Environmental Sustainability and the British Planning System – A Behavioural Approach.

Thesis submitted in accordance with the requirements of the University of Liverpool for the degree of Doctor of Philosophy

By

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Declaration:

This work has not been submitted in substance for any other degree or award at this or any other university or place of learning, nor is being submitted concurrently in candidature for any degree or other award. This thesis is being submitted in partial fulfilment of the requirements for the degree of PhD. This thesis is the result of my own independent work/investigation, except where otherwise stated. Other sources are acknowledged by explicit references. The views expressed are my own. I hereby give consent for my thesis, if accepted, to be available for photocopying and for interlibrary loan, and for the title and summary to be made available to outside organisations.

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Abstract:

Poor air quality, biodiversity loss and climate change are three of the most pressing environmental threats facing humanity. Each challenge is ultimately driven by human behaviour and requires rapid, and wide-range changes across the economy to adapt to and mitigate these issues. Spatial planning represents a mechanism which can develop, implement and coordinate these changes across a range of contexts and spatial scales. This is due to its ability to balance the response to these challenges alongside a range of potentially conflicting policy goals. To enable this, it is necessary to identify and understand the wide range of factors which influence and underpin human behaviour across a variety of contexts. Whilst there is a range of theoretical approaches to planning, there has been a common failure to accurately consider the role of human behaviour within these approaches. This thesis illustrates this 'behavioural gap' and addresses this by presenting an alternative, behavioural approach to planning.

This approach is applied to three empirical studies, which represent a sample of potential spatial planning strategies to address the aforementioned environmental challenges. This formed the basis for a synthesis which identifies and explains a set of factors which support and hinder the implementation of pro-environmental policies and practices within spatial planning. This thesis draws from approaches from across the spectrum of behavioural theory. As a result, a wide range of factors which influence behaviour was identified, with cognitive biases, heuristics, norms, experiential knowledge and the physical environment variably impacting behaviour and the ability to implement new policies and practices within spatial planning.

This evidence identifies that the long-term impacts of these threats and the uncertain pay-offs of mitigation and adaptation activity mean the incentives for planning authorities to implement policy and practice change are often limited. The impact of planning culture was also evident,

with norms, attitudes and habits within an authority creating or limiting the opportunity space for the development and implementation of a new approach to address environmental challenges. The individual skills and knowledge of planners were also identified as being central to shaping the ability to develop and implement new policies. A further influence was the market context which presented challenges and opportunities for authorities depending upon the socio-economic context of a local authority. This analysis led to the development of a series of recommendations for planning policies and practice as well as for the education of planners. These include the need for strong leadership in local authority, greater resourcing for environmental initiatives within planning, changes to institution structure and a need for greater use of behavioural theory within planning education.

List of Published works used in this thesis:

Peer-Refereed Journal Articles:

Buck, M., 2021. Considering the role of negotiated developer contributions in financing ecological mitigation and protection programs in England: A cultural perspective. Local Economy, 36(5), pp.356-373. (used in Chapter 5)

Buck, M., Sturzaker, J. and Mell, I., 2021. Playing games around climate change–new ways of working to develop climate change resilience. Journal of Environmental Planning and Management, pp.1-18. (used in Chapter 6)

Buck, M. and Nurse, A., 2021. Cycling in an 'ordinary city': a practice theory approach to supporting a modal shift. International Journal of Sustainable Transportation, pp.1-12. (used in Chapter 7)

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Chapter 1: Introduction and Research Justification

1.1: Scope and aims:

Environmental challenges pose an existential crisis for humanity, and there is overwhelming evidence regarding the need to address the drivers and consequences of these threats rapidly (CCC, 2019; UNEP, 2021). Human behaviour drives these environmental challenges, and understanding why individuals and other stakeholders act as they do is essential to identify strategies and actions to mitigate and adapt to these threats.

Spatial planning practices can contribute significantly to mitigating and managing such threats, helping to provide stable conditions for economic activity and social life (UNEP, 2021). However, there has been a long-term failure of spatial planning to effectively support the mitigation of environmental challenges including climate change and biodiversity loss (UNEP, 2013; Park, Conca and Finger, 2008). This can be observed through the continued loss of biodiversity, and a failure to support the rapid decarbonisation of urban areas (UNEP, 2021; IPCC, 2022; IPBES, 2019). Therefore, whilst there are many, and diverse planning challenges, this thesis focuses on the most pressing threat of environmental challenges.

This thesis will argue that many approaches to planning theory fail to adequately conceptualise spatial planning with regard to the mitigation and adaptation to environmental challenges. Therefore, this thesis' core aim is to illustrate the value of a 'behavioural approach' within urban planning research, with a focus on understanding humanity's most pressing challenge, the suite of environmental threats which increasingly affect human and non-human life.

Behavioural approaches to planning have, to date been underutilised, this thesis will illustrate the adaptability and versatility of this approach. A behavioural approach to planning provides a pragmatic and theoretically robust approach to examining planning in the context of environmental challenges. It directly engages with different facets of human behaviour and behavioural change and can be applied across a diversity of contexts, something that is

particularly useful when understanding how spatial planning manages mitigation and adaptation to environmental challenges, given the centrality of human behaviour in driving adaptation to these threats.

1.2: Structure:

At the centre of this thesis are three published papers that represent an empirical and theoretical understanding of addressing environmental challenges through spatial planning. These essays are preceded by four chapters that set out the empirical challenge and describe and introduce the theoretical approach taken in this thesis. It closes with an analysis and concluding chapter that draws out the key findings and implications of this thesis.

Chapter 1 sets out the research gap that this thesis seeks to address, presenting evidence of environmental challenges, and the relevance of a behavioural approach when considering planning's response to these challenges. Furthermore, a selection of prominent schools of planning thought are set out, enabling the identification of a key theoretical gap that this thesis addresses.

Chapter 2 introduces the theoretical framework used within this thesis, presenting the key tenets of behavioural theory. This illustrates how this provides a novel and holistic underpinning for planning research. It sets out the key concepts of New and Old Behavioural Economics, Game Theory and Social Practice Theory, illustrating how these approaches conceptualise behaviour and their commonalities and differences.

In Chapter 3 the behavioural concepts set out in Chapter 2 are applied to planning practice. To do so, the chapter illustrates how the character of planning practice means it is well suited to a behavioural analysis. This enables researchers to use such an approach to identify and explain the effect of a wide range of factors on decision-making and behaviour, and the subsequent outcome of these decisions. To support this argument a review of published planning and cognate academic literature is presented in this chapter.

Chapter 4 provides a detailed methodology in which the three case studies are set out in detail alongside an outline of what the conducted research sought to achieve. The research design and the delivery of behavioural research are considered, as well as details regarding the methodology e.g. research methods, sampling and analysis. This chapter ends with a detailed description of each of the case studies included in the thesis.

Chapter 5 is entitled “Cycling in an ‘ordinary city’: a practice theory approach to supporting a modal shift”. It sets out that in many urban areas throughout the world policymakers have identified a modal shift towards cycling as being important to address a variety of environmental and health challenges. Despite this, beyond exemplar cities cycling typically occupies a marginal position, with existing research in this field largely focused upon such localities. This project explores the various factors which influence the decision to cycle in Liverpool, UK – an 'ordinary city' in cycling terms, where no strong 'cycling culture' exists and cycling occupies only a marginal modal share. The paper applies Social Practice Theory, a behavioural theory which focuses its analysis upon the 'practice', or behaviour, rather than individual decision-making processes. The approach provides a three-part framework of factors which combine to shape a particular practice, by altering the availability of these factors that affect the uptake of a given practice.

Chapter 6 is entitled “Playing games around climate change–new ways of working to develop climate change resilience”. This set out that despite widespread acceptance of the need to mitigate and adapt to the effects of climate change there are challenges surrounding the extent to which rhetorical and legal commitments are translated into action. This paper explores this, in a bid to identify how such objectives are rationalized into spatial planning, where other policy issues including economic development, transport and housing are often prioritized. The paper examines this through a series of interviews with key public sector stakeholders within a range of British planning authorities. It employs a series of 'toy games' drawn from Behavioural Game Theory to identify how the various 'rules of the game' affect the behaviour of actors within the planning system. It is used to illustrate how changing these rules can affect

the behaviour of market and non-market actors, supporting climate adaptation and mitigation objectives through development and land-use change.

Chapter 7 considers the role of negotiated developer contributions in financing ecological mitigation and protection programs in England, using behavioural economics to describe and explain the observed outcomes. Land value capture mechanisms are increasingly utilised by local governments worldwide to finance the provision of a variety of infrastructure and other public goods. However, even with the increasing attention of researchers and local government practitioners over the potentially devastating, and wide-ranging impacts of biodiversity loss, there has been only limited consideration of the potential for its use in funding ecological mitigation programs. This paper explores this, using a series of interviews with key stakeholders, exploring the underlying factors influencing decision-making and outcomes in land value capture policy and practice, which lead to a prioritization of other public goods over financing ecological mitigation programs. It draws from behavioural economics and employs the concepts of biases and heuristics to explain two opposing scenarios: LPAs adopting, or failing to adopt land value capture policy and practice to support funding programs which seek to address biodiversity loss. It sets out how this is related to, and shaped by the 'planning culture' in place within these authorities.

Chapter 8 is a discussion chapter, which synthesises the empirical research presented across Chapters 5 – 7, directly addressing the research questions that will be set out in Chapter 4. Firstly, a series of common themes are outlined, illustrating several challenges and opportunities in addressing environmental challenges through spatial planning practices. Second is a reflection upon the methodologies applied in this thesis, with a focus on outlining the utility of a behavioural approach within planning research. Third, drawing upon the earlier analysis is the presentation of a series of practice, policy and education recommendations. The remainder of the chapter reflects on the research process as a whole, including data collection and peer review. The chapter closes by outlining a future research agenda, informed by the experiences and outcome of this thesis.

Chapter 9 provides a conclusion to this thesis, summarising the core theoretical and empirical contribution provided within this thesis regarding the research questions.

1.3: An introduction to environmental challenges:

The actions of humans are now the dominant driver of earth system processes with the impacts on the environment being so significant that many argue we have entered a new geological epoch, the Anthropocene (e.g. Steffen et al., 2011). The collective behaviour of individuals and organisations drives environmental threats, therefore planning research must engage more closely with understanding the effect of human behaviour on planning outcomes. By doing so, practitioners and policy-makers can better understand how different planning policies and practices can be developed and implemented to more effectively shape behaviour to mitigate and adapt to environmental threats.

Many planetary boundaries have been exceeded including biodiversity loss and global average temperature (IPCC, 2022; Zalasiewicz et al., 2017). Current demands upon the Earth's resources exceed the ability of natural processes to produce and absorb pollutants, leading to widespread environmental depletion and degradation across the world (UNDP, 2012). Three of the largest and most pressing global environmental risks are biodiversity loss, climatic changes and poor urban air quality (Steffen et al., 2011; IPCC, 2022; IPBES, 2019; EEA, 2019). As a result of their prominence and scale of the threat to human and natural life as well as to the financial costs these threats impose, this thesis has selected these threats as a sample of the environmental threats which planning must address. Whilst there are a plethora of other challenges, this thesis selects this trio to examine planning responses to these risks and in doing so illustrates how planning might play a role in the mitigation or adaption to these threats.

This section will briefly set out why these challenges require urgent action, before illustrating the relevance of spatial planning in minimising and managing these risks. This section concludes with a consideration of the relationship between behaviour and spatial planning in achieving such objectives.

1.3.1 Climate Change:

There is overwhelming evidence that human activity has increased global average temperatures, reaching an increase above pre-industrial conditions of 1.3 °C in 2020, driving significant changes in climatic conditions, with further change inevitable due to the lag between emissions release and response in metrological conditions (Hoegh-Guldberg et al., 2019; IPCC, 2022). Despite the significant progress made in developing technical solutions, economic tools and regulatory regimes there remains a wide gap between the required change and current action to address this risk (IPCC, 2022).

The future pace and scale of decarbonisation and behavioural change will partially shape future adaptation needs since this can minimize future greenhouse gas emissions (IPCC, 2021). As a result decision- and policy-makers across all sectors must drive rapid and transformative changes to reduce global CO_2 emissions to minimise the probability of average temperature increases beyond 1.5°C. This represents the best chance to avoid catastrophic and irreversible impacts on the natural and human world (IPCC, 2022; Lenton et al., 2019). The key impacts and projected risks relating to climate change differ based on geographical location and context, but the metrological impacts of increased frequency and intensity of flooding, storms, droughts and extreme heat events alongside sea level rise are the most prominent changes (Arnell et al., 2016; Arnell et al., 2019, IPCC, 2022).

The financial and human consequences of these risks are concentrated within urbanised areas, due to the alteration of natural land cover and the concentration of population, development and infrastructure within these areas (Carter et al., 2015; Keat, Kendon and Bohnenstengel, 2021; Miller and Hutchins, 2017). For example, within the UK urbanised areas are expected to be at significantly greater risk of extreme heat stress, whilst 1.9 million people are currently at risk of flooding, causing an estimated £475.5m of annual damage to residential property alone (Kovats and Brisley, 2021; Sayers et al., 2020).

1.3.2 Biodiversity Loss:

In 2019 the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services concluded the background extinction rate was higher than at any time in human history (IPBES, 2019). The background rate of species extinction was 100 – 1000 times larger than the expected background rate, resulting in the loss of approximately 13% of species diversity since 1500 (Proença et al., 2017; Newbold, 2015). The impacts of biodiversity loss tend to be even less visible and tangible than those of climate change, with losses gradually undermining the provisioning and regulation functions of ecosystems (IPBES, 2019). These processes underpin human health and well-being, and an estimated 55% of global GDP is dependent upon high-functioning biodiversity and the ecosystem services they provide (Dasgupta, Raven and McIvor, 2019).

The loss of biodiversity within the UK is assessed to be among the worst globally with a total of 15% of species threatened with extinction and 41% of total species declined in abundance since the 1970s (Hayhow et al., 2019). This has meant that the UK has failed to meet 14 of the 19 Aichi Biodiversity Targets, the key global multilateral treaty on biodiversity (JNCC, 2019). Stocks biodiversity underpins the functioning of many aspects of human life which means it is highly challenging to place even a broad estimate of the financial losses stemming from biodiversity loss (Dasgupta, 2021).

1.3.3 Air Quality:

Another key environmental risk centres upon the release of anthropogenic-driven airborne pollutants in the environment. Within urbanised areas, the accumulation of airborne pollutants includes a mixture of chemicals made up of fine particulates, termed $PM_{2.5}$, alongside toxic gases including nitrogen dioxide (Li, Jin and Kan, 2019). Unlike the previous two challenges, the impacts of air pollution typically occur at a relatively local scale, i.e. within the urban area or region in which the source of these emissions is located (Quarmby, Santos and Mathias, 2019). This means there are large differences in the severity and impact of air pollution across

different nations, with those in lower-income countries likely to experience greater levels of air pollution (Johnson, Rieuwerts and Comber, 2021; Mannucci Franchini, 2017).

Within the UK, poor air quality has been identified as a significant risk to public health (Public Health England, 2018), due to its association with several chronic health conditions including cardiovascular disease and lung cancer. These effects are greatest amongst communities with greater socio-economic deprivation (Williams et al., 2019; Holgate, 2017). The human and financial costs of poor air quality are concentrated within urban areas since the vast majority of airborne pollutants are attributed to transport emissions, industrial processes and domestic generation of heat (Lam and Head, 2012; Zhang et al., 2019).

