger can run into problems, especially with the emergence of innovative new to-go packaging of food and drink that blurs the boundaries between being packed and unpacked. Finally, the chapter tentatively opens up an affective politics of everyday mobility. Through focusing on the (absent present) method assemblages and tactics used by engineers to design packaging to-go, it is suggested that new backgrounds of mobility have emerged which can affect human mobility performances.

Before discussing the performativity of packaging and mobility practices, however, it is important to detail the historical and symbolic importance of packaging as these are often entangled with the momentary embodied mobilities of people (e.g. Cresswell, 2006; 2010). As mentioned, this will be done by looking at the historical emergence of packaging and eating in the cases of air travel and the drive thru. Not only are these historic and symbolic accounts of packaging importantly entangled with the affective materialities of packaging today, but they are also important for understanding the proliferation of packaging designed to be used on the go and the growth in eating on the move. As Löfgren (2008) has noted early rail passengers had to learn how to travel by rail. But similarly, travellers, more generally, had to learn how to eat on the go.

6.2 Materialising class in the air

The coordination of food with people on the move has, in many respects, always been a problem. However, the coordination of food with people is especially difficult in the case of air travel where environmental, physical and economic restrictions became paramount. In the early days of air travel, before mass air travel, many airlines simply

landed for meals which, of course, had important implications for the duration, scheduling and cost of air travel. Landing for meals was also partly a result of the need to re-fuel and of the bumpiness of early air travel which made serving food under such conditions extremely difficult (Votolato, 2007; Lovegrove, 2000). De Syon (2008) adds that stopping for meals broke the monotony of flying. Airlines deployed the strategy of feeding the customers with food and (alcoholic) drink on land and then increasing the temperature once on board the aircraft to ensure customers fell asleep during the journey.

In those instances where food was served on-board and in the air, airlines often tried to emulate the elite luxury dining available on trains and cruise ships. For early airlines food and drink service was simply transplanted from these other modes of transportation. Three course meals were thus served in chinaware with wine and champagne served in glasses. For example, Alicia Momer Miller details the typical dining arrangements on the Zeppelin airships on her journey from Rio de Janeiro to the World Fair in Chicago in 1933:

The waiters changed the living room into a dining room by putting white table cloths and flowers on the tables, setting them with linen napkins, crystal glasses and china plates edged in cobalt blue and gold (In Votolato, 2007:184).

Before the outbreak of WW2 the Boeing 314 flew the first transatlantic route, and the meals were similarly elaborate and slow in order to occupy time on-board as Votolato mentions:

During the day passengers could relax in these cabins, furnished as living rooms or configured for formal dining, an appropriate setting for the elaborate multi-course meals that were prepared on-board and served slowly by the stewards to occupy time on long flights (Votolato, 2007:182).

As these accounts demonstrate, the way food was served was symbolically important and worked to reify the elite status of flying. However, on a more practical level such forms of food service placed great demands on space – both in terms of the food and equipment needed and in terms of the extra staff required to prepare the food. This meant fewer paying customers could be transported which also served to maintain the elite status of air travel.

A revolution in packaging threatened to change these elaborate practices of eating in the air (and/or on land). The “Strato-plate”, invented by William L Maxon, was first used in an attempt to enhance the travel experiences of US Navy service

personnel on long distance flights during WW2. The “Strato-plate” replaced the K ration or a cold sandwich with a relatively novel frozen meal consisting of meat and two vegetables served in a cellophane wrapped segmented dish made of sprucewood and coated in Bakelite plastic. Maxon’s “Strato plate” and later his “Whirlpool oven” – which could heat 12 Strato-plates in 15 minutes – both reduced the space needed for hot meal storage and the time needed for preparation. A large plane full of passengers could be fed what was considered a “proper” meal relatively quickly (Popular Mechanics, 1947).

This new system of food provision in the air represented an attractive prospect for the emerging civil aviation sector too. After WW2, Pan American Airlines (Pan Am) experimented with Maxon's Strato-plate invention as way of reducing costs on long distance flights. Pan Am re-named it the “sky plate” (Popular Mechanix, 1947). While the sky-plate (see figure 5) permitted the more efficient use of space on board, and while it was cheaper than the more elaborate meals offered on other airlines, it was ultimately unsuccessful and soon discarded by Pan Am.



Figure 5 “Magic Oven Heats ‘Sky Plates’”. Media image. Taken from Popular Mechanix. April 1947.

On the one hand, the cost savings of the sky plate were not as significant as anticipated as manufacturing costs were high. Furthermore, the early microwaves – the

However, even with the emergence of mass air travel from the late 1950s the way food came packaged (or not) was interpreted as hugely important for both air travellers and the airlines.⁸ An example of the symbolic power of food *and* the packaging can be found once more in the case of the so-called “sandwich wars”. As air travel was becoming increasingly more popular during the 1950s so certain routes were becoming very competitive, most notably the transatlantic route. As a way of mitigating a price war the International Air Travel Association (IATA) – a quasi-cartel trade body representing and leading many of the airlines– introduced a new “tourist class” rate of travel in 1952. The new tourist class rate would enable airlines to operate closer to maximum capacity. But this move generated a further set of problems, namely, how to distinguish and justify the different rates. With the introduction of new jet aircraft, with their sleek bodies, there was less scope to increase the space for elite passengers as was done on rail carriages or cruise ships. Some extra leg room was provided for those flying in the elite classes and in some instances elite travellers were flown on newer, faster and more comfortable planes altogether (De Syon, 2008). However, the meal and how it came packaged constituted elements that could be more easily differentiated and so used as a form of marking class.

Consequently, in 1952 the IATA, in agreement with the airlines it represented, decided that the “third rate” class passengers would not be offered a meal on board. Still, air travellers needed to eat, especially on long haul journeys across the Atlantic. Many airlines initially encouraged their tourist class or third rate passengers to purchase lunch boxes at the airports, along with their cigarettes and alcohol, for the 12 hour journey across the Atlantic. But the “fear of the aroma of orange peel and garlic sausage” meant the airlines soon agreed to offer a complementary sandwich on board (Economist, 1958:435). A cold sandwich was then offered as it was not perceived to constitute a “proper” meal and could, therefore, be complementary while not going against the IATA ruling. The cellophane wrapped sandwich became the standard quick, cheap and easy means to dealing with the problem of starving tourist class travellers, for British and US airlines at least.

The controversial move by Scandinavian Airline Systems (SAS) to not only offer their extravagant open top smørrebrød style sandwiches but to also compare and

⁸ The website Air Transport World points out that from 1958 to 1963 the worldwide revenue from air travel had increased by 45% heralding what the website terms “a golden age” and a “civil jet age” <http://atwonline.com/> accessed 28/09/13.

contrast this snack/food offering in their sales literature with those offered by other airlines operating the lucrative transatlantic route sparked the so-called “sandwich wars”. The final straw for the US airlines was when SAS published an advertisement commenting that: “On our planes you won’t find rubbery indigestibles wrapped in cellophane” (The Calgary Herald, 1958:50). In response, the American airlines lobbied the IATA to withdraw from SAS the traffic rights on the transatlantic route. This dispute culminated in a two day meeting chaired by the IATA in 1958 to define what and what could not be considered a sandwich.

What this absurd event highlights is not only the importance of food on-board but also the potency of its packaging. While cellophane and plastic were not viewed in quite the same negative terms as they are today (Meikle, 1995; Shove et al., 2007), they were nonetheless deemed inappropriate to packaged food in the air. Another central issue at stake here was the lack of plate and cutlery. The plate and cutlery formed a vital part of a “proper meal” as much as the food itself. Furthermore, this event shows, once again, how the way food comes packaged or served plays a crucial role in materialising class in the air. Similar preoccupations over how to distinguish class and differentiate degrees of comfort surrounded most types of public travel. As Löfgren notes during the 19th century designers, engineers and interior decorators, of ocean liners and railcars alike, were “given the task of giving class a clear and easily recognisable materiality” (2008:344). He draws our attention to the degree of upholstery rail operators used – “none in third class and a voluptuousness of stuffing, tassels and drapes in first, where you could travel in a sea of textiles” (2008:344). But for all public travel, and especially in the case of air travel, the meal and how it comes packaged or served was (and still is) figured as an important element to give class a recognisable materiality. Therefore, the food *and* the packaging of food have been instrumental in the marking of class differences in the air since the emergence of mass air travel. Indeed, the legacy of these forms of materialising class is evident in air travel today with cutlery, china and glass being used over plastic packaging and cutlery in business and first classes.