1.4: An introduction to spatial planning:

Planning is fundamentally concerned with shaping, and managing future land use and development, and in doing so directly and indirectly, shapes nearly all parts of economic and social life. As urban areas and regions become larger and more complex planning is increasingly necessary to avoid inefficient land-use patterns and poor-quality development (Couch, 2016). It also supports economic growth by ensuring the availability of developable land and by coordinating the provision of infrastructure and services. Planning can positively influence environmental outcomes through planning sustainable forms of development, with efficient land use patterns, energy-efficient buildings and the provision of green infrastructure and public transport (Rydin, 2013). It can also encourage negative environmental outcomes by permitting the destruction of natural habitats, with sprawling, in-efficient, car-dependent development patterns. Therefore, the practices and policies of planning are significant drivers of the ability of urban areas to adapt or mitigate the suite of environmental challenges introduced earlier.

Spatial planning is a multi-faceted activity, which seeks to integrate a range of policy agendas, actors and objectives within a single governance system (Faludi, 2009; Friedmann, 2004). Whilst it is operationalized in a diverse manner across different national contexts, there is a commonality in the way that it is used to design and implement various types of plans. This

typically occurs via a mixture of statutory and non-statutory frameworks, tools and decision-making powers derived from national and local legislation (Vigar, 2009; Allmendinger and Haughton, 2013). These legal and non-legal mechanisms provide a medium for local government to intervene and intentionally shape urban areas and their regions through a range of approaches which might be practised individually or in combination (Cullingworth and Nadin, 2015).

The activities of spatial planning can be broadly split into three types of activity: firstly the development of pro-active (physical or policy) interventions which impact the way that development occurs, secondly regulatory interventions which impact how others undertake development and land use activities; thirdly, by providing a forum in which a diverse set of actors can meditate and coordinate their activities through participatory activities (Wheeler, 2013; Davoudi, 2013; Healey, 2006). The combination of these roles and the possibility of coordinating a range of economic, social and environmental objectives across a range of sectors means that spatial planning can be used as a means to address, and balance a wide range of potentially conflicting policy goals across different spatial scales (Wilson, 2006; Hillier, 2008; Betsill and Bulkeley, 2003).

Therefore, spatial planning provides an important mechanism to operationalize international agreements to address the drivers of environmental degradation e.g. the Paris Climate Accords and Aichi biodiversity targets, within a local context through various strategies, policies and actions (Wilson, 2009).

1.5: Environmental challenges, behaviour and Spatial Planning:

To address the environmental challenges facing all nations there is a need for rapid, and substantial behavioural change across all sectors and activities within the economy (CCC, 2021). There is potential for a huge variety of interventions to be implemented to influence behaviour to best address the drivers and consequences of climatic change, biodiversity loss and poor air quality. This means that examining current behaviours and practices, and

understanding how these might be influenced through a variety of interventions will be essential in minimising and managing environmental risk.

Changing the consumption and behaviour of individuals and households has long been an important focus of the development of policy and strategies to tackle environmental challenges (Jackson, 2005), for example, the Stern (2007: 395) report stated that "Dangerous climate change cannot be avoided through high-level international agreements; it will take behavioural change by individuals and communities, particularly in relation to their housing, transport and food consumption decisions". Research and many policy interventions to influence behaviour to mitigate environmental risks have tended to focus on individual actions such as encouraging recycling waste, reducing meat consumption or reducing flying (Wynes and Nicholas, 2017; Ivanova et al., 2020; Whitmarch, Poortinga and Capstick, 2021).

Nevertheless, the role of behaviour extends well beyond such individual behaviours, for example, understanding behaviour is vital to foster political support and action for the adoption of new environmental policies by governments (e.g. through voting and campaigning) and providing new market-based incentives for private business to adopt sustainable practices (Whitmarch, Poortinga and Capstick, 2021). Similarly, adaptation to environmental risks focuses upon behaviour, spanning from individual activities (e.g. preparation of the home for extreme weather events) to the coordination of public and private investment to fund infrastructure mitigating flood risk within urban areas (Nelson et al., 2007).

Broadly, environmental risks are minimised through two core actions, the first is addressing the drivers of these risks, and the second through reducing the exposure of infrastructure, development, habitats and people to current and future environmental risks. This means understanding, and influencing behaviour across a range of actors and contexts is necessary to most effectively address the drivers and consequences of biodiversity loss, climate change and poor air quality (Whitmarch, Poortinga and Capstick, 2021).

Historically, mitigation activities have received greater attention within climate action plans (Dovie, 2019). However, the increasing certainty over the impacts of climate change has increased the focus on adaptive action (Sharifi, 2021). Therefore, there is a need to address both adaption and mitigation simultaneously, which will require a rapid, systemic and varied transformation of urban areas based on localised capacity and need (IPCC, 2021; Coninck et al., 2018). The wide remit of spatial planning provides a means to implement a multiplicity of measures to mitigate and adapt to such threats. Furthermore, it provides a means to support engagement across a diverse set of actors meaning that planning activity can provide an important mechanism to influence behaviour to effectively manage environmental risk. Such measures may target behaviour change at an individual scale e.g. through influencing transport decision-making, shifting transport demand from unsustainable modes (e.g. fossil-fuelled private vehicles) towards more sustainable modes (e.g. cycling and walking) (Rissel, 2009; Macmillia et al., 2020).

The IPCC (2021) defines three key areas of action to support the mitigation of climate change: (1) a reduction in energy consumption in all sectors; (2) a transition to electricity produced with low-carbon energy sources; (3) increasing the uptake of carbon through sinks. The tools of spatial planning can support the adoption of such measures as well as strategies which build resilience to climate change, by reducing risk and vulnerability by fostering adaptation measures (UN-HABITAT, 2017). Similarly, spatial planning can play a crucial role in supporting the protection and restoration of natural ecosystems, thereby supporting the vital functions provided by biodiversity (Healey, 2006; Wilson, 2021). Many of these actions also have benefits for improving urban air quality, such as increasing urban tree cover, reducing the use of polluting transportation modes and controlling development to reduce point sources of air pollutants such as industrial sites (Hewitt et al., 2020; Gulia et al., 2015; Miranda et al., 2015).

These objectives can be met through a range of actions, including influencing land-use patterns and structure, access to appropriate services and amenities, infrastructure provision,

design codes, and the provision and protection of natural and open spaces (UN-HABITAT, 2017; Coninck et al., 2018; Boyd et al., 2022; Bush et al., 2021). Such objectives can be met by influencing the behaviour of development actors through planning policy frameworks stipulating measures to support low-carbon development and urban biodiversity (de Oliveira, et., 2014; UNEP, 2021). Other spatial planning tools, such as land value capture might be utilised to finance the necessary adaption and mitigation activities (Dunning and Lord, 2020; Root et al., 2016). However, the successful adoption and implementation of such objectives and accompanying actions are often contingent upon changing the behaviour and decision-making of individuals within a planning agency, which can be influenced by many contextual, cultural and cognitive factors (Ferrari et al., 2011).

Therefore, spatial planning has significant potential to address a wide range of drivers and impacts of the aforementioned environmental challenges, since it can pro-actively influence development to best address the mitigation and adaption to environmental challenges (Blanco et al., 2011; Davoudi, Crawford and Mehmood, 2009). Behaviour is at the centre of the strategies to tackle a range of environmental challenges in spatial planning, meaning that appropriate theories to analyse and understand empirical challenges are essential in supporting such activities.

1.6: How Behavioural Theory can to used to interpret environmental challenges in Spatial Planning:

The below boxes set out three examples which introduce the ability of a behavioural theory to interpret three environmental challenges within urban planning. This acts as an introduction to these theories, which are set out and explored in greater detail within Chapters 2 and 3. These are the failure to adapt to flooding risks, challenges in the adoption of policies to address biodiversity loss and the need to support modal shifts within transport. These examples are selected as each address the trio of challenges discussed earlier, which were climate change, biodiversity and poor urban air quality.

Box 1.1: Failure to adapt to flood risk exacerbated by climate change.

There are many developments within the UK which have been approved over the past 20 years despite the evidence of current and increasing flooding risk (Rözer and Surminski, 2021). The magnitude and likelihood of damage to property, infrastructure and human lives are increasing as a result of climate change (CCC, 2019; Pörtner et al., 2022). In spite of this, many LPAs continue to approve these developments (Rözer and Surminski, 2021; McClean and Watson, 2009). By integrating a behavioural perspective we can begin to understand LPAs might take these seemingly irrational decisions. Although the evidence exists that such development may, in the medium to long term (i.e. 20-100 years) be at significant risk from flooding this is often expressed as a relatively low-probability event (i.e. in 1 in 50-year storm event). The time scale and low probability of such impacts mean that the risk can often be perceived to be distant and uncertain. By drawing upon the principles of behavioural economics and psychology these decisions can be explained through the concept of temporal discounting, which states humans tend to discount benefits (or losses) in the future to a greater extent than in the present (Frederick, Loewenstein and O'Donoghue, 2002; Critchfield and Kollins, 2001). This can result in the threats from climate change, even where expressed within specific development sites to be perceived as a psychologically distant, future threat which can help to explain the approval of development within these sites (Leiserowitz, 2005; Spence, Poortinga, & Pidgeon, 2012).

Box 1.2: A failure to implement policies to address biodiversity loss.

There is a need for local authorities to address the negative impacts of development on biodiversity (Whitten, 2017). This might be implemented through a strategy, which seeks to limit the negative effect of a development project whilst also maximising the potential biodiversity gains through the development either on-site or off-site (Aronson et al., 2017). However, mandating policies to meet these aims imposes costs upon private developers, and as a result may lead to reductions in investment within a local authority (Díaz et al., 2020).

Therefore, the failure to adopt such policies can be attributed to a failure to understand the strategic interaction of private developers with local authorities. By drawing upon game theory, there is the ability to explain why the first-mover (i.e. the first authority amongst a group to adopt a policy) is at a competitive disadvantage in comparison to other authorities (Lord, 2012; Mylovanov, 2005). Therefore, considering strategic behaviour within interactions between development actors provides one explanation for the slow uptake of voluntary policies to address threats to biodiversity.

Box 1.3: A failure to address transportation emissions contributing towards poor air quality.

Many urban areas suffer from poor air quality, much of which is driven by the transportation decisions of individuals and firms (Lam and Head, 2012; Zhang et al., 2019). Two of the key factors contributing to this issue are the urban form (i.e. density and land use) and the availability of transport infrastructure (Jabareen, 2006). Where a settlement is low-density and sprawling it creates a greater demand for travel, whilst a lack of sustainable transportation infrastructure, such as active travel provision or public transport limits the transportation decisions of individuals and firms (Jabareen, 2006). This drives the behaviour of actors towards modes of travel which exacerbate poor air quality through increasing emissions. Behaviour change theories, such as social practice theory, can help to illustrate how the behaviour of actors might be influenced through limiting demand for travel or through the provision of infrastructure and training to enable actors to use modes of travel which result in more limited emissions (Shove et al., 2015).

1.7: Summary:

This chapter firstly set out why climatic change, biodiversity loss and poor urban air quality require the attention of decision- and policy-makers and researchers. The evidence of the impact of these threats means that rapid, and wide-ranging change is required across all areas

of the economy. The cross-cutting nature of spatial planning means it is well equipped to enable and promote mitigation and adaptation activities, with many of the actions needed to do so requiring a focus on influencing the behaviour of actors. To enable such an approach it will be necessary to identify and understand the wide range of factors which influence and underpin human behaviour across a variety of contexts. The following section will review several influential theories of planning and assess their suitability in understanding how behaviour affects spatial planning outcomes.

1.8: Planning theory in context:

Understanding the variety of activities that comprise the practice of urban and environmental planning has given rise to a great deal of academic activity that collectively can be described as planning theory. Although many different approaches within this academic tradition draw on broader traditions in philosophical, sociological and economic thinking there have come to be four main schools of planning thought that predominate in the literature. The purpose of this section is to provide a brief introduction to the history of planning theory, beginning with planning through design, and rational-comprehensive planning before going on to outline the communicative turn in planning theory before considering the move away from 'grand theorising' through reviewing a series of substantive theories.

The review illustrates how planning theory has evolved in tandem with development in other disciplines as well as in response to the needs of practitioners and policy-makers. The development of planning theory has typically been driven by a selective integration of theories, concepts and ideas from a wide range of disciplines. Early design-led approaches drew heavily from architectural and civil engineering practices, whilst rational comprehensive planning was heavily influenced by cybernetics and operations research (Allmendinger, 2017; Taylor, 1998). The later approaches of communicative planning theory were inspired by the work of Philosopher Jürgen Habermas, with the environmental sciences heavily influencing many substantive planning theories.

Despite the diversity in these theories, a common critique emerges about the absence of a comprehensive understanding of human behaviours within planning practices. Therefore, this chapter introduces and illustrates this gap within existing planning theory, which this thesis begins to address through the introduction of a behavioural approach, in the following chapters, before the utility of such an approach is illustrated in the published papers that follow.

1.9: Rational planning through design:

Whilst forms of planning existed well before the development of formalised 'planning theories' rational planning theory is viewed as one of the earliest 'planning theories', and therefore acts as the starting point of this review of planning theory (Taylor, 1998; Allmendinger, 2017). Despite this, during the immediate post-war period, the subject was considered to be an extension of civil engineering or architecture, rather than a discipline in its own right. The emergence of planning as a statutory activity in the post-war period in many European countries led to greater interest and development of planning, both as a professional and an academic discipline (Taylor, 1998; Cullingworth and Nadin, 2015)

During this period planning theory was focused on developing a set of practical procedures for practising planners to follow, forming what are known as procedural theories, and these were a set of principles for planners to implement to reach a given outcome (Taylor, 1998). The design-led approach was broadly based upon Geddes's (1915) model of 'survey-before plan', beginning with the identification of a 'problem' or 'opportunity', and following this, a physical plan would be developed by professionals (typically architects and civil engineers) with very limited input from the public. As a result, planning was viewed largely as a technocratic exercise in design and aesthetics, as opposed to social or economic planning (Taylor, 1998).

The concept of environmental determinism was influential within this approach, with a belief that the location of buildings, land-use patterns and the aesthetic character of places could directly influence the behaviour of individuals, thereby determining the quality of socio-economic life within communities (Broady, 1968). This drew critique from Brown (1966) and

Alexander (1965) who suggested that the highly ordered urban forms set out in such plans failed to show a real understanding of the complexity of functioning residential communities. Instead, such plans were based upon intuition, with assumptions that a focus on aesthetics and design alone could successfully recreate the successful social and economic functions of new communities (Reade, 1987).

1.10: Rational planning through science:

By the 1960s new ‘rational’ approaches to planning emerged, partially in reaction to the aforementioned shortcomings of a design-led approach. These new 'scientific' approaches were built upon emerging, techniques influenced by the 'quantitative' revolution in Geography, alongside cybernetics (Allmendinger, 2017; Alexander, 1992). This led to a radical shift away from design and aesthetics, leading to two distinct but related theories of ‘systems’ planning and rational, procedural planning.

The ‘rational’ procedural model of planning stated that planning should focus upon ‘formal rationality’, which seeks to identify the most efficient means to meet a goal through ‘facts’ rather than values, ends and goals which were considered to be political concerns (Friedmann, 1987; Allmendinger, 2017). This approach set out planning as a five-step rational decision-making process (see Figure 1.1), in which goals were defined, alternative plans developed and evaluated ahead of being implemented, with ongoing monitoring of said plan, with feedback loops throughout to resolve challenges with plans (Faludi, 1987; 1973; Taylor, 1998).

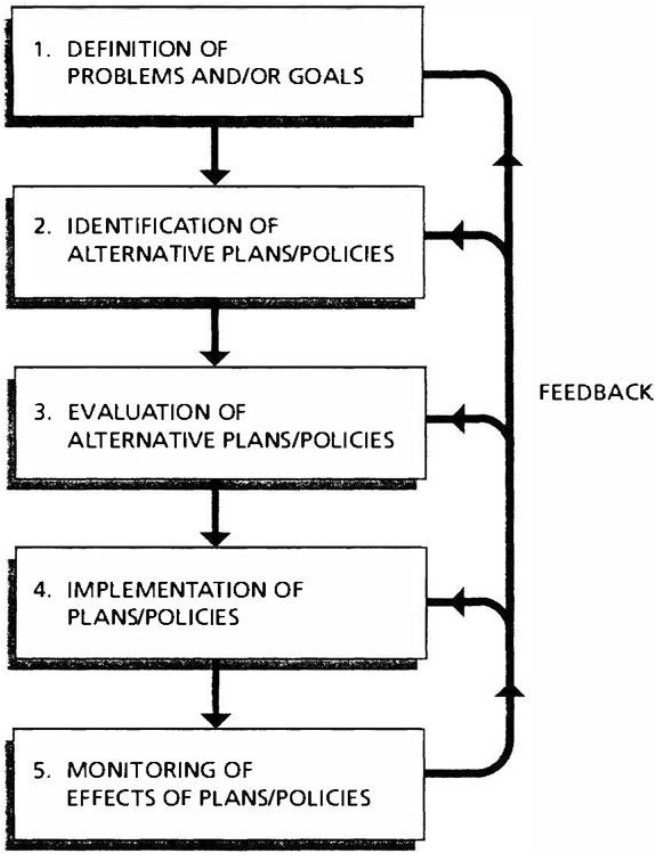

Figure 1.1: The Rational Planning Process. Source: Taylor, 1998.

The distinct but complementary approach of systems planning viewed cities and regions as scientific problems which could be understood, modelled, and corresponding problems 'solved' through system-thinking and cybernetics as a result of newly developed advances in computing techniques (McLoughlin, 1969; Chadwick, 1971). Planning was conceived as a means to analyse and control cities and regions which were conceptualised as a complex set of interconnected parts (Alexander, 1992; McLoughlin, 1969). The ability to model and control the urban 'system' required a simplification of the complexity of the 'real world' thereby providing a means to model and predict behaviour within a given urban area or region, in line with a set of aims and specific objectives set out within a plan thereby 'optimising' the plan for a given area (McLoughlin, 1969; Taylor, 1998).

Whilst there are important differences between these approaches each sought to develop a greater 'scientific' approach to planning with rational means to evaluate the economic costs and benefits of various alternatives ahead of implementation (Hall and Tewdwr-Jones, 2011;

Faludi, 1987). This implied that planners were able to use their expert knowledge to collect the necessary data to identify an issue, evaluate and select the chosen method in an impartial and apolitical way (Alexander, 1979). Planners' 'technical' knowledge and expertise were assumed to be more valid than alternative forms of knowledge such as local knowledge, practical experience and intuition (Allmendinger, 2017). Therefore, an underlying assumption within both approaches was that following a 'rational' process would in itself lead to a 'good' outcome (Darke, 1985).

By the 1980s the products and shortcomings of rational planning had become increasingly physically evident with 'rational' approaches leading to the proliferation of road building and modernist developments destroying long-standing urban communities (Healey, 1992; Dennis, 1972). The products of rational planning therefore often led to discontent, and protest within many communities, which underlined that planning decisions rested upon value judgements on what was a desirable place and environment to live and work in (Taylor, 1998). However, rational approaches had no means to engage with the public in a meaningful way to identify, understand and integrate their views and values within the rational planning process (Sandercock, 1998; Healey, 1993).

1.11: A fragmentation in planning theory:

A shift towards neo-liberalism within Britain and the United States meant that long-standing aspects of the post-war consensus, including the dominant role of the state within town planning, became increasingly challenged through the 1980s (Taylor, 1998). Within the academy, theoretical challenges to the rational approaches to planning were being mounted from many directions. Many of these concerns were rooted in the perceived past failures of post-war planning alongside the practical challenges of rational approaches. In combination, these concerns were significant in highlighting that planning and the plans that it produced were far from value-free, scientific and apolitical (Allmendinger, 2017). Instead, it was increasingly recognised that the stated objectives of plans and how they were met were both highly political (Taylor, 1998).

This spawned a diversity of different planning theories building upon a range of theoretical approaches leading to an era of post-positive planning (Healey, 1991; Allmendinger, 2017). For example, critiques from a Marxist perspective took a critical viewpoint of the role of planning with its interests being rooted within the interest of maintaining the capitalist order (e.g. Scott and Roweis, 1977). On the other hand, theory drawing from the New Right focused on the perceived inefficiencies, burdens and delays introduced through planning processes (e.g. Pennington, 1999; Thornley, 2018). However, perhaps the most influential response to the rational approach was Communicative Planning Theory (CPT) which emerged as the dominant approach within planning theory in the mid-1990s (Mandelbaum, 1996; Healey, 1997; Innes, 1995), this approach will, therefore, be considered in detail below.

1.10.1 Communicative Planning:

Despite attempts to integrate aspects of public consultation and participation within rational planning models the processes of planning largely continued to rely upon developing plans through technical and apolitical means. Attempts to develop public participation were seen by communicative theorists as a ploy by politicians and bureaucrats to maintain legitimacy whilst retaining power and decision-making (Arnstein, 1969; Healey, 1997). Communicative Planning Theory (henceforth CPT) covers several approaches, but each seeks to provide a means for planners to engage with a wider set of stakeholders thereby developing a new approach to planning to accommodate such action (Booher and Innes, 2003; Innes, 2004).

This work was largely built upon the work of Jürgen Habermas, whose work was in part a critique of modernity. Habermas developed a new theory of communicative rationality as a response to scientific (or instrumental) rationality (Allmendinger, 2017). He felt that its dominance needed to be broken down by building a new form of objectivity which was based upon free and open discourse between individuals. Whilst the principles of communitive rationality were often criticised as being abstract this work was influential within the fields of sociology, politics, law, theology as well as planning (Bohman and Rehg, 2014).

This approach conceptualised planning, not as a rational, scientific process but instead set out a new form of rationality which emphasised planning as a social process using communication, collaboration and deliberation between a diversity of stakeholders (Healey, 1992; Forester, 1982). This was known as ‘communicative rationality’ and was largely built upon four assumptions of communication which were believed to be prerequisites for valid communication, it was therefore assumed that by following these principles an agreement would be reached through free and open discourse:

“1. Truth of propositions about our external reality.
2. Rightness of our interpersonal relations with the other person.
3. Truthfulness about our internal subjective state.
4. Comprehensibility of our language.” (Low, 1991 in Allmendinger, 2017: 247).

Though these may not always be achievable, by following the six further descriptions of discourse any consensus reached is seen to be 'rational':

“1. Interaction free from domination (the exercise of power).
2. Interaction free from strategizing by the actors involved.
3. Interaction free from (self-) deception.
4. All actors being equally and fully capable of making and questioning arguments.
5. No restrictions on participation.
6. The only authority being that of a good argument.” (Dryzek, 1990 in Allmendinger, 2017: 247).

A consensus which is reached under such conditions was then viewed to be ‘rational’. Given the abstract nature of these assumptions, there was a need for planning theorists to develop these concepts into a practical approach (Low, 1991; Healey and Hillier, 1995). This approach also addressed the inability of the rational model to integrate values, uncertainty or ambiguous objectives in planning (Innes and Booher, 2015). These approaches sought to ensure that all

stakeholders with an interest in a decision or plan were all given an equal opportunity to debate and influence decision-making rather than it being solely in the hands of those with political or financial capital to implement decisions (Taylor, 1998).

CPT emphasises pragmatism and situational learning based on the specific planning context (Innes and Booher, 2015). Despite this three leading theorists developed a set of principles drawing from Harbermas's principles through a series of studies of planning practice (e.g. Innes, 1992; Forester, 1989; Healey, 1993). This corpus of work set out broad procedures for how planners should act to meet these conditions, for example setting out how planners should prepare and act in communitive discussions (Forester, 1989) and questions that planners should consider when working through the plan-making process (Healey, 1993). These indicated how planners can facilitate an open, fair and meaningful process of collaboration, concluding in a consensual agreement between all parties (Gunder, 2010). This was built upon a desire to enhance the implementation of plans, but also through their desire for this process to occur within a democratic and participatory style (Healy, 1993, 1997; Forester, 1989). Therefore, this guidance was built upon Harbermas's principles set out above, and their analysis illustrated how existing approaches had failed to meet such conditions, thereby attributing this contributed towards planning failures (Healy, 1992; Healey and Hillier, 1995).

1.12: A shift in theoretical responses to changing demands of planning:

By the late 1990s planning theory tended to move away from attempts at 'grand theorising' which sought to deal with planning in a broad, abstract sense (Taylor, 1998). This approach to planning research drew critique from many, including those within planning practice, who perceived such theorising about planning as being detached from the reality of problems which planning must address (De Neufville, 1983; Watson, 2002).

In response, Campbell (2012) and Friedmann (1987) each called for planning research to seek to connect forms of knowledge to forms of action in the public domain. The turn away from 'grand theorising' also responded to the growing expectations and demands placed upon

planning. These changing demands could be attributed to the changing nature of the goals of planning, most notably the need to address environmental challenges (Behrend and Levin-Keitel, 2020). Such goals were captured within the shift from 'land use planning' to ‘spatial planning’ alongside the adoption of the normative goal of ‘sustainable development’ within planning (Grant, 1999; Davoudi and Pendlebury, 2010; RTPI, 2004).

Together, this meant there was an increasing diversity of influences from a range of theories, methodologies and solutions from a diversity of disciplines being applied within planning research (Behrend and Levin-Keitel, 2020; Olesen, 2018). For example, the increasing importance of environmental concerns within land-use planning led to a greater cross-disciplinary work, often drawing upon concepts from ecology, environmental sciences and transportation, each contributing to the development of substantive approaches within planning practice (van Zhl et al., 2021; Gómez-Baggethun and Barton, 2013).

An influential example is the application of ecosystem services, which seeks to identify the many benefits that ecosystems can provide to humans (Lennon and Scott, 2014; Costanza et al., 2017). Similarly, ‘natural capital’, seeks to place an economic value upon different aspects of nature (Owen, 1994). An alternative decision-making framework is the ‘ecosystem approach’ based upon 12 key ecological concepts (see CBD, 2004 for more details; Waylen et al., 2014). This provides a means to mainstream ecological decision-making through greater integration of knowledge and understanding between spatial planning and environmental governance practices (Natural Capital Committee, 2015).

Another highly influential concept is 'green infrastructure' which is frequently used across a range of public policy discourses (Mell, 2014), it can be defined as “[…] *a* network of multi-functional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities” (MHLCG, 2021: Annex 2). This approach seeks to highlight the wide-ranging benefits of ‘natural solutions’, and in doing so stimulate investment in ‘natural solutions’ to address a range of environmental challenges

e.g. flood risk, which had typically been dominated by grey infrastructure and ‘hard’, technical solutions (Jones et al., 2012).

At the same time, other substantive approaches focused on the patterns and intensity of land use, these seek to tackle key environmental challenges including poor air quality and climate change by influencing land-use patterns within urban areas. Prominent examples include ‘new urbanism’, ‘smart growth, ‘compact cities’ and more recently ‘15/20-minute cities and neighbourhoods’. Whilst the specifics of each of these approaches differ, they all seek to limit urban sprawl and instead support accessibility to a range of services, employment opportunities and amenities within local communities, often through discouraging car use and enhancing public transport and the walkability and cyclability of urban areas (C40 Cities Climate Change Leadership Group, 2021; Moreno et al., 2021; Stanley and Davis, 2015; Iravani and Rao, 2020; Daniels, 2001). By doing so, they seek to address a suite of urban challenges beyond environmental objectives, including improving mental and physical well-being and livability in urban areas (Capasso De Silva et al., 2019; Weng et al., 2019).

1.13: The ‘behavioural gap’:

As previously stated there is huge diversity in the theories set out above. Typically the development of a new school of planning thought responds to the weaknesses and challenges of existing approaches. However, in all cases there are weaknesses within the consideration of the role of human behaviour within the planning process with behavioural processes often ignored or there are often unrealistic assumptions or failures made when considering the role, and impact of human behaviour. This section will therefore highlight, and begin to consider the implications of these weaknesses ahead of the following chapter which presents an alternative, behavioural approach to planning research.

1.13.1 The failure to consider how behaviour is influenced

The critiques raised above each relate to a failure to fully consider the complexity and nuances of human behaviour within these models of planning practice. For example, the early post-war planning theories were heavily reliant upon the concept of environmental determinism to direct individuals toward 'desirable' behaviours (Fishman, 1982; Chermayeff, 1982), rather than a consideration of how a variety of factors might influence the behaviour of individuals (Allison, 1986).

1.13.2 Complexity, the absence of values and bounded rationality

Whilst systems and rational planning sought to introduce a greater 'scientific' rigour to planning practices, the assumptions which underpinned both were unrealistic and inaccurate when applied within the 'real world' (Ward, 2004). The expectation that any issue could be 'solved' so long as a rational process was followed was unrealistic since the information required was often out-of-date, inaccurate, unavailable or subject to uncertainties, resulting in sub-optimal information guiding decision-making (March and Simon, 1956; Forester, 1984). Even where there was an ability to collect this information the ability of planners to make an 'optimum' decision based upon this information was limited, due to the cognitive limits created by bounded rationality (March and Simon, 1956; Simon, 1979).

Such models also poorly reflected the disorder and complexity of the 'real world' *(*Rittel and Webber, 1973*).* Part of this weakness can be attributed to 'rational models' failure to integrate local, intuitive and experiential knowledge meaning that these approaches fail to accurately reflect the nature of the challenges being addressed by planners, since they often cannot be quantified and are, therefore, incompatible through these formal means of analysis (Innes, 1995; Sandercock, 1998; Healey, 1993). The uncertainty introduced through external influences, including the often conflicting objectives of many state, and non-state actors, lead Faludi (1987: 47) to conclude that planning had become "a complicated political game which probably defies coordination". This emphasised that the resolution of certain issues and

questions within the planning process were political, which meant a purely rational approach was neither possible nor achievable (Allmendinger, 2017; Hall and Tewdwr-Jones, 2010).

1.13.3 A failure to consider strategic behaviour

Communicative planning sought to resolve the absence of meaningful participation, introducing a means to integrate values, perceptions and experiential knowledge in the planning process. However, this introduced a different set of assumptions which were based upon meeting Habermas' (1984) theory of 'communicative rationality'.

Many scholars challenged the expectation that planners can meet Habermas' conditions when interacting with a variety of stakeholders (e.g. Huxley and Yiftachel, 2000; Hytönen, 2016; Lord, 2012). These challenges were based upon questioning the assumptions surrounding human behaviour since the process can be exploited and manipulated by stakeholders acting strategically to maximise their self-interest (Tewdwr-Jones and Allmendinger, 1998; Woltjer, 2017; Sager, 1994; 1999*).* Therefore, stakeholders may disguise their true position for strategic purposes or exploit the positions held by other stakeholders, though there is no capacity for the theory to conceptualise the possibility of actors behaving strategically to further their self-interest, illustrating naivety in the communicative approach (Lord, 2012; Bengs, 2005). Abram (2000: 357) warns this introduces the risks of the hijacking of democratic processes resulting in "local exclusion and profiteering", whilst Flyberg (2002: 360) illustrates how this occurs through his case study in Alborg, where he shows how formal decision-making processes were overridden by "strong tribalistic rule".