It would seem, then, that people would prefer their food to be served on ceramic crockery and in glass with metal cutlery given that first class and business class offer these “better” food service options. Yet plastic packaging has become an accepted part of economy class air travel. Whereas earlier innovations like cellophane wrapped sandwiches or the sky plate failed, economic pressures meant airliners persisted in using these types of packaging. An important transition in the packaging of airline food can be

identified when celebrated designers Robin and Lucienne Day were asked to re-design airplane interiors and, importantly, the food service packaging for the British Overseas Airways Company (BOAC) in 1961. Robin and Lucienne Day invented a type of food packaging not too dissimilar to the sky-plate. De Syon (2008) lists the attributes that the new packaging required; not only did the finished product have to “feel modern” but it needed to fit into tight spaces, weigh little, be easy to grab, be stackable, heat resistant, washable, never lose its colour and be re-usable many times over” (2008:204). By making these packages “feel modern” it was believed (correctly) that customers would more readily accept food packaged in this way. It is worth noting also that the new airline packaging was introduced at a time before plastic lost its popular appeal (circa the mid-1960s according to Shove et al., 2007). As mentioned in chapter 3, the positive attitudes towards plastic arose from sustained efforts by the chemical industries during the 1950s to position plastics as a “material of the future” (Meikle, 1995). Just five years previous the MOMA had a show of Tupperware, and countless innovative products were being designed from these relatively new plastic materials (such as the polyprop chair, also invented by Robin Day). So while the Day’s air service packaging was a remarkable success it was helped along by the work done by chemical manufacturers and by enthusiasts such as Earl Tupper (Clarke, 1999) who made plastic acceptable (see chapter 3).

In addition, and crucially, these new types of air food packaging were not simply cellophane-wrapped sandwiches but bore a greater resemblance to a chinaware plate – being made of harder and more durable polycarbonate plastic. The meal offering also necessitated cutlery. For these reasons the food packaging introduced by the Days was successfully assimilated. The packaging invented by the Days was also hugely important for making possible the new, economically efficient, aircraft set up. Indeed, the specifications for the food service ware noted above related in large part to the airlines desire to generate efficiencies and costs savings. The packaging also had to fit with the rest of the new aircraft interior – the seating, fold down tables, galley inserts, food storage areas. These all formed part of the networked aircraft interior that circumscribed or scripted what Latour would term “patterns of action” within the air travel context (Latour, 1992). The following excerpt from a focus group highlights the degree to which actions are still scripted through these networked configurations:

- on a plane I could eat all day long.
- but what is the difference on a train?

-on a train I would eat, yes.

-so what is the difference?

-you have your own unit. I know on the metro you have your own seat but you don't have anywhere to set out your own little area whereas on a plane this is your tray please put things on it and you think lets have some food; one of those lunch boxes, crisps or a can of drink. Same on a train, exactly the same (exchange from focus group C).

This focus groups excerpt highlights the degree to which particular types of packaged food and drink and corresponding food consumption have become normalised, standardised and necessary elements of air (and other) travel systems. They have become part of a successful mass travel assemblage that sustains passengers on the move, making the consumption of food while travelling in the air habitual and scripted. It is important to note, though, that the excerpt above is set within the context of discussion over low-cost, short haul flying. These more recent innovations in air travel have unbundled the food service using it as yet another potential revenue stream. Nevertheless, despite a change in the terms of exchange the packaging retains a degree of similarity to those earlier examples mentioned in this section (see figure 7).



Figure 7 Typical snack pack offered on an Easy Jet flight in 2010. Photograph. n.d. Airlinemeals.net. Reproduced by kind permission by Airlinemeals.net.

Food is, of course, central to the experience of air travel, but as the examples presented in this section illustrate the packaging also matters. Another travel context where packaging and the consumption of packaged food has been successfully assimilated is in the car.

6.3 Packaged fast food and the car

Mobilities research has shown us how driving is about much more than simply getting from A to B. The car is also seen as a place of dwelling and emotion (Sheller, 2004a); a place of complex social interaction (Laurier et al., 2008); a place for working

(Laurier, 2004); and, critically, a place for eating (Jakle and Sculle, 1999). Notwithstanding the picnic baskets which were brought on some of the very earliest car journeys (Merriman, 2012), carrying or consuming food in the car has, for the most part, only been made possible through the introduction of disposable packaged food purchased at service stations, the drive-in or the drive thru.

Drive-in, drive-thru and other roadside restaurants have been closely imbricated with car culture over the second half of the last century. As Peter Hall (1998) indicates in his book on cities and civilisation: “the relationship was such that cars of the late 1950s, with their flowing lines belong with the coffee shops and hamburger stands” (1998:837). But these co-evolving cultures and systems of food and mobility have been significantly shaped by the packaging.

As Schlosser (2001) details the great innovation of McDonalds drive-ins, a pioneer and world leader of the fast food burger restaurant, was the so-called “speedee service system”. This new system of food production and assembly was based on Fordist production principles and it improved the efficiency and speed of food provision which allowed a greater number of people to be served over a given time period. But this system relied upon certain types of packaging, as Schlosser indicates “They got rid of everything that had to be eaten with a knife, spoon or fork. The only sandwiches now sold were hamburgers and cheeseburgers. The brothers got rid of their dishes and glassware, replacing them with paper cups, paper bags, and paper plates” (Schlosser, 2001:20).

The paper cup was initially designed for hygiene and to prevent the spread of disease through using communal vessels (Petroski, 2003). But the emerging fast food industry soon appropriated this technology and innovated upon the paper plate leading, eventually, to the enclosed clamshell paper box specifically designed for hamburgers. The growing popularity of fast food increased the use of these types of packaging inside the car and helped shape the design of car interiors in the US with the introduction of the car cup holder, which started to appear in US cars from the 1960s and has remained a standard feature ever since (Petroski, 2004). Whereas previously it was normal to attach a tray to the outside of the car window which was returned after the meal was finished, the cup holder along with paper cups and clamshell packaging meant meals could now be transported more easily on the go and the tray was no longer needed.

The associations between cars, the roadside burger restaurant and its packaging laid the foundations in the US for the successful assimilation of the drive thru restaurant (what Latour might term “the pre-inscription” processes of the drive thru). While fast food drive-ins opened up new (mobile) spaces of food consumption in the car, and popularised disposable paper packaging, the drive thru further engrained and normalised these practices and technologies. Early versions of the drive thru had existed since the 1940s (In and Out Burger of California claim to be the first), but this model of food provision only became widespread in 1975 when market leaders McDonalds and Burger King began constructing drive thrus at scale. For example, Ray Croc, the founder of the McDonalds chain, was known to have flown around cities in his helicopter locating sites for new restaurants, often along busy intersections (Steel, 2009).

The construction of drive thru networks across cities in the US would make a durable inscription on the road landscape. The drive thru, moreover, was entirely dedicated to car-based consumption of food and even went as far as excluding non-car users from this particular network of food provision. It seamlessly connected the ordering, purchasing and consumption of food in the car which helped re-enforce and accelerate the normalisation of eating (and dwelling) in the car. Yet none of this would have been possible without the packaging. As Jakle and Sculle (1999) mention in their review of roadside restaurants in the automobile age “...not until paper cups, dishes and cartons became available was the carryout truly feasible” (1999:60). Hence, the packaging has played a vital role in assembling and enacting drive thru markets and assembling and enacting driving cultures.

It would be over a decade before the first *drive thru* restaurants appeared in the UK and Europe. The first drive thru restaurant arrived in the UK in 1986. The later emergence of such systems in the UK compared to the US might be related to the later arrival of dual carriageways and motorways, or the distinct organisation of cities with many parts having been designed for a pre-car era. For instance, the drive thru system was largely incompatible with many of the small, windy roads and pedestrianized zones that characterise European city centres. Fast food US burger restaurants, and their packaging, were a feature of some busy high streets with high foot fall during the 1970s (the first McDonalds being established in the UK in 1975). These earlier burger restaurants (and their packaging) did similar pre-inscription work as in the US and facilitated the eventual assimilation of the drive thru and the translation of UK drivers, car passengers and their eating habits.