As a result, the assumptions underpinning CPT can be challenged, meaning that the inclusion of local communities and other relevant stakeholders in a communitive process will not necessarily result in an equitable, and 'better' outcome. Instead, some contend that such an approach was highly attractive to dominant interests in urban development, especially in light of large imbalances in power and resources between such actors and local communities (Purcell, 2009; Tewdwr-Jones and Allmendinger, 1998). Therefore, rather than empowering

less dominant interests, this approach may instead reinforce the status quo, by legitimising their decision-making through democratic means (McGuirk, 2001).

1.13.4 A failure to consider integration and implementation of new policy and practice changes

A further critique of communicative planning approaches was the failure to consider how institutional arrangements external to the collaborative process and the dependence upon market forces could affect the implementation of the plan produced through the communicative process (Alexander, 2001; Chaskin, 2005). Therefore, there was a lack of focus on the implementation of an agreed plan.

There are wide-ranging and varied strengths and weaknesses of the substantive approaches to planning theory. The diversity of these approaches means that a common critique is challenging, though in common with the communitive approaches, many studies have highlighted their failure to fully consider the practical integration and implementation of the principles within existing planning practices (Carter et al., 2015; Wamsler et al., 2014; Beery et al., 2016).

For example, the introduction of new substantive approaches e.g. the ecosystems approach often requires significant behavioural changes amongst officers within a local authority, in particular, the integration of environmental objectives with other competing objectives can often result in challenging trade-offs (Sitas et al., 2014). These changes require significant cultural changes within an organisation, with behavioural biases and heuristics often hampering the integration of new approaches to the management of land use and development (Christina von Haaren and Othengrafen, 2019; Wiek et al., 2012; Adolfsson, Lindblad and Peacock, 2021). Therefore, while there is significant value in substantive approaches indicating how planning practitioners should tackle a suite of spatial planning issues, they each fail to properly address several potential behavioural challenges in the implementation of such approaches.

1.14: Summary

This section has given a broad overview of several 'phases' of planning theory, illustrating the diversity of influences upon planning theory and its evolution since the development of formal planning theories in the post-war period. The diversity of these approaches means there are a range of strengths and weaknesses in each approach, however, this chapter has illustrated a common thread of weakness running through each of these 'phases' of planning theory, which is a failure of planning theory to adequately conceptualise the complexity of human behaviour.

The following chapter will introduce the behavioural sciences and illustrate how a selection of different behavioural theories and concepts can be drawn upon to provide a useful analytical framework to explore and understand how planning takes place. A behavioural approach is applied across the three published papers within this thesis, therefore the following chapter set out the fundamental tenets of a behavioural approach before Chapter 3 illustrates its applicability within the study of planning. As a result, the following chapters underline how this approach provides an insightful approach to understanding current practice, as well as to inform action and improve understanding of how planning practice and policies can best be shaped to address the environmental challenges presented at the beginning of this chapter (Chettiparamb, 2019; Lord, 2014).

Chapter 2: ‘An introduction to a behavioural theory’

Chapter Summary:

This chapter introduces a behavioural approach to planning research. Firstly the chapter sets out the key tenets of this approach through the presentation of four aspects of the broader ‘behavioural insights’ school of thought, introducing a series of key concepts embedded within these approaches. This will also illustrate how such an approach is well suited to planning research. The chapter concludes by showing how the behavioural approach might be applied to describe and explain planning practices, including encouraging behavioural changes amongst a range of actors.

The purpose of this chapter is to introduce and provide detail on what is meant by a 'behavioural approach' in planning research. Therefore, this chapter sets out a series of concepts and ideas drawn from Old and New Behavioural Economics, Game Theory and Social Practice Theory, which represent theories across the spectrum of behavioural theory.

In doing so, this chapter will illustrate how these theories relate to each other, and deviate from the standard economic model, which is a dominant approach to understanding economic behaviour and decision-making. These theories are applied within the three papers which make up this thesis, therefore this introductory chapter is an opportunity to provide a longer, more detailed description of the core theories and concepts within each approach than is possible within the published papers. The following two chapters will provide a review of behavioural theory, as well as providing an understanding of the theoretical framework used within this thesis.

2.1: An introduction to a ‘behavioural approach’

The previous chapter concluded by making a case for the need for a theoretical perspective that can fully account for the complexities of human behaviour within the range of activities that are commonly understood to comprise urban and environmental planning. This mirrors the infusion of behavioural theory into many branches of the social sciences, particularly

economics and public policy (Behavioural Insights Team; 2012; Ball and Feiesma, 2020). This approach largely draws from psychology, neurosciences, sociology and economics and, as such, it can be seen to 'blend' different aspects of each of these disciplines to provide an 'umbrella' that covers a wide range of research topics and agendas (London School of Economics, 2016).

There is no ‘dominant’ behavioural perspective but, instead, a wide range of behavioural theories. For example, Davis et al., (2015) and Michie et al., (2005) both examined health science literature identifying 82 different theories of behaviour and 33 psychological theories for behaviour change, whilst Rain Kwon and Silva (2020) identified 62 cross-disciplinary behavioural theories. Some approaches place the individual at the centre of behaviour which attributes cognitive processes and external factors e.g. peer influence or cultural factors, with greater or lesser importance in determining decision-making (Todd and Gigerenzer, 2012). This approach relies heavily upon insights from psychology, using an understanding of the effects of cogitative biases, heuristics and the impact of beliefs and attitudes (Simon, 1954; Kahneman and Tversky, 1979; Ajzen, 1985). Other behavioural theories attempt to move away from the individual and instead focus on the interaction between the individual and the social and physical environment (Morris et al., 2012). As a result, such theories tend to draw from sociology, anthropological and geographical research such as Social Practice Theory (Shove et al., 2012) and Actor-Network Theory (Latour, 2007).

Despite the differences in approach, collectively these theories provide a means to account for the variety of factors which affect an individual's decision-making processes (Morris et al., 2012). These might be qualitative factors e.g. social norms, the quality of the physical environment, heuristics, peer influences and beliefs, alongside quantitative factors such as cost and time. Therefore the use of a behavioural approach can be utilised to provide a framework to model, observe, explain and predict behaviour which can help to identify opportunities and challenges in policy design as well as behavioural interventions (Rain Kwon and Silva, 2020).

The rational choice model which mainstream economic theory is built upon has been challenged to a varying degree by different behavioural models, and so acts as a suitable starting point to introduce a 'behavioural approach' to planning research. The following section will set out this approach before considering how Old Behavioural Economics and New Behavioural Economics each challenge the assumptions underlying the rational choice model, these insights can also be integrated into the analytical toolkit of game theory. What follows is an introduction to Social Practice Theory, which moves away from an individualistic perspective when considering behaviour.

2.2: The 'rational' economic model of behaviour

The rational economic model is based upon the assumption that human behaviour is driven by a desire to maximise individual gain, and that decision-making is a process of calculating and maximising this gain (Mill, 1836; Wilkinson, 2008). The combination of these concepts produces the model of *homo economicus,* which assumes that a human has an infinite capacity to maximise utility from decision-making, using a complete information set to calculate the possibility for future gains and losses in utility and in doing so avoiding any error or bias (Barnes, 1988; Simon, 1986).

This framework can consider decision-making concerning a range of economic agents such as individuals, households or firms, predicting the behaviour of agents in all circumstances (Becker, 2013). Whilst this is an abstract, reductionist view of human behaviour it remains the basis of the framework underpinning neo-classical economics. This framework has then been the prevailing basis for macro-economic policy in many countries worldwide and has also been an influential model for academic analysis, including within planning (e.g. Pennington, 2000; Cheshire, 2014).

2.3: Challenges to rationality

The rational model can be challenged by a range of different behavioural theories, with each challenging the assumptions underlying the neoclassical theory to a different extent, one body of critique focuses on challenging the assumptions of rationality in decision-making (Thaler, 1988). Several pioneering psychologists such as Herbert Simon fused emerging psychological insights into economics from the 1950s, with advances in psychological testing providing a means to challenge these assumptions and provide a biologically plausible account of decision-making and behaviour (Wilkinson, 2008; Camerer, 2014), developing what is known as Old Behavioural Economics (OBE). The concept of bounded rationality is at the core of this approach and is central to understanding how behavioural economics challenged the previously dominant standard economic model. This section introduces several areas in which 'rational' decision-making was challenged, before examining New Behavioural Economics, which shares some aspects of OBE whilst retaining some elements of the rational economic model of behaviour, which OBE rejects more emphatically.

2.3.1 Cognitive Limitations

The concept of bounded rationality proposed that a model of human behaviour must consider the cognitive limitations of humans, thereby challenging the core assumption that individuals can undertake an accurate cost-benefit calculation of every decision (Simon, 1986). This sits at the core of both Old and New Behavioural Economics. There are many sources of uncertainty in decision-making processes, which can relate to the poor definition of the choices or the outcome of these choices. Even where choices are tightly defined, it often remains impossible to accurately foresee the outcome of each decision (Savage, 1972; Dosi and Egidi, 1991), creating uncertainty in decision-making.

The conditions of uncertainty might be derived from cognitive limitations or due to the environment in which decisions are made (Simon, 1986). In conditions of uncertainty and complexity Simon (1957) believed the ability of human cognition to accurately formulate and optimally solve a ‘problem’ (therefore optimally maximise utility) was limited due to bounded

rationality. Instead, he developed the concept of satisficing, which is required since incomplete information leads to uncertainty, meaning that humans employ rough rules-of-thumb (or heuristics) to reach a solution (Simon, 1976). Heuristics were defined by Simon and colleagues (Newell et al., 1962, quoted in Schwartz, 2002: 182) as “any principle or device that contributes to the reduction in the average search to a solution”.

2.3.2 Experiential knowledge, socio-cultural environment and institutions

Another pioneer of behavioural economics, George Katona, was also critical of the lack of psychological basis within economics and sought to analyse the processes behind economic choices, actions and decisions (Hosseini, 2011). To do so, he undertook empirical studies studying the motives, attitudes and expectations which psychologists saw as underpinning decision-making (Curtin, 2016). This led to a perspective that consumers were influenced by their experiences and sociocultural environment, which then shaped norms, attitudes and habits (Katona, 1975).

Simon's earlier work focused on behaviour within organizations, like Katona he believed that social environment impacted decision-making. These influences can be described as institutions, which are embedded rules of varied formality which guide decision-making through enabling and constraining behaviour (Hodgson, 2004). An important example is the role of docility developed through identification with a given organization, an example of the response of social influences which lead individuals to imitate, obey or conform to a particular set of behaviours in a given context (Schwartz, 2002; Simon, 1991).

2.3.3 Emotions

The model of *homo economicus* assumes a stable, rational decision-making process, with no scope for the influence of emotions. This was challenged by Elster (1998) and Twomey (1998) who both argued that emotions could form an important aspect of rationality. For example, emotions such as fear and hope might induce a decision to be made, or support a 'better' decision to be made (Damasio, 1994; LeDoux, 1996). Going further, emotion may play an important role in coordination and decision-making within social contexts, helping to prioritise

goals and actions (Johnson-Laird and Oatley, 1992). This suggests that unlike the stability of preferences set out in neo-classical theory, emotions do play a significant role in shaping decision-making and behaviour, further challenging the one-dimensional, reductionist nature of the neo-classical model of decision-making.

2.4: New Behavioural Economics

Developments within old behavioural economics, presented in the previous section challenged the notion of *homo economicus,* by setting out humans as fallible, making decisions based upon incomplete, or incorrect information. Decision-making might also be influenced by their emotions, peers, past experiences, norms and wider decision-making environment, forming the basis of decision-making heuristics (Simon, 1955; Katona, 1975). This laid the foundations for the later development of behavioural models of economics, known as New Behavioural Economics (Sent, 2004).

Simon's conception of heuristics was largely based on past experiences, which guided decision-making (Heukelom, 2014). Instead, New Behavioural Economics describes heuristics differently, as a set of principles which act to simplify information and analysis, which aids in the evaluation of the probability of outcomes, providing a more efficient decision-making process (Kahneman and Tversky, 1982). Proponents of new behavioural economics stressed that rather than usurping the rational choice model they sought to enhance the predictive power of this model, by applying new insights from Psychology to more effectively reflect the reality of human cognition (Camerer and Loewenstein, 2004; Thaler, 2000). To so do, a series of experiments largely focused on understanding the processes of decision-making under risk and uncertainty, identifying how cognitive processes are impacted by a series of biases and heuristics (see Kahneman, Slovic and Tversky (1982) for an extensive review).

2.4.1: Biases and Heuristics

Many of the biases and heuristics set out in New Behavioural Economics can be captured with Prospect Theory, which attempts to capture the predictable and systematic biases which occur

in decision-making, which are particularly apparent when decision-making occurs under the conditions of risk or uncertainty (Kahneman and Tversky, 1979). As a result, Prospect Theory will be used to describe and explain the role of several biases and heuristics.

The following figure sets out the concept of a utility function – a way of measuring an individual's attitude to risk. The standard utility function concept is set out in the left-hand panel of Figure 1.2: the concave character of the function illustrates a general aversion to risk, and a convex shape would imply a 'risk-loving' attitude. By, contrast the prospect theory utility function (the right-hand panel of Figure 1.2) illustrates how attitudes to risk may fluctuate when understood over a broader range of potential gains and losses: i.e. a 'risk-loving' attitude may be more commonly displayed for low stakes prospects; a more risk averse attitude may follow as the prospect of gains and losses is perceived to grow. The perception of what constitutes a high or a low-value prospect is determined by any individual relative to their past experiences, which illustrates the role of experiential knowledge in forming a decision-making heuristic.

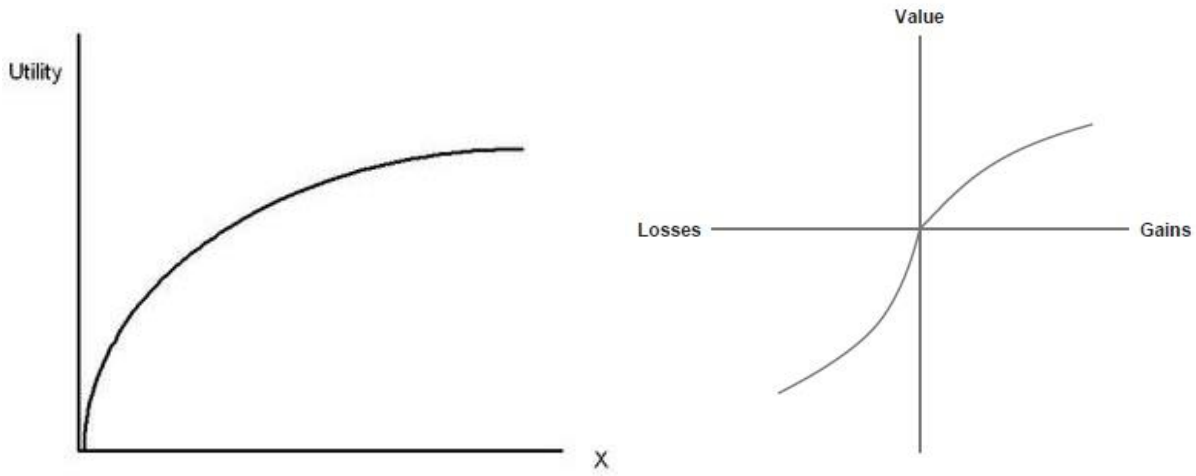

Figure 1.2: Standard economic model utility function (left), Prospect Theory utility function (right). Source: Barberis and Xiong, 2012

Like the standard economic model (figure 1.2) Prospect Theory can be graphically represented by Prospect Theory's utility function. A fundamental difference between these functions is that the standard economic model is only concerned with gains since it does not

include reference points, meaning the model ignores the outcomes of the past and instead understands decision-making as solely based upon future expected utility (Berberis and Xiong, 2012). In contrast, Prospect Theory predicts that rather than interpreting the outcomes of a decision in absolute terms, humans instead simplify decision-making through a series of heuristic rules (Wilkinson, 2008). These options are then evaluated in terms of a reference point, typically the present situation, meaning that humans evaluate the decision based on losses and gains from a reference point (Kahneman and Tversky, 1979).

Prospect theory also captures the systematic biases that occur through loss-aversion which states that losses result in greater disutility (pain) than utility (enjoyment) resulting from an equivalent gain. The resulting function means that PT predicts risk-aversion for gains and risk-seeking for losses (Kahneman and Tversky, 1974), hence the steeper curve seen in the domain of losses (in comparison to gains) is due to loss-aversion.

Decision-making often occurs in conditions of uncertainty and incomplete information. Therefore the outcomes of decisions are affected by the availability and access to information, with economic agents typically using information or services which are easy to find, use or recall (Tversky and Kahneman, 1979), creating an availability bias in decision-making. This means that decision-making is timely, but can mean that aspects of information are missed, leading to sub-optimal outcomes (Jolls, 2009). This bias can help to explain habitual behaviour since it can take effort to change behaviour or decision-making processes, meaning there is a tendency towards the current situation in decision-making, known as the status quo bias (Samuelson and Zeckhauser, 1988; Silver and Mitchell, 1990).

Another important element of behavioural economics is framing effects, which relate to the heuristics of individual decision-making. They can be useful in understanding how, and why consumer preferences vary, in contradiction to the model of rational choice. A wealth of studies have illustrated how consumer preferences, attitudes and values can be influenced by the context (framing) of the choices (Wilkinson, 2008). Tversky and Kahneman (1984) postulated that humans estimate the outcomes of different prospects and that these estimates can be

affected by the order, context and framing of information. This means that decision-making can be influenced by the context of choices (Wilkinson, 2008; Jolls and Sunstein, 2006).

2.5: Game Theory

The interaction of individuals or other agents can be examined through Game Theory, examining how changing payoffs, intentions, and the interdependent nature of strategies resulted in varied outcomes (Binmore, 2007). Latterly, the aforementioned insights of behavioural economics led to the application of game theory as a behavioural theory of decision-making (e.g. Camerer and Loewenstein, 2004). Whatever the situation being modelled the game always includes at least two players (who may represent individuals, firms, or other organisations), a set of strategies and co-corresponding pay-offs, which may be negative or positive (Osbourne, 2004).

Game theory largely examines conflict between players, and understanding how different strategies, contexts and information can result in varied pay-offs for different players (Kockesen and Ok, 2007). By examining these issues via 'toy-games', predictions on outcomes can be made, helping to identify how different 'rules of the game' might affect outcomes, thereby informing the institutional design and optimal strategies for players to follow across a range of contexts. Game theory can also be applied to understand cooperation, which typically focuses on the distribution of pay-offs amongst a coalition (Binmore, 2007). There are several alternative 'toy-games' which can be applied to support the modelling of different real-world scenarios including 'the stag-hunt' and 'chicken' which each alter respective payoffs to reflect the context of different situations (Osbourne, 2004).

Reliance upon the principles of the standard economic model alone suggests that decision-making within a 'game' is solely driven by self-interest and utility maximisation (Binmore, 2007). Therefore, the outcomes of a given 'game' could be predicted by using predicted pay-offs and the availability of information between 'players'. However, the insights of behavioural economics can be applied to game theory, by including the influences of social norms such as trust, institutions and experiential knowledge (Golman, 2020; Camerer and Fehr, 2004).

This arguably more accurately reflects the 'real-world' situation. For example, if one player has a close working relationship with another it can be assumed they have a high degree of trust in each other, meaning that the player will act to reach a mutually beneficial outcome, rather than pursuing a purely self-interest strategy (Sally, 1995).

Game theory can also be applied in cooperative scenarios where coalition formation is often important to achieve an outcome, this branch of theory focuses on the formation and stability of coalitions and the division of collective pay-out amongst a coalition (Osbourne, 2004). Stability within coalitions often requires that the membership of a coalition results in a greater payoff than membership of an alternative coalition (van der Linden and Verbeek, 1985). In some cases certain players must be part of a coalition for any pay-out to be reached, these players are known as 'essential players'. To support coalition stability payments can be made by one member to another, which is known as transferable utility (Binmore, 2007).

2.6: Social Practice Theory

Social Practice Theory (SPT) provides a more emphatic rejection of individual rationality in human decision-making when compared to the other behavioural approaches covered in this review (Keller et al., 2016). This approach rejects the notion of economic rationality and instead provides a framework to identify and understand a wide range of factors which might affect human decision-making (Shove et al., 2012). The approaches presented above remain focused on the individual economic agents, attempting to understand how heuristics, biases and socio-cultural factors might affect the behaviour of this agent (Sent, 2004). SPT rejects this, and instead understands behaviour as ‘practices’ (Reckwitz, 2002), defined by Giddens (1984) as the repetition of actions that produce social structures.

There is no dominant, unified theory of practice, and instead, there are several conceptions of practice theory, many of which are built upon Gidden’s (1984) theory of structuration and Bourdieu’s (1990) work focusing on the recursive relationships between practices and habitus. Rather than decisions being driven by procedural rationality or by the goal of approximating

utility maximisation, behaviour is seen to be driven by the combination of the physical, social and cultural context in which decisions are made (Reckwitz, 2002; Shove, 2010).

Perhaps the most influential, and well-known theory of practice is used within this thesis, developed by Shove et al., (2012). They set out a framework of practices made up of three elements (materials, competencies and meanings) that inter-relate and combine to form a practice, summarised in figure 1.3. Materials are “things, technologies, tangible physical entities and the stuff of which objects are made”, competencies refer to understanding and practical knowledge – including ‘skills’, and 'techniques', with meanings considered to be the emotional, social and symbolic significance of the practice (Shove et al., 2012: 2014; Spotswood et al., 2015). Individually the elements are important in determining a practice, however, the links between these practices have a strong influence on the character of a particular practice (Shove et al., 2012).

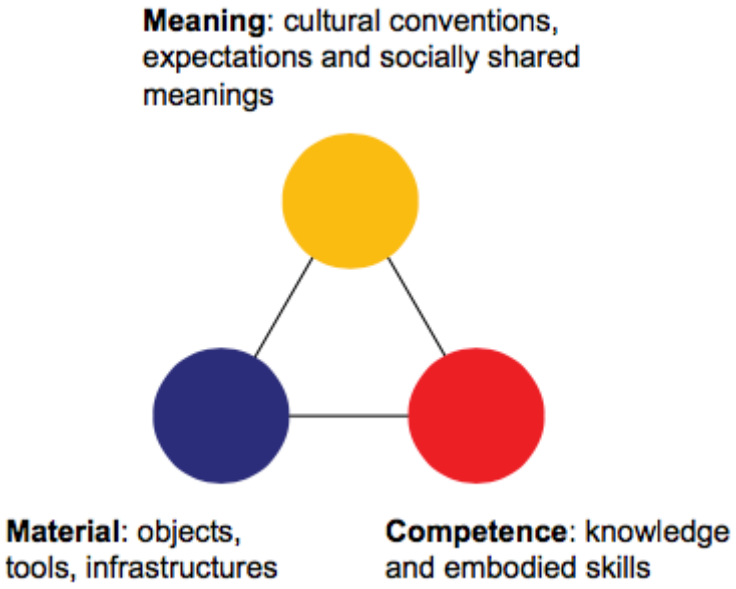

Figure 1.3: Elements of Practice Theory. Source: Spotswood et al., (2015)

Therefore the approach attempts to incorporate physical factors with the intangible social influences of (in)formal rules, perceptions and understandings as well as the enabling and disabling influences of skills and abilities (Kent, 2021). This means the determinants of behaviour and decision-making are not considered and explained through rational decision-

making nor the more complex cognitive or psychological functions of the individual (Keller et al., 2016). Instead, decision-making and uptake of particular practices are the results of the complex, web of interconnected socio-technical structures (Shove et al., 2012). As a result, a wide range of influences can be identified, understood and altered to shape and encourage or discourage the uptake of a given practice.

2.7: 'A spectrum of behavioural approaches'

Thus far, this section set out several influential behavioural theories, each of which challenges the previously dominant rational model of behaviour to a different degree. This set out the case that a more complex and nuanced perspective of human decision-making can provide a more complete and accurate model of human behaviour. The spectrum of behavioural approaches can be compared from the distance from the rational choice model, as illustrated by Dunning (2017), which reviews a series of behavioural housing search models. This thesis expands this spectrum by including Social Practice Theory, the underlying assumptions of this approach, and others reviewed in this chapter are summarised in Figure 1.4.

Rational choice lies at the left of the diagram, in which decision-making is shaped by maximising personal utility alone, with no influence of the external environment or cognitive limits impacting decision-making. In contrast, the right of the diagram represents theories which place greater weight upon the environment in which a decision is made. This might refer to physical factors (i.e. availability of infrastructure) or less tangible factors i.e. the organisational 'culture' in which decisions are made. Social Practice Theory lies to the right of the diagram since it rejects the notion of individual decision-making to maximise utility, the two schools of Behavioural Economics then lie between these two extremes since each accepts the influence of external factors upon decision-making to a varied extent.

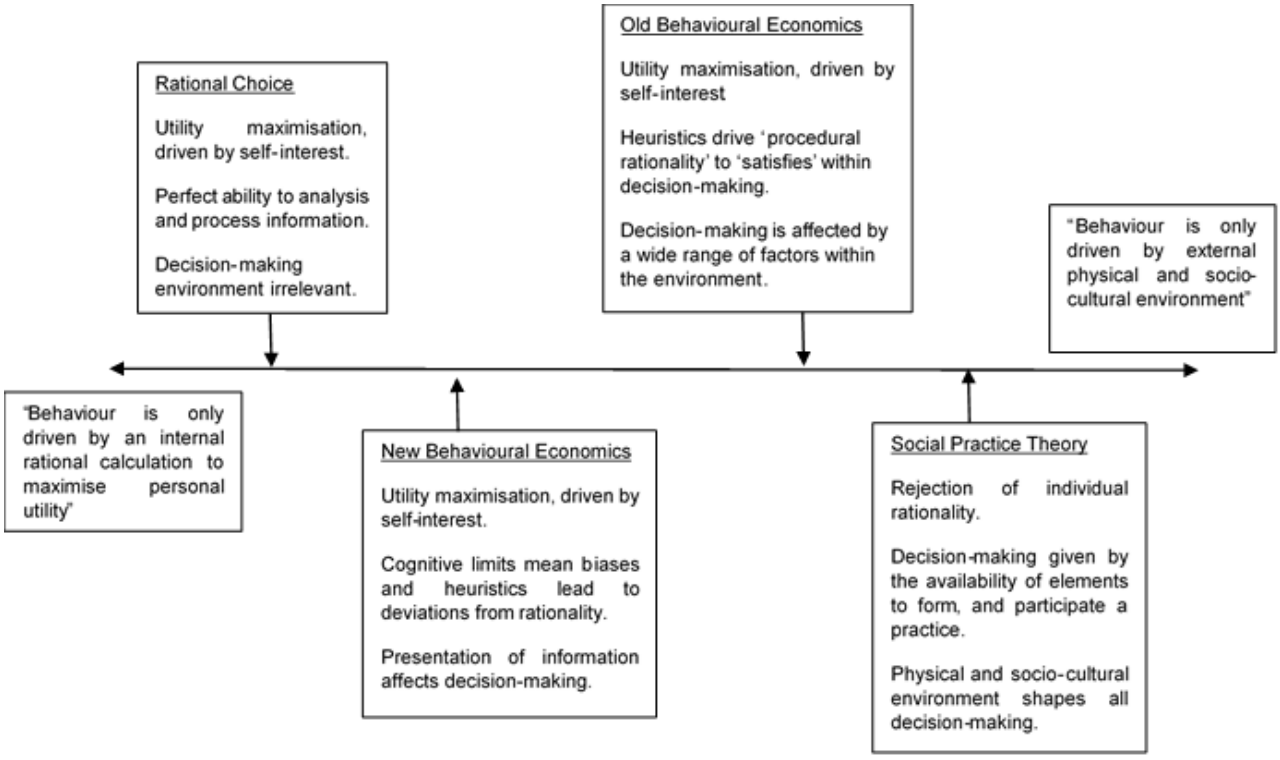

Figure 1.4: The 'spectrum of behavioural approaches' Source: author's own.

2.8: Summary

This chapter began by introducing several approaches to understanding behaviour and decision-making. This began by setting out the rational choice model, whilst this approach has been highly influential, particularly within economics there are several weaknesses within the assumptions underpinning this model. There are a huge selection of potential approaches which critique rational choice, this review has drawn from across the spectrum of behavioural theories to illustrate rational choice weaknesses by detailing Old and New Behavioural Economics, Game Theory and Social Practice Theory.

Each set out the potential for a wide range of cognitive, institutional, experiential, physical and socio-cultural factors to shape behaviour. Each centres their critique of rational choice upon the assumptions of rational decision-making, which were challenged by a series of different theories. Old Behavioural Economics introduced the concept of bounded rationality, which set out that decision-making was influenced by heuristics, experiential knowledge and socio-cultural norms, forming procedural rationality as opposed to a decision underpinned by rational

cost-benefit calculations. New Behavioural Economics applied psychological insights to set out how a series of biases and heuristics affected rational decision-making. The chapter then examined how other behavioural models such as Behavioural Game Theory might be applied to explore the interaction and decision-making of economic agents. Social Practice Theory positions itself further from the rational choice approach, by illustrating how a wide range of physical, socio-cultural and personal characteristics can combine to affect decision-making. These approaches can be positioned by their distance from the view that behaviour is driven by rational calculations to maximise personal utility, creating a spectrum of behavioural approaches. The next chapter will begin to consider how these approaches might be applied to urban planning research, illustrating how each of the behavioural theories set out in this chapter might be applied within urban planning.

Chapter 3: A Behavioural approach in Planning Research

Chapter Summary:

Chapter 3 considers how the behavioural concepts and theories introduced in Chapter 2 relate to planning practice. This begins with setting out how the rational economic model might be applied to the analysis of planning. However, this thesis argues that such an approach is inappropriate and the assumptions underlying this model mean it inaccurately conceptualises planning practice. Instead, this chapter describes how planning processes are often characterised by risk and uncertainty, with decision-making being influenced by incomplete and inaccurate information alongside a range of political and socio-cultural factors. Other cognitive factors such as emotions, biases and heuristics can also influence planning and development outcomes.