Sit-down and drive-in restaurants/cafes had been a standard feature of major roads networks and motorway service areas in the UK before the 1980s (such as the Blue Boar café chain). Indeed, cafes and restaurants on the M1 became fashionable places for teenagers and celebrities to “hang out” during the early 1960s when the M1 had just opened (Merriman, 2007). But the consumption of packaged food *in* the car was, to a large extent, facilitated by the establishment of an extensive drive thru system of food provision. The apparent delay in consuming food in the car compared to US motorists’ can be evidenced by the lag in the introduction of cup holders as a standard feature of European cars, as pointed out by Petroski (2004).

By the early 1990s the drive thru and its packaging were actively following the British motorist. The growth in the drive thru model of food provision was co-evolving alongside trends towards out-of-town shopping, out-of-town business parks, the rise of a physically mobile workforce and continuing processes of suburbanisation, all trends intimately associated with the car. But the growth of the drive thru was also being aggressively driven by the fast food industry’s desire for larger markets. According to David Wignall, a training officer for McDonalds, interviewed by The Independent newspaper in 1994 (Thomson, 1994), existing burger restaurants were “... pretty well on every high street we want to be on... now we've got to be a bit cleverer to attract new customers... Instead of people coming to us, we have to go to the public. Shoppers are moving away from the high street.” The same article also notes how 80% of new McDonalds restaurants opened in 1993 had a drive-thru capability and were mostly being located along arterial routes.

Drive thrus are now visible along most arterial routes into, out of, between and through UK cities. These have diversified recently and now include drive thru cafes which all rely on similar types of disposable and portable packaging. For example, in 2011 the coffee chain Starbucks announced it was opening 200 drive thru cafes in the UK (Wallop, 2011). The drive thru now forms a pervasive background for driving and the consumption of packaged food and drink in the car are now normal practices. Fast food packaging and its material affordances have asserted themselves into driving cultures in critical ways. The lightness and cheapness of the packaging has made the movement of food beyond the restaurant much easier. It rendered the products offered by an emerging fast food industry portable. Consequently, developments in the packaging of food and drink have transformed the social life of the car, re-assembling the vehicle into a moving restaurant/dining room. On one level this has permitted

multitasking and rendered car travel more “productive” (e.g. Kenyon and Lyons, 2007). On another level, packaged food and the drive thru have become iconic features of car cultures and practices which have become normalised so as to operate on a pre- or, better said, non-cognitive level forming part of habitualised mobile practice, as the following excerpt illustrates:

-because when you're going out you don't think to bring a packed lunch

-or you're always pressed for time, always pressed for time. Always picking people up late or like we've got to get there.

-so you just pop into...

-so you just pop into the drive-thru before you know it the magic golden arches are on the side of the road and before you know it you're talking to some spotty 16-year-old asking for a Big Mac meal.

-Before you know it you're back on the road munching away... (excerpt from focus group B).

While the quote above certainly reflects stabilised and translated networks of association between the drive thru, driving practices and the packaging that holds these together, it is suggestive also of the indeterminacy and indirectness of such encounters. Accordingly, we might shift perspectives and view packaging and the mobile food systems they are part of not as stable and immutable technologies that work to stabilise and script mobile practices but rather look at them in terms of their molecular mobilities, as assemblages composed of vibrant matters each interacting with each other. When thought about in these terms we can get a sense of how these technologies interact with the momentary unfolding of travel. We can begin to grasp how mundane packaging technologies, like packaging, have the capacity to affect. Packaging is more than a symbolic device from which meanings are simply read off. Packaging and packaged food can generate positive or negative affective corporeal experiences. These features form part of the more-than-representational aspects of mobility and its materiality briefly outlined in the introductory chapter.

The more-than-representational features of mobile practice are notoriously difficult to still, reflect upon and represent via language. However, as Merriman notes these difficulties might be considered part of all research examining (mobile) practice. In his account of early motoring Merriman has argued that certain more-than-representational features and the process of becoming a motorist can at least be glimpsed through the commentaries of cultural commentators and early motoring

enthusiasts. The quote above is only suggestive of the process of becoming and non-cognitive dispositions that drive drivers and their passengers to stop at a drive thru. More relevant for understanding the affective materialities packaging, though, are the commentaries from packaging designers who are more aware of the sensations and practical embodied interactions that unfold when consuming packaged food in the car. As one designer notes when talking of testing prototype packaging:

The way we did it was a cross between a wrap and... And it was really nice... It was all heat sealed on the edge so the edge was quite hard but so you could grab with one hand tear it and eat it like that. And I thought that was really nice because we tested it ourselves we brought it to the car and drove to McDonald's a few times, you know we used to have quite a bit of fun thinking about that. (personal communications, April, 2012).

The excerpt on one level is talking about the ergonomics of packaging. While the language of ergonomics can be associated with rather deterministic imaginations of objective features that can be tweaked to make an object more useable or comfortable, the excerpt above also attends to the ways in which packaging used in the car can affect drivers and passengers. Interacting with packaging and packaged food are multi-sensorial events in the momentary unfolding of driving and quotes like that above helps us at least glimpse the shifting everyday corporeal and material affects and atmospheres of driving.

The same, of course, could be said of packaging as it is used in the momentary unfolding and embodied experience of air travel. Here too packaging has the capacity to affect. Take, for instance, the demands placed on the Days to make the new airline packaging “feel modern”. Packaging, then, has the *capacity* to affect, to change the states of other bodies and assemblages (Bennett, 2010). Emphasising packaging’s affective capacities takes us back to a more performative and processual way of thinking mobility and to molecular mobilities and the flowing, turbulent assemblages they give rise to. Both the quotes from the designer and of the drive-thru outlined above start to give a sense of the molecular mobilities that underpin the momentary unfolding of driving and the use of packaging in the car that might be conflated with recursive habits operating at a non-cognitive level. These impersonal affects of packaging, of course, are only one instance in the on-going flows that compose and re-compose driving assemblages. And moments of affective intensity are no doubt generated by packaging once it becomes waste and these are very different from those encountered with food.

6.4 The proliferation of packaged foods to-go today

The last two case studies have traced the co-evolution of packaging in the specific cases of eating in the air and the car. It was shown how these packaging technologies were either designed specifically for or adapted to fit certain eating locations and situations, namely, those encountered on the plane or in the car. And in some instances these interior travel spaces were also designed around the packaging. The final part then interrogated some of the ways in which packaging is a vital and vibrant part of continuously unfolding driving and flying assemblages.

However, a new generic set of packaged foods to-go have emerged that place even less restrictions on where, when and how food can be consumed. Consequently, these technologies have opened up a series of new mobile relations/locations/situations of food consumption. From a systems point of view they have formed crucial elements of an expanding system of convenience to-go food provision. As with the expansion of the drive thru system so these systems of food provision – which include shops, quick service restaurants, cafes and street stalls and kiosks – follow and are followed by the flows and movements of contemporary societies. They are important constituent parts of the so-called nodes of mobility (Urry and Sheller, 2006) such as cities, stations, airports, and motorway service stations which help organise the complex intersecting and interdependent flows of mobile populations (as seen in the last chapter).

The category of “food service at travel locations” alone represents a growing 3.5% of the overall consumer food service sector in 2010 estimated to be worth £54 billion (Euromonitor, 2011). And in recent years major roadside concession companies have incorporated many more street stalls and kiosks offering food and drink to-go. The likes of Upper Crust, Caffe Ritazza (part of Moto, an offshoot of Compass Group) and Starbucks (in association with Welcome Break) are now found at motorway service stations along with fast food restaurants such as KFC and Burger King. The leading players in the café sector - Caffe Nero, Costa Coffee and Starbucks - are all found at British Airports alongside Burger Kings. And SSP UK Rail, the major provider of railway catering in the UK, has included Upper Crust, Caffe Ritazza, Threshers, Millies Cookies and Whistlestop with its Burger King franchises (International Markets Bureau, 2011). Growing in parallel with the growth in the food service at travel locations are the new quick service restaurants and convenience stores which, as mentioned in the last chapter, have seen significant growth over the past decade as well (Euromonitor, 2011).

However, these systems and corresponding mobility practices would not be possible without designs and adaptations in the packaging that make food and drink more portable and ergonomic. For instance, there are now countless variations of packaging designed to be used on the go from folding sandwich cartons to graze boxes, portable porridge pots and breakfast cereal bowls, cereal bars, bento boxes, shaker salads many incorporating plastic and wooden cutlery, chopsticks, and sachets of sauce, sugar and salt, the list can go on. These constitute genuinely fluid technologies which can mould into a number of diverse mobile environments. Fluid packaged foods to-go are often hermetically sealed, more portable and user-friendly than the burger clamshell, the paper cup or variations of the sky-plate. Accordingly, it is increasingly possible to encounter packaged food across many different modes and practices of travel be that of snacking on foot, waiting for the bus or metro as well as the usual airplane, trains and cars. In one sense the fluidity of these packaging technologies disrupts the binary notion of a packed or unpacked passenger or traveller (c.f. Watts, 2008). The fluidity and adaptability of the packaging designs means food can now be eaten literally while waiting, walking or even running. There is no longer a need for a tray table or even a seat from which to unpack the food and consume.