This means that a behavioural approach is well suited to describing and explaining the influence of such factors. The chapter illustrates how a behavioural approach can produce an analysis which effectively identifies and explains the processes of strategic interaction of stakeholders, the shaping and framing of development plans and policies as well as behavioural change. Each of these areas are essential aspects of planning practice and is important in understanding how planning policies and practices might best tackle the environmental challenges presented in Chapter 1. Therefore, this chapter illustrates a behavioural approach's suitability in understanding the opportunities and challenges of developing and implementing environmental policies and practices within planning. It does so by illustrating the suitability of a behavioural theory in understanding the context in which planning practice occurs, whilst also presenting existing analysis which utilises such an approach.

3.1: The rational economic model and planning:

The previous chapter illustrated the principles underpinning the rational economic model, despite the critique of this model it has been applied to form an influential body of academic

work. This work often critiques the role of urban planning, either critiquing particular planning policies and practices or even undermining the entire premise of urban planning. This section will therefore introduce an analysis which draws upon the principle of the rational economic model, considering how planning practices are conceptualised within this model. The later sections in this chapter will argue that the standard economic model is poorly equipped for the analysis of planning practice. It will instead illustrate how drawing from alternative behavioural theories provides a more accurate and useful framework to understand planning practices and provide recommendations for practices and policies to best tackle planning challenges such as the environmental threats presented in Chapter 1.

The rational economic model when applied to planning and development practices assumes that each actor (e.g. landowners, developers, residents and planners) is seeking to maximise their utility and that this alone drives their behaviour. The approach typically emphasises the regulatory functions of planning, claiming that unnecessary regulatory burdens and delays are imposed through planning creating additional costs to stakeholders via price distortions, delays and the inefficient allocation of resources (Pennington, 2000; Cheshire, 2014; Cheshire and Sheppard, 2005).

Inefficiencies within the planning system are blamed upon the 'iron law of bureaucracy' which argues that expanding bureaucracy is in the self-interest of the public sector (Pennington, 2000; Dunleavy, 1991). Similarly, disinterest in taking part in public consultation events for planning processes is explained by the costs of attending such events typically being greater than the benefits of attending. Pennington (2000) argues that this can be exploited by well-organised residents, or by certain interest groups (e.g. the construction industry or landowners). Self-interest can also explain why actors engage in rent-seeking behaviour through lobbying for certain planning policies or decisions which have a financial benefit, for example through the relaxation of development codes (e.g. Taylor et al., 2016; Murray and Frijters, 2016) or conversely through residents lobbying to reject new development proposals, often termed NIMBYism (Rydin, 2021).

However, challenges to the assumptions underlying the rational choices mean that many of the assumptions of self-interest maximisation may be inaccurate, and instead a behavioural approach can help researchers consider a wider range of factors affecting decision-making in planning, including the potential to move beyond the focus on the individual as the unit of analysis.

The following section begins to explore this further, by illustrating how the particular context of decision-making in urban planning is inherently uncertain and characterised by risk, meaning that the rational economic model is particularly unsuitable for describing and analysing planning practices. Instead, this chapter will argue that a behavioural approach, encompassing a spectrum of approaches can provide a pragmatic framework to provide a useful and insightful analysis of urban planning practices.

3.2: Uncertainty, risk and deviations from rational behaviour in Planning Practice:

The remainder of this chapter will consider how the concepts and principles introduced above can be applied to understand contemporary planning practice. Firstly, it will provide evidence which suggests the conditions of decision-making planning and development are well suited for analysis through behavioural theories, illustrating how such concepts can be related to the process and outcomes of planning practice. Following this discussion several examples of the application of behavioural models will be considered, illustrating how a variety of planning and development practices can be informed through the use of behavioural approaches in planning research. In doing so, the spectrum of behavioural models introduced in the previous section is considered within the context of planning practices.

3.2.1: Uncertainty in information

Decision-making within planning is often hindered by incomplete information or through significant uncertainties over information. There can be delays which means the necessary information cannot be collected in the appropriate timescale to inform decision-making (Khisty

and Arsland, 2005; Haase et al., 2014). Equally, the presence of data and information alone is inadequate without the ability to use it to support decision-making processes. In this respect, the frequently reported shortage of human and financial resources within many public planning administrations in England, and elsewhere (Hastings et al., 2015; Haughton and Hincks, 2013; Schipper and Schönig, 2016), can limit the ability to consistently collect and analyse the appropriate information to support 'rational' decision-making processes (Forester, 1989; Tait, 2009). To further compound the situation the 'issue' or 'opportunity' which is being addressed through plan-making, or development control processes can often be ambiguous and poorly defined (Adolfsson and Brorstrom, 2020; Forester, 1984).

These conditions imply risk and uncertainty in decision-making within planning and, as a result, the earlier introduced insights of 'bounded rationality' are likely to have significant relevance in decision-making (Simon, 1958). Going further, the development and planning process is often characterised by an interplay between quantifiable factors such as technical and financial issues alongside qualitative, 'value' laden issues which include political constraints. This leads to many planning problems being characterised as wicked problems, with no straightforward solutions (Rittel and Weber, 1973). Contradictory and conflicting objectives between development actors often mean that there are likely to be instances in which certain stakeholders may appear to act irrationally or unpredictably (Ferrari et al., 2011; Guy and Henneberry, 2000).

3.2.2: Uncertainty in values and interests

The decision-making environment within planning and development processes involves a range of stakeholders, and despite the development industry often being characterised as being relatively homogenous, different actors may have their own preferences, values and interests beyond financial gain (Adams, Croudace and Tiesdell, 2011; Payne, 2013). The range of actors is partially a function of the complexity of the development process which encompasses many stages including financing, land assembly and engagement with a wide

range of stakeholders such as planners, landowners, developers, local communities and investors. This means that the development and land markets are contextual and highly sensitive to market conditions and subject to the varied aims of development actors (Guy and Henneburry, 2000). This diversity means there is “no single land and property market, but many markets, each reflecting the different ways in which development cultures play out in different localities.” (Adams and Tisdale, 2010: 194).

Despite these differences, the processes of plan-making and development decision-making must coordinate, mediate and eventually resolve conflicting objectives of these stakeholders to align these into a future vision for a location or area (Samsura et al., 2010). This inevitably leads to 'winners and losers' within different interest groups, meaning there are incentives to apply pressure within decision-making through various formal, and informal means (Pennington, 2000).

3.2.3: Uncertainty through flexibility, discretion and the socio-cultural environment

There are significant differences in the way that various planning systems operate. For some these differences can be largely attributed to the socio-cultural environment in which planning is situated (Knieling and Othengraften, 2015; Sanyal, 2005). This context is captured within the concept of a planning culture, although understandings of this concept vary (Fürst, 2009). Othengrafen (2012: 19) suggests that planning culture encompasses the variety of "attitudes, values, rules, standards and beliefs shared by the people involved" within planning. These are often assumptions of behaviour which are ingrained to the extent that they are taken for granted (Booth, 1993; Knieling and Othengraften, 2015). These 'cultural' factors have been identified as a barrier to reform within the planning system since they create resistance to change (Evers, 2015; Root, Van Der Krabben and Spit, 2015). This concept can be closely related to the old behavioural economics perspective of routinized behaviours as they are based upon the experiential knowledge of individuals alongside the socio-cultural context in which planning practices take place (Simon, 1958).

The focus of cultural analysis is typically through international comparisons (e.g. Knieling and Othengraften, 2009; Sanyal, 2005) which examine how, and why the socio-economic, cultural and political particularities of a nation become reflected within planning practice (Othengrafen, 2010; Alexander, 2005). Within Britain, the planning culture is heavily influenced by the British legal system, reflected in the discretionary approach, in contrast to many other European nations which have a stronger plan-led system (Nadin and Stead, 2008; Newman and Thornley, 1996).

Within Britain, this means there is a tension between providing certainty (through local planning frameworks and rulebooks) and flexibility (through individual decision-making and negotiation) within planning (Tewdwr-Jones, 1999; Booth, 2007). The scope for negotiation means that rather than relying upon a clear and predictable 'rulebook' provided by a planning framework there is instead significant scope for the individual agency of planners and other stakeholders within the planning and development processes. This means that variations in behaviour can have an important influence on planning outcomes, with ‘rules of thumb’, experiential knowledge, emotion, culture, values, and beliefs each playing an important role in behaviour alongside professional knowledge and skills (Kitchen, 2006; Claydon, 1998).

However, there are also significant differences within planning practices in a given nation, based upon the local context, for example through particular political pressures or geographical challenges. Illustrating this Purkarthofer et al., (2021) attribute significant differences between practices within and between Finnish regions to localised political pressures. Similarly, within England, differences in localised planning cultures have been suggested to be an important determinant of land value capture outcomes (Dunning et al., 2019).

3.2.4: Emotions, biases and heuristics

Uncertainty in information or the inability to process certain types of information e.g. values within planning decision-making processes can mean that cognitive biases and heuristics impact development outcomes. Whilst there is a paucity of studies examining biases in

planning, there are several studies examining the impact of status quo bias within planning and development markets. Sturzaker and Lord (2017) point out that planning decisions tend to have long horizons (since development is a long-term process) meaning there is often a preference for the status quo with pressures from interest groups (e.g. local communities groups) re-enforcing this bias (Sturaker, 2011). Elsewhere, Samuelson and Zeckhauser (1988) described the re-location of a town due to the construction of a new mining project. Rather than a new design which might have been more efficient, the local residents were reported to have a strong preference for recreating the old layout, which the authors argue is reflective of the status quo bias. Similarly, Bullock (2008) raises the influence of the status quo bias in supporting residents' attachment to existing green space. There also tends to be a preference for stability in planning and development practices amongst developers and planners (Van der Heijden, 2014; Hu and Sheal, 2020).

Baum (2015) notes the lack of interest in emotion from planning scholars, attributing this to the normative view of ‘rationality’ within planning practice. However, emotions are likely to be a potential source of irrationality within planning practice, since they form an important aspect of behaviour (Elster 1998; Steimer, 2002), therefore this may contribute to the preference for the status quo within decision-making processes. Several studies directly examine the influence of emotion, for example, Hoch (1994) and Baum (1983; 1986) both examine variations in emotion amongst planners, respectively finding that anxiety affected their performance in negotiation and coordinating roles. Fear can also be an important influence on behaviour. For example, Sturaker and Lord (2017) and Baum (1986) attribute the fear of being 'blamed' for poor decision-making, contributing to risk aversion among public sector planners (Gunn and Hillier, 2012).

Overall, the conditions of ‘bounded rationality’ mean that the role of emotions, biases and heuristics each contribute towards a perspective in which a purely ‘rational’ means to evaluate and choose an ‘optimum’ solution to a given issue within urban planning is challenging to develop and implement (Blower, 1980; Breheny and Hooper, 1985).

3.2.5: Summary

These areas of uncertainty within planning and development processes underline that the expectation that planning actors can consistently undertake strictly rational decision-making on a consistent and predictable basis is a highly unrealistic prospect. Instead, it suggests that cognitive limitations and socio-cultural conditions in which planning takes place have an important impact on outcomes. Overall, these factors suggest that a behavioural account of the processes of managing the built and natural environment may lead to a more useful and accurate analysis and provide valuable insights (Adams et al., 2016; Ferrari et al, 2011). Such a perspective embraces the concept of 'bounded rationality' which unifies new and old behavioural economics, accepting that decision-making is rarely based upon purely rational, utilitarian terms. In turn, this underlines the role of integrating concepts which include heuristics, biases, attitudes, norms and values when analysing and understanding planning and development outcomes.

3.3: A behavioural analysis of Planning:

The previous section set out why a behavioural approach is well suited to the analysis of planning, due to a range of factors introducing uncertainty in decision-making within urban planning. Furthermore, the influence of emotions, biases, heuristics and norms upon behaviour means that an approach which can integrate such factors into an analysis is well suited to identifying and understanding how planning can tackle a range of challenges, not least environmental threats. The following section will now set out how a behavioural framework can be applied to understand many aspects of planning practice. To do so it will identify a series of practices which characterise planning e.g. interaction of stakeholders, enabling behavioural change and shaping development through planning frameworks and policies. This review will consider a range of previously published materials, which apply behavioural concepts and theories, illustrating the value and utility of such an approach, thereby justifying the approach taken within this thesis.

3.3.1: Behavioural game theory and the co-ordination of stakeholders in planning

The previous section already noted the importance of negotiation, formal and informal rules, norms, framing and culture in influencing planning outcomes (Claydon, 1998; Ernste, 2012; Dunning et al., 2019). In this context, a behavioural game-theoretical perspective can give important insights, since it provides a means to explore and predict the outcomes of strategic interaction (Binmore, 2007), while accounting for behaviour by integrating bounded rationality of players, institutions and other norms (Camerer, 2011; Binmore, 2007). The necessity for cooperation within planning means the strategies taken by each player can be highly dependent and influenced by the strategy taken by others (Samsura et al., 2010). Game theory's focus is to examine strategic interactions meaning it is well suited to examining the context in which planning takes place. When these 'games' are played repeatedly new information is brought to the fore which can help each side gain new information about the other party i.e. identifying their interests and motivations, this information can then change the strategy for the next move, altering the level of trust between parties (Lord, 2012).

The long-term nature of many development projects means the maintenance of stable coalitions is vital to achieving a payoff for all parties. To do so, negotiation agreements regarding land assembly, profit and cost-sharing are important aspects of maintaining stability within planning and development processes (Samsura and van der Krabben, 2012). Here, the concept of an 'essential player' is important, without their involvement there can be no development and no payoff for any player. The most obvious 'essential players' in planning are the landowner and the consenting authority (Asami, 1985; Wang et al., 2011). For a coalition of stakeholders to remain stable these players typically require appropriate incentives or sanctions to remain within a coalition. Planning frameworks are a means to provide stability within a coalition, reducing the power of individual stakeholders within a coalition (Wu et al., 2015). For example, Glumac et al., (2015) and Blokhuis et al., (2012) use game theory to examine the role of private-public partnerships in overcoming the financial challenges of brownfield redevelopment. Similarly, Lord and O'Brien (2017) use game theoretical concepts

to examine how the 'drip-release' of development consents strengthens the bargaining position of the public authority with competition between private actors also enhancing design quality (Lord et al., 2015).

Other games examine competition between players, here ‘toy-games’ such as the Prisoner’s Dilemma and the Stag-Hunt have been identified as useful for exploring the interactions between various stakeholders in planning (Lord, 2012). Such games can be utilised to examine the contrasting opportunities of cooperation or defection between players across a range of contexts, including the payment of public infrastructure (Samsura and van der Krabben, 2012; Samsura et al., 2013), development of brownfield sites (Glumac et al., 2012), land acquisition (Hui and Bao, 2013) and negotiation of the location of public infrastructure (Chiu and Lai, 2009). A game-theoretical approach can therefore support the identification of an optimal strategy for stakeholders to follow in future 'games' as well as inform the institutional design of new planning and development frameworks.

3.3.2: Shaping, framing and influencing through plans and decision-making

Development plans, strategies and policies and even individual development decisions provide important information to stakeholders within the planning and development sector, the role of information can be analysed through concepts provided by new behavioural economics. Planners have significant opportunities to proactively shape and stimulate markets to meet a range of spatial objectives (Adams and Tiesdell, 2010; Tiesdell and Allmendinger, 2005).

This can occur through the careful framing of information within planning frameworks, which then provides a statement of the authority's preferences for development (Healey, 1992). This process can be seen through the behavioural concept of 'framing', which Rein and Schön (1993: 146) define as “a way of selecting, organizing, interpreting, and making sense of a complex reality to provide guideposts for knowing, analysing, persuading, and acting”. Framing of information, therefore, provides the basis for action and helps establish the key arguments for this action, building meanings and sense-making within spatial practices (Ernste, 2012). This can occur through the specific selection, analysis, manipulation and

presentation of images, policies, data or strategies within planning frameworks (Faludi, 1996; Healey, 1992). Wardekker (2021) raises the framing of an urban resilience agenda within planning as an example, finding its malleability helps shape collaboration across departmental silos. Harris et al., (2016) illustrate the opportunity to frame health objectives within land-use planning policies supporting local public health objectives. Therefore, the careful framing of information can help to support meeting particular priorities or pressures within a public authority and help shape local development markets.

The discretionary nature of the development control system in the British context means the framing of individual planning applications to decision-makers (e.g. local councillors) can mean that planners (and developers' agents) apply a degree of influence upon the decision by carefully framing the proposal (Claydon, 1998). Individual development decisions can also reveal information regarding the nature of development which is more or less likely to be accepted by a local authority. In behavioural economic terms, this provides information which forms new reference points regarding the scope of deviation from the terms set out in the development plan. This might lead to cost efficiencies or additional costs for a developer (Adams et al., 2016). Such a case is illustrated by Hall (2011) in his study of the impact of newly introduced design guidance in Chelmsford where previous applications helped guide and justify bidding prices of land.

The information presented within the development plan also influences the behaviour of the developer. In new behavioural economics terms, this forms part of a 'choice architecture' (Thaler, Sunstein and Balz, 2013), since it provides information to market actors to encourage or discourage certain actions (Klosterman, 1985). The plan provides incentives for market actors to take certain actions, by providing information indicating where public-sector investment and visioning (i.e. through planning frameworks) will support development, which is particularly important in supporting weaker development markets (Healey, 1992; Adair et al., 1998). Providing information on the location, and types of development which are more,

or less likely to be accepted increases the certainty of acceptance of development, thereby encouraging private-sector investment (Neutze, 1987; Adams and Tiesdell, 2010)

This information tends to represent the broad aims of a local authority (Healy, 1992), but can be seen as an LPAs 'opening terms', which are subject to negotiation, with site-specific factors and various competing pressures upon a local authority shaping the development outcomes. However, specific areas of policy are less negotiable, an indication of the low probability of approval of development can provide a price signal, anchoring the selling price of land (Woestenburg, van der Krabben and Spit, 2019).

3.3.3: Behavioural change in planning

The above section illustrated how the framing of information within development plans and past planning decisions can be a means to influence developer behaviour. Another area in which planners can play an important role in changing behaviour is through individual behaviour change e.g. altering the design of the physical environment to encourage greater physical activity (Forberger et al., 2019; Sallis et al., 2012). To do so, planners can exercise an influence upon the physical environment as explored above i.e. through setting standards in development plans and negotiation of individual development consents (Barr, Gilg and Shaw, 2011).

To understand how to engender behaviour change there is a need to consider the factors which might support the desired behavioural change to take place (Koohsari et al., 2013). In the earlier section, the behaviour change framework of Social Practice Theory was introduced, which provides a contrast to rational models of behaviour, moving beyond deviations from the rational model set out through alternative behaviour change frameworks e.g. 'nudge' (Shove et al., 2012; Keller et al., 2016).

Notably, there has been no direct engagement with practice theory to examine planning practices. However, there is extensive work utilising practice theory to examine and develop behaviour change strategies to support a wide range of policy goals, in particular those relating

to environmental sustainability such as modal choice, domestic energy use and water conservation (Shove and Warde, 2002; Strengers, 2013; Kuijer, 2014). Several leading social practice theorists (e.g. Barr, 2015; Shove, Watson and Spurling, 2015) have highlighted the role of urban planners in provisioning and shaping the availability of elements, in particular materials e.g. urban infrastructure. This means that urban planners have an important role in shaping the provision of elements to meet environmental policy goals.

Using the example of modal choice, social practice theory can highlight how a wide range of factors influence transportation decision-making (Kent, 2021). For example, highlighting the strength of car dependence within many communities, with land-use patterns necessitating travel, alongside the absence of alternative infrastructures such as cycle lanes or public transit (Barr, 2015; Sheller and Urry, 2006). Going further, this approach can highlight several, wider 'cultural factors' which support car dependence e.g. the association of freedom and status associated with car ownership (Kent and Dowling, 2015; Watson, 2012).

Since the focus on the individual is avoided (unlike many other behaviour change frameworks) there is the opportunity to encourage change through a wide range of factors. Again, using modal shift as an example, Spurling and McMeekin (2014) suggest that the substitution of a practice (i.e. replacing the car with a bus journey) or recrafting of practice (i.e. replacing a petrol vehicle with an electric one) are two means to engender change. However, change can be directed towards planning and development practices which create car-dependent neighbourhoods, with solutions instead seeking to reduce the demand for travel (Shove, 2003; Strenger, 2011).

In each of the cases, Social Practice Theory illustrates how development and planning might support desirable behavioural changes. Therefore, SPT can be used as a support tool, which in the context of modal shift helps to identify both individual materials (e.g. travel infrastructures) as well as wider contextual factors (e.g. planning practices which encourage

out-of-town retail) which can lead to dependence upon motor vehicles (Barr, 2011; Watson, 2012). This means that this behaviour change framework can provide urban planners and policy-makers with guidance and information regarding the alteration of policy and practice to achieve particular policy goals. As a result, a theory generally overlooked by planning scholars can form an important element of a 'behavioural approach' to planning research.

3.3.4: A brief illustration of a behavioural approach

To provide a more tangible example of how the application of the three theoretical approaches discussed in this chapter could address a common issue within urban planning the three boxes below present a hypothetical scenario. The purpose of this is a tool to illustrate how these different approaches would be used to analyse and understand this hypothetical scenario. The boxes will set out how the application of a diverse set of theories places attention on contrasting aspects of planning, and as a result, place attention toward different conclusions and implications following the analysis. The purpose of these illustrations is not to provide a detailed analysis of the situation, but rather to provide an example of how these different approaches might be applied to explore a given issue within urban planning.

The scenario:

A local planning authority has developed a new environmental planning policy framework, which contains a range of policies designed to address the mitigation and adaptation to climate change, support biodiversity and improve air quality within the area. However, there are challenges within the implementation of this strategy, with private developers frequently challenging the new policies within informal, and formal development negotiations. There are also conflicts emerging with other core policy agendas within the local authority including the delivery of housing and boosting local economic growth.

Box 3.1: Game Theory

Game theory's core strength is within the modelling of strategic interactions between different stakeholders, it is therefore particularly useful in understanding how negotiations between development stakeholders play out (Samsura and van der Krabben, 2012; Wu et al., 2015). To do so, game theories' toolkit of 'toy-games' can be applied to model the situation at hand (Binmore, 2007). For example, it could use non-cooperative game theory to understand the relative 'pay-offs' of one opposing stakeholder within a development negotiation (Osbourne, 2004). It would help to explain why private developers might choose to play certain strategies to gain an advantage within negotiations following the implementation of a strategy. It might also help to highlight where changes within the development strategy are required to provide key stakeholders with the necessary incentives to cooperate with the local authority (Lord, 2012). It might also illustrate where new coalitions between these stakeholders may be formed by using cooperative game theory, helping to illustrate how 'pay-offs' from forming new coalitions could successfully deliver a new policy agenda (Lord and O'Brien, 2017). In this way, the use of game theory as an analytical tool is most useful in understanding the strategic interaction of stakeholders within the development arena and as an aid in understanding how successful coalitions of stakeholders might be built to successfully deliver the new development policies.

Box 3.2: Behavioural Economics

Drawing upon the framework of behavioural economics would lead to a focus on how a set of biases and heuristics might be affecting the behaviour of stakeholders (Kahneman and Tversky, 1982). This then may explain the difficulties within the implementation of the framework. The application of this approach might lead to an examination of how particular policies are framed within the new plan (Healy, 1992; Rein and Schön, 1993). It would question

how the plan presents information surrounding the policies. For example, it could question does the presentation in a way that provides a clear rationale to persuade developers and stakeholders within the council to implement this approach? Does the information within the plan provide an effective 'choice architecture' to encourage market actors to take the desired decision? By analysing the plan and the information contained within, it can help to explore and explain if the plan is providing a useful tool to guide and convince developers to take the necessary decisions to meet environmental objectives (Ernste, 2012; Klosterman, 1985). Secondly, the toolkit of behavioural economics would also explore whether particular biases, such as the status-quo bias might be leading to resistance to changes in practice and policy (Van der Heijden, 2014; Samuelson and Zeckhauser, 1988). Therefore, the use of behavioural economics would emphasise how information is presented and interpreted and how the effect of cognitive biases and heuristics in interpreting information and change might affect the processes of policy development and implementation (Thaler, Sunstein and Balz, 2013).

Box 3.3: Social Practice Theory:

Social Practice Theory focus is upon the change and evolution of different practices (or behaviours). If this issue is conceived as being focused upon the practice of 'planning' then, as with all practices is split into three elements (Reckwitz, 2002). The analysis would then explore if the necessary competencies (i.e. skills and knowledge) and materials (i.e. physical elements) are present to support the implementation of the plan. It would also consider the meanings embedded within the new plan (i.e. the symbolic and cultural attributes of the plan). Splitting the practice of planning into these elements then enables an analysis which highlights the possibility of certain factors affecting the implementation of the plan, thereby preventing the necessary behavioural change to successfully meet the objectives (Shove et al., 2012). This might lead to specific changes such as retraining employees to develop new competencies, or it might suggest that the meanings embedded within the plan fail to appeal to particular stakeholders. As a result, the use of social practice theory redirects attention

towards the different aspects of change which are necessary to implement a new policy agenda within planning (Keller et al., 2016).

3.4: Summary

The case for the application of a spectrum of behaviour approaches within planning research was made in this Chapter. This began with a consideration of the treatment of planning through the rational choice approach, with the assumptions underlying this model weakening this analysis. This is particularly evident when considering that the decision-making environment within planning practice rarely meets the conditions in which purely 'rational' decision-making can be made.

Instead, this review illustrated how planning practices are characterised by risk and uncertainty, with decisions being influenced by differing values and relationships between development stakeholders. Emotions, negotiation tactics and the socio-cultural context explain why planning and development outcomes often deviate from what a rational, utility-maximising model might predict. Planners can engender behavioural change amongst the public and development stakeholders to meet a range of public policy goals, not least environmental challenges introduced within Chapter 1. Approaches and concepts introduced in this chapter can help to provide guidance upon how planners might design development frameworks or build coalitions to best achieve strategic outcomes. Similarly, the application of behaviour change frameworks e.g. Social Practice Theory can provide planners with a wide range of potential strategies to support the achievement of particular policy goals.

The following chapter will set out the methodology applied within this thesis, building upon the concepts and theories introduced within this chapter to form a detailed research design and methodology appropriate to produce a series of behavioural case studies.

Chapter 4: Methodology

Chapter summary:

This chapter will set out the methodology followed within this thesis, the chapter is split into three parts. The first provides a brief introduction to planning research, placing the approach taken in this thesis within the wider context of planning research, ahead of setting out the key objectives of the thesis. The chapter then moves on to consider the specific research methods employed in the thesis in greater detail, considering issues of theoretical framework, data collection, sampling and data analysis. The final section provides specific details of the three papers explaining the approach to examining these particular research questions.

4.1: An introduction to planning research:

Planning research was historically rooted within the positivist research tradition (Sandercock, 1998) reflected through the influential theories of the 1960s and 1970s such as systems and rational procedural approaches. Research in this tradition typically uses quantitative methods to uncover cause and effect relationships, developing 'rules' which can then be translated into planning practices, with purportedly reliable and predictable outcomes.

As positivism was challenged throughout the social sciences, a range of interpretative approaches became increasingly common within planning research (Allmendinger, 2002). This emphasises research which identifies how individuals understand the social world, providing logic to their decisions and actions (Fischer, 2003). Despite this shift, planning research often remains focused on the delivery of research outputs which can directly, or indirectly inform policy and policy recommendations (Farthing, 2015).

To meet this goal, planning research must go beyond a description ('what') and explanation ('why) of a given issue and consider what changes might be made to remedy a given issue, described as 'how' questions (Blaike, 2000). These are important in planning research since it is important for planners (and other relevant stakeholders) to identify how particular actions lead to more (or less) desirable impacts (Rydin, 2007). A common approach is to explore the

activities and practices of planners (Watson, 2002) and identify how such activities are constrained and enabled by a range of factors. The research reported in this thesis follows such an approach, largely using data collected via interviews to enable a series of 'what', 'why' and 'how' questions to be answered (Farthing, 2015).

4.2: What does this research project seek to achieve?

This thesis seeks to illustrate the value and adaptability of a behavioural approach within planning research, to do so a selection of behavioural theories were applied across three areas of planning practice. These topics were selected to reflect the diversity of planning practices and to illustrate the ability of these practices to address a range of environmental challenges set out in Chapter 1. There are three research questions that this thesis seeks to answer set out below:

4.2.1: Research questions

Research Question 1: How do behavioural factors impact the decision-making of planners regarding the implementation of pro-environmental policies and practices within the British planning system?

This question forms the core of the scientific enquiry of the thesis and is reflected across the three papers, each of which focus on a different aspect of pro-environmental policy and practice. The thesis sets out to explore how a specific aspect of planning, i.e. the behaviour of planners and as such sets this at the centre of the research. As previously set out in Chapter 1, the magnitude and scale of risk of environmental risk lead to the decision to narrow the inquiry upon these types of policies and practices within the British planning system.

Research Question 2: How does the application of a behaviour approach support the identification and explanation of the impact of the behaviour of planners?

This question has a tighter focus on exploring the methodological and theoretical aspects of behavioural theory, responding to the relatively nascent nature of this approach within planning research. Given that a considerable aspect of the thesis examines the weaknesses of many approaches to planning theory it is important that, in response, this thesis set out how, and why a behavioural approach is well suited to identifying and explaining the role of behaviour in influencing the outcomes observed in the thesis. As a result, this research question set out how these theories support examining planning in a variety of contexts. It also sets out to explore and explain how the diversity and adaptability of behavioural theory aid its utility in understanding the role of the behaviour of planners.

Research Question 3: How can the application of a behavioural approach support the development and justification for the adaption and adoption of existing and new pro-environmental practices and policies within urban planning?

The focus of this question is to examine how a behavioural approach to planning is useful in developing and justifying new insights into planning policy and practice. To do so, the thesis builds upon the conclusions developed through research questions 1 and 2 by developing the implication of the analysis within the context of planning practice and policy-making. By doing so, the thesis provides an explanation and illustration of the utility of a behavioural approach within planning research.

These research questions are addressed within the papers themselves and are therefore reflected within the research questions relating to each Chapter, set out later in Sections 4.7 – 4.9. These questions will also be addressed in detail in Chapter 8, a discussion chapter which draws together the new insights and understanding gained throughout the research process.

4.2.2: The examination of who's behaviour?

Given that behaviour forms a central theme of the thesis, it should be specified that the thesis is seeking to describe, explore and explain the behaviour of practising planners in a wide range of contexts in which they operate (Fischler, 2012). It seeks to also provide insights and recommendations for practising planners and policy-makers within the areas of planning, environmental management and development.

There are several reasons for this focus. Firstly, it is planners, whether it be junior officers or those within senior leadership and decision-making positions who make the decisions which affect the implementation and operation of policies and practices which affect meeting environmental objectives (RTPI, 2020; Bicquelet-Lock and Taylor, 2020). These decisions might be at the scale of day-to-day individual development negotiation or strategic decision-making affecting the longer-term operation of planning within an authority. The thesis, therefore, focuses on the decisions of planners, and how the context of the decision-making affects these decisions.