The changing design of packaging is also a consequence of the demands placed on the packaging to protect and preserve an increasingly diverse array of food to-go alternatively marked as ethical, healthy, high end, local, exotic. Contemporary packaging designs have also been adapted to aid the mobile consumption of a variety of foods which would have been thought impossible decades ago. Thus soups, yogurt drinks and even breakfast cereals equipped with spoons and separate compartments have emerged. These and other types of packaging designed for mobile use are deeply implicated in the construction and assembly of to-go food markets and economies that are bound up with a range of new conducts and calculations including various techniques of mobility in the 21st century. As Hawkins mentions with regards to the proliferation of bottled water:

It is difficult to generate new drinking habits without these being connected to a distinct ethos or rationale: changes in everyday comportment do not emerge spontaneously. In the case of drinking water from bottles these rationales are heterogeneous. They range from the rise of risk culture to techniques of mobility; or, as the ads like to say 'hydration on the go'. (2011:186)

As with the symbolic importance of packaging for air travel, as outlined above, types of to-go packaging today are also clearly entangled with symbolic and

representational meanings of mobility. They can provide the surface from which to mark identities, including mobile identities. For example, one packaging executive notes:

I am 54 years old and I, and there is a balance in me, I'll fly and have a Costa in the morning but then I'll feel guilty about it why couldn't I get out of bed 20 min early to make a flask of coffee and a sandwich which is actually made better ingredients, doesn't produce a whole load of packaging that somebody has got to dispose of because I've got to look like a trendy commuter (personal communications, May, 2012).

But such comments fail to fully convey the material affects that emerge through the event of buying and consuming a coffee packaged in a disposable cup. As mentioned, stilling or representing what are, in effect, more-than-representational aspects of mobility is a difficult (maybe impossible) task. The following quote, however, provides a better sense of the affective materialities of the packaging used on the go:

But the Pret packaging is really good actually. Those hot wraps have the tear off things which is absolutely perfect for what you need. And then when you buy those little croissants. I like Pret so much. I was obsessed with Pret. Everything is cool. You have a little tray for your croissant so you can eat it while you walk around. It is like a little cardboard plate. I still get one every time I pass by (excerpt focus group A).

While such comments might be interpreted as another example of a stabilised actor-network it also highlights how certain types of packaging affect people and their everyday mobilities. The emotive account of brands and branding is unsurprising. The power of brands in generating affective relations has been well documented (Lury, 2009). But the affect of the brand is tied up with a vital materialism or “thing-power” enacted by the materiality of the packaging that plays out in the encounter of buying and consuming packaged foods. As the quote above suggests the design of the packaging (trays, easy to tear off etc.) is intensely corporeal and provokes affects. This way of framing the encounter goes beyond thinking of these as merely symbolic devices which script relatively structured and stable mobile actions and identities. In these instances packaging also appears as a *thing*. Packaging is, therefore, not reducible to the context set for it by human subjects nor as a coded surface to be read by abstract and disembodied mobile subjects such as the “trendy commuter”. When we shift our attention towards packaging as a vibrant matter we can begin to get a sense of how they play an active role in animating everyday mobile life. Put differently, the packaging (along with the food and the brand) are autonomous, vital and vibrant matters that may alter the nature of the travelling assemblage and that may change bodily states.

Highlighting the impersonal affective capacities of packaging points to the always imminent, dynamic and processual character of the mobile life of human-nonhuman assemblages. These are not inert or passive technologies but things which have the capacity to assert themselves in the world, to disrupt, intervene and affect. In this way packaging helps shape the embodied, affective and emergent, if somewhat unpredictable and indeterminate, techniques of mobility. Moreover, these assemblages and the vital materialism of packaging have important implications not only for our understanding of mobile practices but for our understanding of mobilities in the city more generally. Far from the repetitive rhythms that create the “metabolism” of the city as discussed in the previous chapter, these sometimes explosive and expressive moments of intensity and affect in everyday life work to create unfolding affective cities and affective mobilities through these cities, as Thrift points out:

Cities can be seen as rolling maelstroms of affect. Particular affects like anger, fear, happiness and joy are continually on the boil, rising here, subsiding there, and these affects continually manifest themselves in events which can take place either at a grand scale or simply as a part of continuing everyday life (Thrift, 2008:171).

Affective encounters with packaging form events of continuing everyday life which not only form part of the city but also of mobility within the city. They can do so through the disgust of litter or, as I have shown here, through the obsessions or positive corporal experiences generated through their interaction as packaged food.

It is worth discussing one final point which relates to the politics of these materialities and mobilities. We have seen already how Gay Hawkins has addressed the political capacities of packaging to assemble publics through the proliferation of hybrid forums which she shows in the case of an advertisement that drew attention to the oil used to produce plastic bottles (see chapter 3). Packaging’s political role was seen once again in chapter 4, where BPA has helped assemble publics towards matters of concern. Jane Bennett similarly stressed the capacity of things to assemble publics when talking of the political ecologies of matter. But I want, in this final part, to draw out a different politics of mobility within which the types of packaging described in this chapter are implicated. This alternative approach draws instead upon Nigel Thrift’s work on the politics of affect where he pays close attention both to the knowledges created and manipulation of a “fleeting space of time” of embodied action – that half second before the reflective act kicks in.

The quotes and discussion so far in this section has shown that packaging generates corporeal affective encounters that form and re-form the charged background of everyday mobile life. But these events, which constitute a more-than-representational dimension of mobile practice, are, as Thrift puts it, increasingly open to investigation and manipulation. It is important, therefore, to recognise the techniques and methods which industries are now using to grasp the seemingly ungraspable aspects of everyday mobility and how these are then used to engineer affect within human-nonhuman assemblages and, more generally, to produce affective urban spaces and mobilities. The following two quotes, which are worth outlining in full, show how engineers and designers are, firstly, attending to the minutiae of embodied mobile practices (and have been doing so for a long time) but also, and secondly, they show how these insights are being used to pursue greater profits and to script the embodied, non-cognitive and affective mobile actions of the population at large:

You don't need hundreds of humans, you just immerse yourself in their world. And you collect information from the consumers based on three themes: I saw it, I heard it, I did it. You don't use anything from market research at that stage. You just take the points I saw somebody doing something, I read an article that this is going on, I heard something on the radio, so the absolute attributable data points, and you collect those in huge quantities by observing and when you look at all those you create hunches as to what might be going on. And it is when you look at enough data points, without analysing them, you don't say well those random data points might actually take me to why people are rushing in the morning. When you've got the hunches you can then use those hunches as creative platforms to come up with... We did that a lot in the beer industry. We came up with some quite interesting different approaches to the way consumers interact with bars, cups, bottles, cans. It is a quick and dirty ethnography. I am a great fan of ethnography, it's very powerful. (personal communications, April, 2012)

In another interview it was stated:

A consumer will never tell you what they want if you go into consumer group and say I am designing the next yoghurt how do you want it packaged? They'll go (shrugs shoulders). And if you go and present the whole lot of yoghurt packages and say this is the next thing in yoghurt, do you like it? They'll go yeah it's great fun you can do this and they always go brilliant they are both right and both give you valuable data. I have a view from practising the last 15 years that you employ good designers and good technologists we work together understanding consumers and actually you can learn an awful lot by just sitting and watching, I'll walk into a train station and just watch people, if you get really cheeky you catch them on the shoulder and say why did you just buy that? They might look at you and they may ignore you may get useful data, there is a process of, actually 12 years ago, called touch insight developed by a company called 'what if', a brilliant creative industry consultancy, innovation agency what they do they take clients to where consumers are and immerse them in the consumer's world (personal communications, May, 2012).

These method assemblages which, we might add, constitute "mobile ethnographies" par excellence, can help bring about new modes of embodiment. It

suggests, as Thrift shows us with his discussion of the software mediated practice of driving, that “we have arrived in a world in which knowledge about embodied knowledge is being used to produce new forms of embodiment-cum-spatial practice which are sufficiently subtle and extensive to have every chance of becoming a new background to everyday life” (Thrift, 2008:85). The quotes from the designers above provide mundane yet powerful examples of where embodied and affective mobile practices are being minutely described and then written into the design of packaging to-go, adding new openings to the event and providing new backgrounds to everyday mobilities. Furthermore, as Thrift argues, once these spaces are opened up they can also be operated on constituting what he calls a “microbiopolitics”. These processes work in addition to and in tandem with the powerful advertising and media apparatuses that also regulate conduct with the key difference being that these former forms of manipulation work directly on and through the body or nervous system engendering particular bodily dispositions. Put differently, insights from these moments or fleeting spaces of time that are opened up feed back into representational strategies that “seek to colonise the world beyond cognition” or to “hijack the process of (mobile) becoming” (Cresswell, 2006b:73). These research practices by corporations thus entail a softer and more obscure politics of mobility. One that gets fed through to the performance of mobile subjectivities like the “trendy commuter”.

6.5 Vibrant materialities of travel

This chapter has continued to explore histories of packaging, this time looking specifically at packaging used on the go. The first two sections provided a cultural-historical account of how packaging has transformed the practices of flying and driving. The utter pervasiveness and normality of packaged food consumed in the air or in the car today make it difficult to imagine the negotiations that have surrounded these technologies at their inception. What was outlined, then, was a history of how packaged food, in a sense, became mobile. To trace, as Merriman (2012) would put it, the complex work, embodied skills, novel sensations, multiple materialities, etiquettes and evolving subjectivities associated with consuming packaged food on the go.

In a brief and selective review of the history of air travel we have seen how the packaging of food has been, and still is, a powerful symbol used to mark class distinctions but also how it helped organise the economics of flying. Another brief and selective account of fast food showed how packaging constitutes a vital element that enabled the fast food drive thru systems of food provision. The drive thru system has re-

configured the car into a place of dining and reinforced it as a place of dwelling. But these features of driving culture were made possible by the disposable packaging that made the carryout truly feasible (Jakle and Sculle, 1999). As such packaging has, on one level, helped make driving more “productive” through allowing multitasking (Kenyon and Lyons, 2007).

However, these brief historical reviews provided a springboard from which to discuss the contemporary proliferation of packaged foods to-go and their material affects. It was argued that food to-go today is increasingly packaged in ways that can be easily moulded to multiple different mobile environments which helps open up new fields of possible relations, intensities and contexts of mobile practice. Moreover, the degree to which some of these ergonomic packaging technologies and more portable and hermetically sealed packaged foods can be consumed so easily on the move and, at once packed away on the body, disrupts the stable configurations of Watt’s packed and unpacked passengers. Rather passengers or travellers are, in some sense, always unpacked and yet, at the same time, packaged and ready for mobility. Packaging to-go today, then, is a more fluid and adaptable technology.

That being said, we should not simply place the “old” packaging innovations mentioned in the previous sections in some binary opposite to contemporary packaging designed to be used on the go. The packaging technologies described in the cases of air travel and the drive thru were, in many senses, fluid too. Not only were they (and still are) part of on-going and always indeterminate travelling assemblages but even in terms of their design they retain a degree of fluidity. The paper cup, after all, was not designed specifically for the drive thru fast food system but for hygiene purposes. And this fluidity can work the other way around too. The sky plate, while initially a failure as a package for aircraft meals, soon after heralded the beginning of convenience food at home. But most importantly for the purposes of this chapter, these early packaging developments and their associated practices of eating in the air and on the road have normalised eating on the go and therefore helped open up the possibility that many more fluid packaged foods and mobile food practices exist today. Air food and the drive-in/drive-thru, and the packaging that enabled these, might be said to have pre-inscribed these other mobile food practices and the travel assemblages they form part of (Akrich, 1992; Latour, 1992). Contemporary habits of eating on the go did not, after all, just appear from nowhere. People, passengers, travellers had to learn to eat on the go and to accept food that was packaged in ways that permitted these practices. And the

consumption of packaged food and eating in the car and aeroplane provided links for these new mobile practices and technologies to emerge and unfold.

The last section then began to open up and look more closely at the interrelated material affects of packaging. The use of packaged food and packaging constitute unfolding events that form part of the tumultuous, emotional and materially affective moments of everyday mobile life in the city. This chapter has also, at least implicitly, opened up the figure of the traveller/passenger. In the introduction to this chapter it was suggested that passengers do not end at the skin but rather constitute hybrid assemblages that roam. And these hybrid assemblages often (and increasingly?) include some form of packaged food and drink that mutually affect each other. Finally, the absent presence of designers, or rather their method assemblages used for the development of creative platforms from which to generate new packaging technologies, was interrogated. From the evidence gathered for this research it seems that designers and corporations are deploying innovative methods (akin to mobile methods) in order to grasp and intervene in the complex, shifting, embodied and affective relations within which the potential packaging designs or innovations will unfold. This has profound implications for our politics of mobility as these mundane materialities help bring about new modes of embodiment and spatial practice which are open to manipulation.

Approaching packaging from these processual and affective points of view adds to the substantial body of literature that is drawing attention to what have arguably been for too long rather one-dimensional representations of what are in fact highly complex, fluid, multiple and material mobile practices. The accounts and perspectives presented in this chapter contrast starkly with those of the previous chapter, which might now be considered rather abstract accounts of the patterning of movement writ large as it happens in Euclidean container spaces and unit times. In any case, this chapter has provided additional insight into the complex mobile life of food and drink packaging and especially highlighted its vibrancy. It has also suggested that bodily mobilities are produced not only within socio-cultural, historical and geographical contexts (e.g. Cresswell, 2006) but also within mundane material contexts.

Chapter 7. Conclusion

This thesis has been concerned with the mobile life of food and drink packaging. It has been structured in two parts in order to take into account the interrelatedness of the mobilities of food production and mobile food consumption. Each of the four chapters within these two parts have built upon each other to provide a detailed account of the ways in which food and drink packaging is not only in a continual process of mobile formation but also shapes and directs the mobilities of humans, food, information, micro-organisms, global trade and much more besides. Attending to these multiple interconnected mobilities has meant criss-crossing various sites where packaging is encountered from the work desk, the car, the plane, the distribution centre, the food manufacturing plant, reference laboratories and all the way to the oil and gas fields or forests. Each of these settings enact different realities of food and drink packaging just as food and drink packaging also enacts and breathes life into these sites. Packaging, then, has been used both as a probe to explore these mobilities but has also been examined as vibrant, mobile entity itself.

By way of conclusion this final chapter will draw together a number of strands of argument that have been developed in the previous four chapters. The chapter is in four parts corresponding to the concerns and research questions outlined in chapter one as well as to themes and debates that have emerged in each chapter. A final section then outlines potential directions for research in the future. While this chapter is primarily designed to underline and emphasise the findings and contributions of the thesis in general terms, reference will also be made to the conversations and meeting points with other conceptual and empirical themes as they have unfolded throughout each chapter. At the same time the usefulness and possibilities of the different conceptual approaches used to investigate the mobile life of food and drink packaging will be assessed and discussed.

7.1 Packaging, transport and travel

The first and most straightforward concern of this research was to examine how mundane packaging technologies have helped organise and script human travel. This objective was in response to the challenge posed in the Technology and Travel working paper that asked us to consider the potential impacts and influences of so-called unusual suspects on travel and transport. This was the central goal of the second part of this thesis. It was shown, firstly, how packaging, once it has been wrapped around food,

helps shape particular urban metabolisms and patterns of movement in the city by helping (re)order the temporal and spatial ordering of everyday life. Evidence showed that packaging once converted into *packaged food to-go* constitutes a “time-space” shifting device. Not only does it delay or retard the natural decomposition and decay of food (chapter 4) but, by allowing food to be de-coupled from refrigerators, utensils, and cupboards, it also helps configure and shape the temporalities, spatial orders and mobilities of everyday life. This was shown with specific reference to the mundane event of eating packaged food at the workplace. From a historical perspective it was shown that advances and innovations in packaging and packaged food have helped de-couple food from home meaning workers travel home for lunch less frequently, if at all. At this very crude level we can see how food and drink packaging has played a role in re-shaping patterns of everyday mobility.

However, a more detailed examination of the event of eating at work as it is played out today has highlighted a number of other ways in which food and drink packaging influences the rhythms of human mobility. Easily storable, portable and ergonomically packaged foods and drinks consumed at work allow workers to manage time at work despite complex and unpredictable workloads. These technologies immobilise the worker and, in the case of the 21st century office worker, help amplify and sustain virtual mobilities and connections with distant others. While it was suggested that in some cases these technologies permitted a degree of routinization by allowing workers to finish “on-time”, food and drink packaging, for the most part, and following Warde’s (1999) suggestions, may have facilitated a wider de-routinization in the temporal and spatial ordering of societies. It was shown, for instance, that the event of eating at work has important reverberations for the timing and spacing of other practices before and after work. As focus group discussions illustrated the ability to manage work time makes it easier to organise and partake in activities after work, generating mobility not directly related to work.

Food and drink packaging has also helped script the experiences of travel. Chapter 6 showed this to be the case through a brief cultural-historical examination of air travel. The way food came packaged was a highly potent symbol that was (and still is) used as a way of marking class differences. Furthermore, it was also shown how packaging forms a vital element of the drive thru which has become somewhat of an icon of car culture and has encouraged practices of eating in the car.

However, this thesis showed that the patterns and practices of human movement enabled by packaging and packaged food and drink cannot be properly understood without attending to the ways in which packaging developments have configured food systems and the movement of food. This was the focus of the first part of the thesis. It is worth highlighting that connecting analyses of the consumption and the production of food was facilitated by the “follow the thing” method adopted. This method permitted the flexibility to move with packaging through these different settings of consumption and production. From the immobile site of the workplace or the mobile site of the car or airplane we could then follow packaging to explore how designers approached the design of packaging to-go; we could move from looking at packaging in the reference laboratory through to following it to oil fields or the forests of Scandinavia. It meant criss-crossing various networks of packaged food and packaging production – the converters, the manufacturing plant, the tertiary packaging or the container within which packaged food is moved – which then became linked into the more or less routinized patterns and practices of mobile food consumption.

Following packaging through these different settings allowed us to get a sense of the networked character of packaging and thus the research was able to connect many of these different facets of food and drink packaging’s mobile life. It was shown how packaging constitutes an immutable mobile that can combine with food to create another immutable mobile. Throughout chapters 3 and 4, particular emphasis was placed on the role of standardisation in packaging. This meant standardisation not only in terms of its “dimensional consistency” and form but also in terms of its material composition. Without this standardisation the smooth, anticipated, patterned and frictionless flows of food through the food system would not be possible and mobile lives would be dramatically disrupted. In tracing these connections, then, it is possible to show the significant networked influences of packaging on food systems and on everyday human mobility.

In summary, this research has demonstrated how the standardisation of packaging form – and its electronic tagging – permits a rhythm of food production which helps give shape to rhythms of human mobility. This research has, therefore, shed light on various aspects of a politics of packaging and packaged food mobility. Not all packaging and packaged foods move in the same way. Following Cresswell (2010) we have been able to interrogate the differences in the starting points, directions, routes, speeds and rhythms of packaging and packaged food and how this might impact or

influence the directions, routes, speeds, rhythms and experiences of human mobility. Certainly some very specific types of packaging can provide a standardised and compliant vehicle which permits food to travel in certain directions and to certain markets. But for packaging to be a compliant vehicle it must be directed through particular obligatory points of passage (Latour, 1987). This was seen in the case of food safety standards in particular, where a vast calculative apparatus exists which works to determine the effectiveness of packaging barriers. The packaging barrier, then, is not only important for regulating the mobilities of microbes, gas and water vapour, but it is also important for regulating the mobilities of packaging and packaged food, with some types permitted access across borders or into markets whilst others cannot. These calculative apparatuses, and the documents that must accompany packaging for it to be considered an appropriate vehicle for transporting food to certain areas, forces packaged foods and packaging to travel through particular routes or passage points; namely, the laboratory.

Consequently, for packaging and packaged food to be accepted into powerful retail networks they must be electronically tagged whilst also being re-directed to the laboratory for challenge testing. These costly processes have led to a consolidation not only of food manufacturing but also of packaging production. This, in turn, has meant that food, packaging and its raw materials must travel extensive distances which raises questions over the environmental sustainability of the packaged food systems (it was pointed out that foodstuffs represent 24% of all transported road freight). Consolidation also makes the packaged food system more complex and tightly coupled, which makes it, in certain respects, more vulnerable to disruption (c.f. Law, 2006).

7.1.1 *Small technologies, big systems?*

Another outcome of the research speaks directly with that strand of mobilities research that places an emphasis on the “mobility system”. Birtchnell and Urry, in a paper produced as part of the Technology and Travel research programme, outlined how mobility systems often presuppose a vast array of small technologies. They add “it is the diversity of such elements that we emphasise, elements which often seem to have nothing to do with the system as such” (2011:2). We may argue that this research has developed the idea that small technologies, which might seem to have nothing to do with mobility systems, can, nonetheless, significantly influence them and their corresponding mobility practices. However, early on the concept of a system was questioned.

While the concept of a system is useful, and has been used throughout this research, it is less useful when thinking about the interactions and horizontal circulations of elements within *and* between systems. As argued in the introduction this may be a result of the self-organising or autopoietic characterisation of systems which creates a propensity to draw boundaries around and separate systems. This thesis, however, has raised questions over where exactly the boundaries of mobility systems should lie and whether it is even very useful to use the term system for this type of analysis. Is food and drink packaging an element of mobility systems? Would, for instance, the car system have evolved in the way it has without the food and drink packaging that enabled the drive thru? Certainly in chapter 6 it was suggested that modern-day mass air travel systems would have evolved very differently had it not been for the introduction of certain types of specialised packaging.

Such provocations have implications for systems thinking and the fashionable multi-levelled perspective which has been a prominent field outside of the field of mobilities research but which has, nonetheless, examined mobility system transitions. Frameworks such as the multi-levelled perspective of system transition usefully incorporate “small” technologies and events into their analysis of large scale and historical system transitions. But the range of “small” technologies incorporated into their empirical analyses is too often restricted to those that circulate within particular bounded and unified systems under review. This analysis, by contrast, has focused on a small technology that, at first glance, might seem to have less to do with transport than with food systems. But as the discussion has shown, and especially the second part of this thesis, these small elements which configure various food systems do play an important role in shaping and scripting travel over time.

Taking account of such small and seemingly unrelated technologies and objects when analysing large systems has been a critique of Shove and Walker also. They argue that we need to incorporate the so-called horizontal circulation of elements of practice and “comment on the extent to which images, meanings, technologies and forms of competence travel within and between ‘regimes’ [or systems]” (Shove and Walker, 2010:472). This thesis demonstrates how the horizontal circulation of one particular type of element of practice – a small mundane technology – does indeed travel within *and* between systems and can have a profound influence on more than one system or type of regime or system. Therefore, it may be argued that if we are to understand mobility systems (or any other type of system for that matter) then we must understand

how these systems are not bounded per se but interact with each other, criss-crossed and held together by various small objects and technologies that circulate between them. That being said, in taking account of these interactions we are, at the same time, pointing out the limits of a systems approach to mobility.

7.2 From packaging and movement to packaging's mobile life

The findings in the previous section relate to mobility inasmuch as they are about the interrelations and interconnections between packaging and the physical *movement* of food and people figured as discrete entities displaced in space and time. Underpinning the analysis is an assumption that time and space are fixed and given coordinates that can be easily measured. Accordingly, the analysis provided insight into the stable and repetitive flows of packaging, packaged food and the similarly stable and scripted mobilities of humans. We might say, then, that packaging was deployed as a probe to investigate the movements of the food system and of humans.

However, throughout each chapter (except perhaps chapter 5) attention was also paid to the *molecular mobilities* of packaging, its vibrancy and its interactions within on-going, fluid assemblages. This meant re-thinking packaging as a site of material transition and becoming-flows instead of a site of material stability. It was argued that objects like packaging can, therefore, be mobile in two ways. Firstly they can be mobile in the literal sense of moving through Euclidean time and space. Most, if not all, objects move in these ways at least at certain points in their lives. A second and related way of being mobile is through mutability, fluidity and vibrancy. *Things* change. And not only do things transmute but they also continually change the “spaces” and the more or less mobile “subjects” that encounter these *mutable* mobiles. Accordingly, one “romantic” pillar of this research has attended to the movements of stable and singular objects and scripted subject actions. A second “baroque” pillar has critiqued and built upon these romantic approaches to view things and interrelated subject actions as in-process and as continually becoming. These shifts in perspective – made possible by what was termed a fractional mode of knowledge production – were deemed important for three interrelated reasons.

First, while we might think of everything as being mobile and as movement as primary there is a danger that we lose sight of the very important movements in Euclidean spaces and times that are the effect of these more fundamental mobilities. It is important, therefore, to still stress that packaging as an object has a very real impact on

the patterning of food and human movements. This is also important because packaging is a largely neglected technology in food studies and, clearly, in studies of travel, transport and mobility.

Second, and related to the first point, in comparing different perspectives we can understand how molecular mobilities can influence and interfere with more stable movements of discrete objects and subjects in Euclidean times and spaces. In other words, attending to packaging's mobile mutability *and* its mobile stability allows us to grasp the interferences and interactions between the different topologies of packaging. Third, moving between perspectives – from the stable and singular mobilities of packaging to its molecular mobilities – we are able to open up a much wider range of mobile relations within which packaging is entangled. Opening up this wide range of mobilities, moreover, provides a greater understanding of the politics of mobility within which packaging is implicated. Most importantly, packaging becomes political in its own right. Through a processual framework we can apprehend how packaging can interfere, affect, disrupt and disturb. In sum, we can get a better understanding of packaging's *mobile life*.

With the exception of chapter 5, each of the substantive chapters highlighted various aspects of packaging's mobile mutability, its fluidity and its molecular mobilities and how these interfered with its movements within stable network topologies and across Euclidean times and spaces. In chapter 3, we began to open up the idea that packaged food systems might be usefully reconsidered as an economic event and as an assemblage. It was argued that re-conceptualising packaging and the food system in this way would be useful in comprehending disruptions and interferences which clearly happen and which are set in contrast to the smooth mobilities portrayed. It was suggested that knowledge of the “embodied mobilities” of packaging – the miles incurred in its production and distribution – might provoke ethical outrage and it has the capacity to assemble publics which might have the (transitory) effect of re-configuring entrenched mobilities of packaging and packaged food production. Packaging might also have asserted itself by something as mundane as getting stuck in a piece of machinery and thus detaining the highly automatized, precisely timed and seemingly frictionless flows of the packaged food system. Similarly, a fire in a packaging production plant might produce a “cascade of becomings” (Bennett, 2005) which could disrupt the continuous flows of fast food, as one expert pointed out.

While the disruptions outlined in chapter 3 were speculative, the vibrancy of packaging was more clearly demonstrated in the controversy of BPA in chapter 4. BPA and certain types of plastic packaging have affected consumers, scientists, campaigners, government officials as well as those who work in the plastics packaging industry. The vibrancy of plastic packaging and of BPA in particular serves to render packaging barriers fluid, multiple, changeable and uncertain with significant implications for packaging's movement in other topological spaces like the region. For example, in the case of BPA this component of packaging dramatically disrupted the trajectories of packaging, packaging components and packaged food as shown with the French government decision to ban these types of packaging and packaged food within their jurisdiction. The BPA crisis is one example of the vibrancy of packaging and how this can effect movements of packaged food and packaging but other examples were considered. Packaging and packaged food's fluidity and liveliness emerges when it acts as the vehicle for mobile pathogens, which problematizes the safety of packaged food. We again caught a glimpse of packaging's vibrancy through its affective capacities when used on the go. Packaging has not only constituted an important symbolic feature of travel which has, in the case of air travel, served to mark class differences, but it also, and at the level of bodily interaction, can affect and be affected by everyday mobilities. It can generate positive affective corporeal experiences.

In re-thinking packaging as lively and mobile it was therefore possible to open up a series of mobilities that build upon the important yet rather simplistic argument that packaging helps or enables the movement of food and people. Furthermore, throughout each chapter attention was drawn towards the different politics of mobility as they became apparent through this more processual view of packaging. For a start, and as mentioned, packaging could be seen as a political "actor" if one considers politics a conjoined effect between various (human and nonhuman) bodies (Bennett, 2005).

Packaging's political capacities can emerge at a large scale such as in the case of BPA where the global flows of packaging, packaged foods and packaging components have been re-routed. But it can also emerge at the level of everyday mundane mobile practices as mentioned. In chapter 6 especially we began to see how designers and corporations are engineering affective mobile environments by designing packaging according to the detailed embodied descriptions of human-technical interaction. These techniques of engineering affect operate in addition to a vast apparatus of advertising

that works more directly on cognitive, discursive, representational and personal/subjective levels. Whether these interventions that work on the fleeting space of time before the reflective act kicks in are positive or negative is, however, up for discussion. But it signals the intense relations between absent present others and travellers where travellers are no longer viewed as sovereign individuals but as effects “of the events to which their body parts (broadly understood) respond and in which they participate” (Thrift, 2008:175).

7.3 Contributions, conversations and meeting points

This research has provided a number of contributions. One important contribution centres on how this thesis has broadened our understanding of travel and of the relationships between technologies and travel more specifically. This has been achieved in a number of ways. First, as outlined at the very start of this thesis, this research has explored the interactions and relations between an “unusual” technological suspect and travel. Examining the interactions between food and drink packaging and travel provides a contrast with the well-documented effects and relations between ICTs and travel, both in the fields of transport studies and within the field of mobilities.

Second, this research, like much other mobilities research, has successfully combined and connected mobilities across different scales from looking at bodily mobilities to looking at the global flows of packaged food, from interrogating the barriers of individually packaged food to the trade barriers that are erected across nations, from exploring the event of eating at the work desk through to the metabolisms and patterns of mobility in the city. Combining scales of mobility from the bodily movements to the globalised flows of people, objects and information has been highlighted as an important feature of mobilities research that distinguishes it from other studies of transport and travel (Cresswell, 2011). Consequently, this research builds upon this rich vein of work within mobility studies.

A third contribution of this research is its focus on the histories of object mobility. Throughout each chapter there has been an explicit attempt to fold in the histories of packaging and packaging mobilities. An awareness of mobilities of the past is crucial and provides a counterbalance to the emphasis placed on the new within the “new” mobilities paradigm, as Cresswell reminds us (Cresswell, 2010; see also Cresswell and Merriman, 2012). Awareness of historical mobilities and how they inform the present may also afford a more nuanced reading of politics of mobility.

A fourth contribution of this research relates to our understanding of packaging. As noted in the introductory chapter industry literatures have pointed out that packaging has a central place in society. Yet the arguments presented in these documents tend to take “society” somewhat for granted and tend to essentialise “packaging”. This research has taken up the starting premise of these investigations but analysed packaging’s place in society using more sophisticated concepts of society, technology and, indeed, the relation between both. Most importantly, this research has understood societies as being materially heterogeneous and constituted by and constitutive of a complex set of interconnected but differentiated mobilities and flows. The same might be said for technology or packaging which are themselves constituted by and constitutive of mobilities and flows happening at different speeds and in different ways. Moreover, understanding packaging’s role in society from these “mobile” perspectives helps us think about problems of waste packaging. It is clear from the evidence presented in this thesis that reducing or eliminating packaging would significantly re-configure not only societies but also, and more fundamentally, the mobilities which underpin these societies. This has important implications for any normative work that seeks to somehow easily reduce or eliminate packaging as a result of the waste problem. Packaging is an element that keeps food systems moving and thus keeps societies moving. Without it there is danger that both food systems and societies would stop circulating as they do today with huge repercussions on many aspects of everyday life. This prospect has to be taken into account in any argument against packaging. At the same time, ways of potentially making the packaged food system more environmentally sustainable have been hinted at – e.g. creating closed loop packaging production systems – but significant barriers (a politics of mobility) have also been identified that inhibit the emergence of such systems. Notably, the routes that new packaging must go through to be deemed appropriate or safe are expensive, time consuming and often imply a dramatic reordering of economies (of food and of packaging) as well as changes in everyday practices. To put it succinctly debates around packaging need to take more seriously the mobile life and mobile politics of packaging (broadly speaking).

In addition to these contributions, this research has set up a number of conversations and meeting points between different debates and schools of thought. This research, as with most mobilities research, continues to constitute a fruitful meeting point between social science and the humanities and transport studies. For example, this thesis has problematized existing work on technology and travel from a

transport perspective. Not only has an alternative approach that moves away from technological determinism been presented, but this study has also shown how a wide range of mundane technologies, like packaging, and events mediated by such technologies, can have a profound, and in some instances just as significant, an impact on patterning and experiences of travel as the usual suspects of ICTs.

This thesis, of course, forms part of the on-going conversation within the field of mobilities research that focuses on materialities and mobilities. It has served to further blur the line between what might be considered human and non-human thus problematizing the notion of atomistic, rational individuals who move. These movements are always already embedded within material contexts that are under-examined within transport studies literature. More specifically, however, this research engages with literature on food mobilities and waste mobilities. Existing work on food mobilities has tended to either concentrate on the symbolic possibilities of food in relations of travelling and dwelling or has investigated the mobilities of food production with little investigation of the corresponding moments of consumption. Yet, and as this thesis demonstrates, without the movement of packaging and packaged food, some people would find it very hard to move in the same ways as they do today. The first call, then, would be for work within food mobilities to connect the mobilities of food consumption with the mobilities of food production and vice versa. This has happened to some extent within food studies and more specifically the work on food networks, yet within this latter body of work more attention arguably needs to be paid to the *mobilities* of food. But perhaps most important, both for work on food mobilities and work on food studies more generally, is that more attention needs to be paid to the packaging, an element that not only enables food mobilities and the food system to function but which also has the capacity to disrupt it.

The processual conceptual approach that informed this research also engages with conversations in an emerging waste mobilities scholarship and performative approaches to waste in particular (Hawkins, 2012, 2013; Gregson et al., 2010a; Gregson and Crang, 2010). However, a number of differences exist between this research and those within the waste mobilities sub-field. To begin with, this research has concentrated not on packaging and its un-becoming as waste but instead on its life as raw material, packaged food commodity, and as packaged breakfast and lunch. While the waste mobilities literature that adopts a performative cultural economy approach is certainly useful, few studies have examined the life of packaging before waste from this

perspective. In those instances where packaging has been examined in terms of its becoming, or its life as a vibrant matter helping assemble “hybrid forums” (e.g. Hawkins, 2012, 2013), there is little talk of the mobility implications across complex topological spaces. Put differently, this research has considered packaging not only as mobile itself but as also caught up in the mobility of others (food, humans, pathogens and microorganisms, food processing plants etc.).

In adopting a performative approach to packaging’s mobile life this research also builds upon wider debates on materiality within the social sciences. It forms part of the on-going attempt to “re-materialise” human geography (Whatmore, 2006). The trend towards re-materialising human geography has formed the basis for a number of studies within the field of mobilities research that have looked at materialities and mobilities but none have, as yet, examined food and drink packaging from these perspectives. In addition to these general contributions a number of meeting points have been staged at each chapter between diverse sets of literature. For instance, chapter 5 set up a meeting point between mobilities studies and the work on food practices and temporality. A meeting point was also staged in chapter 4 between mobilities work and laboratory studies. While laboratory studies have always emphasised mobility – most notably through detailed discussions of immutable mobiles – more could be done to examine the wider reverberations, effects and affects that laboratory work and immutable mobiles have beyond the enclosed networks of technoscience (although see Lavau, 2013). Productive dialogues have been started at each of these meeting points and each of these meeting points could constitute grounds for future research, as the next section will briefly detail.

7.4 Opportunities for future research

At the end of the introductory chapter a series of potential trajectories not taken were outlined. These included following packaging as waste, examining its role as a surface for branding and communications, looking at how packaging has (re)shaped patterns of mobility for shopping or how it has been used at home. These avenues were not taken, in part, because existing literature has already dealt with these issues, even though there is scope to further develop these lines of enquiry. Indeed, as argued, some of these lines of enquiry could benefit from looking at these issues through a mobilities lens. However, let us instead focus on the possible directions of future research as they have emerged through the various meeting points and conversations that were pointed out in the last section. After all, and as mentioned already, each chapter was, in many

respects, a preliminary exploration into packaging's mobile life that can be built upon and which could constitute entire theses in their own right.

At the end of chapter 3 discussions turned to re-think packaging and packaged food processing as assemblage. This clearly engages with recent moves to think of cultural economies as events and materials as sites of continual transition. Future research could concentrate solely on framing packaging as a lively and disruptive component of the food system. This might require investigating various crises in more detail and honing in on their mobility effects and/or their ability to significantly re-direct entrenched mobilities. It might also require changing the methodological approach. As Swanton (2013) notes many of these performative readings of cultural economy are best suited to a literary narrative style that foregrounds material encounters and which stress the importance of process and materials' instability in process. Desk-based research and interviews might then be complimented with co-present observation of packaging as it progresses through chemical plants, mills, food production plants and through its distribution in order to present a literary narrative of packaging's mobile life. A specific focus on moments of disruption or practical ways of managing controversy would provide a useful additional perspective on the situated and embodied sociomaterial practices that help enact packaging differently and which at times help contain the liveliness of packaging. As mentioned in the methods chapter this research was in some sense limited by problems of access to packaging or packaged food processing plants or regional distribution centres or any other highly sensitive site. Future research might, nonetheless, attempt to access these sites and provide descriptions of the practical minutiae of how these processes are held together.

The same sort of co-present observational approach could provide additional insights into the practical construction of packaging barriers in the laboratory and as regulation. It could also offer insights into the material affectivity of packaging as it is used on the go. As argued in the methods chapter, though, these methods by themselves would not necessarily be any better or grant a more authentic picture, but they would present a different picture of the mobile life of food and drink packaging as it was presented here.

In chapter 5 it was already mentioned how future research might usefully investigate and compare a wider range of work locations and occasions where packaging is consumed. We might, for instance, investigate the eating practices and the

use of packaged food by night workers, shift workers, manual labourers as well as providing a finer grained analysis more sensitive to the differences in the use of packaging and experience of mobilities according to class, gender, ethnicity and age. The mobility implications and the politics of mobility of these different eating practices and uses of packaged food could then be traced and compared. This is especially relevant in the case of gender differences given the recent controversial art-cum-popularised “Women Who Eat on Tubes” collaboration.⁹

More could also be said of the affective materialities of packaging as it moves and moves others. However, while initial attempts have been made to grasp these more affective registers of packaging, especially in chapter 6, perusing these lines of enquiry further might again require different methods. Future research, then, could adopt phenomenological or post-phenomenological methods to interrogate better packaging and the indirect yet embodied and lived practices of mobility. That being said, it was noted in chapter 6 that talking to designers constitutes a fruitful avenue for exploring such embodied sensations. Furthermore, and related to this last point, at the end of chapter 6 it was suggested that the research methods used by corporations (which could be considered forms of mobile method) are advantageous for grasping these embodied practices.

Another potential avenue for future research might involve thinking about futures. The cultural-historical approach incorporated into the methodology has been useful in telling us how and why certain packages exist, how they have come to matter and how they have co-evolved with the movement of humans and food. While we must be careful in not positing that the past was somehow immobile it is, nonetheless, evident that packaging and packaged food have become path-dependent and entangled with faster, more geographically extensive and generally more mobile ways of life. It has become clear, though, that such ways of living are environmentally unsustainable.

In order to think about future mobile worlds we must, therefore, think about how small mundane technologies might interact and co-evolve alongside such wider developments. A scenario building exercise might then be conducted as a way of envisioning different mobility futures and how packaging and packaged food might fit into and shape these. This would be especially useful for packaging designers and industry representatives as well as policy makers concerned with packaging and waste

⁹ See <http://womenwhoeatontubes.tumblr.com/> (accessed, 10/04/2014)

packaging. A possible title for such a scenario building exercise might be – “Food and Drink Packaging in Fast, Slow and No (food) Futures”. Such scenarios would detail what packaging might be like under these different mobile futures. They would also detail how packaging developments might co-evolve alongside and shape these mobile futures. This exercise would help translate one of the key findings of this thesis – that small technologies matter for travel – to policy makers who could then possibly think of strategies that can better deal with the complexities and (environmental) unsustainability of contemporary mobility. Similarly, if the goal is to design future packaging then understanding the relations such mundane technologies have with wider and more or less loosely connected sociotechnical processes forces us to pay more attention to the potential implications such designs might have. It is important, though, not to think of either society causing the proliferation of packaging or packaging somehow causing various social practices. Rather we must think of these relationally, that is to say as interacting and co-evolving alongside each other in complex and unpredictable ways. Such scenario building exercises would render packaging design a more reflexive process as well as highlighting the complexities of thinking about future mobile worlds.

This research has, therefore, opened up a number of additional avenues that could not be explored further in this research but which might provide more insight into packaging’s mobile life. However, and finally, it is worth pointing out that packaging is but one of many small, mundane or unusual technologies that might impact and influence complex mobilities. Future research might take on board the call from the Technology and Travel research programme and investigate the mobile lives of a number of other small, unusual and mundane technologies.

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