At times the research also collects data from individuals beyond planners, such as within Chapter 7 where the views and perceptions of the general public are gathered. However, the actions of the planners remain within the focus of the inquiry, since it is the decision-making of planners (i.e. to provide certain aspects of infrastructure) that helps to shape the perception of decisions of individuals to cycle.

Beyond this, it is also the intention that this thesis provides analysis, conclusions and implications that are directly relevant for planners, and planning policy-makers (Alexander, 2001; Bicquelet-Lock and Taylor, 2020). By placing a close focus on the decisions and behaviours of planners currently working within practice this aim can be more easily reached.

Table 1.1, below, outlines the research approach and contributions provided within the published papers that form the core of this thesis. The structure of the research questions relating to each project follows a similar structure, reflecting the research questions presented

above. First, is the identification of the factors which support or undermine the ability of planning practice to tackle a particular challenge. The research applies concepts from three different theoretical approaches, illustrating the value of a behavioural approach within planning research, with different theories illuminating different facets of human behaviour. This enables an explanation of a particular planning outcome, providing a rationale for the potential policy and practice changes.

In common to each paper is an exploration of how 'contextual' factors such as socio-economic context, political and financial pressures interact with: cognitive biases and heuristics (Chapter 5); institutional arrangements (Chapter 6) and the physical environment (Chapter 7) leading to particular actions being taken by stakeholders including individuals, local planning authorities and private developers.

Project	*Theoretical Framework*	*Empirical Focus*	*Behavioural Focus*	*Policy and Practice Recommendations*
'The use of planning obligations to support ecological investment'	New Behavioural Economics.	Use of land value capture to fund ecological mitigation.	Role of cognitive biases and heuristics.	Policy change to support greater investment via land value capture.
'Playing games with climate change'	Behavioural Game Theory	Integration of climate adaption and mitigation objectives with planning practices.	Role of institutional arrangement.	Greater use of strategic planning frameworks.
'Cycling in an ordinary city'	Social Practice Theory.	Identifying opportunities and barriers for modal shift to cycling.	Role of the physical and environmental factors.	Greater investment in cycling infrastructure, training and enforcement.

Table 1.1: Summary of thesis papers.

In summary, each paper applies a different behavioural theory thereby demonstrating the adaptability and versatility of a behavioural approach. The rationale for researching a particular

empirical issue, and selecting a particular behavioural theory to do so for each chapter is set out in the remainder of this chapter.

4.3: Theoretical framework:

The application of theory supports the analysis of empirical data and guides research design (Jackson, 2005; Sartori, 1970). The definition of a theory is a "formal idea or set of ideas that is intended to explain something" (Collins English Dictionary, 2022), within the social sciences theory can provide "systematic explanation for observations that relate to a particular aspect of life" (Babbie, 2010: 8). Theory, therefore, provides the means to describe and explain a given phenomenon, thereby leading to the production of new knowledge and understanding of a given situation (Silverman, 2017; Strauss and Corbin, 1994).

Within planning and allied fields, research questions tend to have regard to both individual behaviour and the social-economic and environmental context in which activity takes place (Rain-Kwon and Silva, 2020). Therefore, the use of a range of behavioural theories provides a means to highlight different factors which motivate certain behaviours in a variety of contexts. For example, both Davis et al., (2015) and Schluter et al., (2017) highlight the contrast between individually focused theories and those relating to social and environmental factors. The application of different behavioural theories when designing research and analysing data provides a means to identify and emphasise the range of factors which motivate a given behaviour. They can also provide a means to understand and structure the varied, and rich context in which behaviour takes place, thereby avoiding a narrow and simplified description and explanation of a given behaviour (Van Bavel and Dessart, 2018).

The integration and comparison of insights from different theories can provide a means to address the relative weaknesses, or gaps in certain conceptions of behaviour (Sovacool and Hess, 2017; DellaValle et al., 2018). Going further, Adams and Watkins (2014) and Guy and Henneberry (2000; 2002) each argue that methodological diversity and pluralism can be useful in uncovering new and complementary insights within housing research. Wilson and

Chatterton (2011) argue that different models of human behaviour can co-exist since different theories focus upon different aspects of human behaviour and conceptualise a given 'problem' in different ways. Therefore, the application of different behavioural theories within different contexts provides a means to uncover and emphasise different motivating factors, and in doing so reveal richer insights into human behaviour and outcomes of such behaviour.

4.4: How is behavioural research delivered?

Behavioural research is delivered through a diversity of approaches reflecting the diversity of theoretical standpoints, these are traditionally divided into two types of methodology: objectivism/positivism and subjectivism/constructivism (Crooty, 1998). The first is typically associated with a range of different quantitative research methods and tends to be the dominant approach in much of the behavioural sciences (Van Bavel and Dessart, 2018).

4.4.1 Quantitative approaches

Randomised controlled trials (RCTs) are an important approach within the behavioural sciences (Olofsgård, 2014), they identify the cause and effect relationship between an intervention and observation, randomly allocating research subjects between control and treatment groups to reduce bias (Kendall, 2003). An example is a trial investigating the effect of providing additional information on the estimated lifetime running costs of electric appliances (the treatment), enabling the researchers to identify that this led to an 0.7% reduction in energy use in appliances sold in the treatment group, compared to the control (DECC, 2014).

Experimental studies are another important method in the behavioural sciences, these tend to take place in a controlled environment, and approximate 'real-world' conditions. For example, the analysis of negotiation processes might simulate the situation by providing participants with particular information, rules, incentives and penalties (Feri and Gantmer, 2011). Samsura et al., (2015) and Chiu and Lui (2009) are two such examples, who each examine negotiation

processes within land and property markets and the disputes over the siting of new infrastructure through using game theory.

4.4.2 Qualitative approaches

An alternative approach within behavioural research is the use of qualitative research methods, either in isolation or through mixed-methods approaches (Van Bavel and Dessart, 2018). The use of qualitative approaches within behavioural research enables a researcher to understand the meaning that participants attach to certain decisions and behaviours (Erickson, 1986). This approach tends to include some level of inductive inquiry which enables the research to be flexible through the course of an investigation (Taylor et al., 2015). In this case, the 'behavioural insights' tend to be produced through the patterns found in the analysis of the data (e.g. textual data or observation). This approach, therefore, tends to produce, rather than test, hypotheses (Veltri, Lim and Miller, 2014).

A qualitative approach provides a means to examine a particular behaviour within the wider, social context in which it takes place (Van Bavel and Dessart, 2018). This provides a means to develop a nuanced understanding of the experiences and behaviours of participants within a given social context, providing a 'thicker', in-depth description and explanation of behaviour (Tierney and Clemens, 2011). This means that there can be a consideration of how different cultures, geographies and socio-economic circumstances might impact behaviour. This then provides a means to compare the impacts of such factors by examining the differing contexts that participants operate within (Corbin and Strauss, 1990).

Such approaches can encompass a selection of different methods, although interviews, focus groups and ethnographies are most common. Interviews provide the researcher with a set of textual data to analyse, produced through a verbal exploration of an individual participant's experiences, attitudes and perceptions. The private, and typically anonymised context means that there is the opportunity to explore personal, sensitive or controversial topics (Silverman, 2017). Focus groups also produce a set of textual data although the group context can provide

insights into shared or contrasting experiences within a group (Barbour, 2005). In contrast, an ethnography provides an account of the actions within a 'natural' setting. The researcher, therefore, must embed themselves within this setting, document actions and identify why individuals are undertaking particular actions (Hopf, 2004).

4.5: How is behavioural research delivered in this thesis?

Following the introduction of key behavioural research methods, the following section will set out the decisions to follow an exploratory qualitative methodology applied within the research. The section then provides details on the particular research methodologies applied. It will also consider alternative research approaches which could have been utilised within the research.

The research approach followed within this thesis follows an exploratory, qualitative approach. Given (2008) highlights the importance for the researcher to set out the nature of their academic inquiry. Therefore, this section will set out the decisions taken in the design of this research inquiry, and how this aligns with the research questions.

The research methodology chosen is exploratory, since it does not seek to test a specific and tightly defined hypothesis (Given, 2008). Instead, in this kind of inquiry the researcher holds a set of generalised understandings or ideas about a given situation and through the research seeks to explore these (Given, 2008). In contrast, deductive research typically sets out highly specific predictions, or a hypothesis about a given research question (Veltri, Lim and Miller, 2014). In the latter, there tends to be a need to measure a number of variables in a bid to understand the relationship between two factors, this typically requires these variables to be highly controlled to understand the extent of an effect or relationship between two factors.

In contrast, exploratory research does not set out to undercover specific relationships but instead seeks to set out a nuanced understanding of a specific topic. Qualitative research

approaches tend to be well suited to this approach, partially because they allow a researcher to be relatively flexible during an investigation based on the developing knowledge and experiences throughout a research project (Taylor et al., 2015). Therefore exploratory research typically adopts qualitative research methods such as interviews and focus groups, though not exclusively (Given, 2008).

In this thesis, the objective was to explore how the behaviours of various actors within the planning arena affect the implementation of pro-environmental policies and practices across a set of case studies. To do so, the objective was to understand how these factors are attached to particular decisions and behaviours which actors undertake (Erickson, 1986). This required the use of methods which were well suited to explore the meanings, experiences and perspectives attached to the doings and sayings of participants.

By using a qualitative research methodology there is the ability to develop ‘thick’, in-depth descriptions of these behaviours, and how to explore how the particular social, cultural and economic context in which they take place shapes these decisions and behaviours (Tierney and Clemens, 2011; Van Bavel and Dessart, 2018). By examining how behaviours and decisions change across different cultures, geographies and socio-economic circumstances there is the ability to compare and develop an understanding of the impacts of such factors (Corbin and Strauss, 1990).

The research approach is also exploratory in the sense that it sought to apply a relatively nascent theoretical approach within planning research, the use of a behavioural approach. As a result, the research relies upon a set of qualitative research methods following an exploratory research approach. The specific methods utilised are set out in greater detail in the following section.

4.5.1 Interviews

Interviews were used as the primary source of data collection in all three of the published papers that comprise the core of this thesis since they provide a means to identify the cultural, symbolic, emotional and ideological factors which participants explicitly or implicitly identify as drivers of their behaviour (Simon, 1958; Shove et al., 2012). Therefore they provide a useful means to understand the influence of behaviour within the planning system providing an opportunity for an in-depth exploration of the motivations behind a particular decision or action (Curry, Nembhard and Bradley, 2009). They are particularly well suited to the needs of this research since they provide a means for the researcher to actively engage with the perspectives and experiences of participants (Groenewald, 2004; Tierney and Clemens, 2011).

There are several interview styles, though this thesis uses semi-structured interviews since they enable customized replication, ensuring that two key requirements of qualitative research are met, consistency and flexibility (King et al., 2018). This means that the ordering, emphasis and detail of an interview schedule are not dictated by the researcher ahead of the interview, they instead respond adaptively in line with the responses of different interview participants (Patton, 2015). This reflects the person-centred nature of an interview, which accepts the diversity and complexity in the experiences of interviewees, which a strict interview protocol will rarely be able to reflect ahead of an interview (Barbour, 2003). For example, the experiences and perceptions of an interviewee might not align with a given question, alternatively, there can be considerable value in asking follow-up questions where it may be necessary to clarify a point made by an interviewee (Flick, von Kardoff and Steinke, 2004; Silverman, 2015). During the interviews, notes were also taken, which highlighted sections of the interviews which were particularly notable, alongside the collection of non-verbal data (i.e. tone, body language), which can be combined with the textual data (Poland and Pedersen, 1998; Barbour and Schostak, 2005).

The interviews in this thesis reflect a behavioural approach, by focusing on why particular actions were or were not taken by individuals in a given scenario, encompassing the wide range of factors which influenced decision-making. This might include examining the impact of the local and national political and financial context. The importance of the social context in guiding behaviour means the interviews also sought to capture the impact of external and internal stakeholders, including the influence of senior colleagues on decision-making. There is also a need to consider the impact of internal institutional, organisational, and 'cultural' factors as well as the incentives and disincentives in place which might serve to enable or constrain particular courses of action. Other key topics include how values, skills, and experiences affected their decision-making. In summary, the choice to use semi-structured interviews provides an effective means to build an understanding of the motives and intentions behind an individual's actions (Hopf, 2004). In doing so, this provides data which can be analysed to support the understanding of the outcomes of these actions.

4.5.2 Sampling

The research in the papers presented in this thesis used purposeful sampling, as is common in qualitative research approaches (Farthing, 2015). Instead of using probabilistic techniques which can be inappropriate due to the inability to identify all potential participants this approach requires that researchers select 'typical', 'interesting' or 'representative' cases which encompass a wide range of factors which the researcher is examining (Marshall, 1996). The goal of a sampling approach is to ensure that the research could credibly draw comparisons, descriptions and explanations based on the chosen sample (Barbour, 2001; Barbour; 2013).

The diversity of contexts that planning operates within needed to be captured, to do so a range of socio-economic statistics and geo-demographic typologies (e.g. Local Authority Family Type (Lord et al., 2020)) and policy literature was used to guide the sampling approach. Similar data was used to target sampling to focus upon particular specific geographical areas, for example, electoral wards or administrative areas. Limiting data collection in this way ensures

that the localised geographical and physical influences upon human behaviour were captured, meaning the influence of such factors could be considered when analysing decision-making.

4.5.3: Analysis

Semi-structured interviews produce qualitative data in the form of audio recordings, which were then digitally transcribed verbatim. The textual data was then analysed through a process of 'coding', undertaken with the aid of a software package (NVIVO). This required the development of a coding scheme, informed by the theoretical framework applied in the research i.e. behavioural theories and concepts (Coffey et al., 1997). A code can be defined as "a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (Saldaña, 2021: 3). They help to develop and form a link between textual data and the explanation of meaning within the research write-up.

The analysis requires multiple coding cycles, with an initial coding structure developed which typically relates to broad categories and factors under investigation (Saldaña, 2021). The later processes are where the initial codes are further analysed, and embodied with further meaning, providing a systematic means to group and link various pieces of data enabling greater meaning and explanation to be drawn, in comparison to the individual codes (Grbich, 2012). Within the coding process, the theoretical framework provided by a behavioural theory is integrated within the analysis, with the raw data analysed in line with the concepts, themes and factors related to various behavioural theories. This embodies the raw data with greater meaning, providing a suitable means to explain the patterns and relationships observed within the data (Saldaña, 2021).

4.6: Which other research approaches were considered?

It is important at the outset of a research project to approach the inquiry with an open and well-informed consideration of a variety of research methodologies available to answer the research questions (Farthing, 2017). Therefore, a range of methodologies were considered

within the research design phase of this thesis. This included a consideration of a variety of qualitative, quantitative and mixed methods approaches.

Behavioural research tends to be dominated by quantitative research (Van Bavel and Dessert, 2018), which is particularly effective when testing, or validating hypotheses. The ‘gold standard’ of a quantitative approach is typically represented by randomized controlled trials (RCTs), in which a given ‘treatment’ is applied to one of two groups, with participants randomly assigned to either group (Olofsgård, 2014). However, the implementation of such an experiment within the context of urban planning research is challenging (Athey and Imbens, 2017), not least within the relatively short-time scale and limited financial resources available to this PhD project.

A further reason for not pursuing such an approach was due to the challenges of fair comparison between the control and treatment groups. Designing an experiment within urban planning, whilst avoiding confounding variables affecting the outcome is challenging (Athey & Imbens, 2017). Secondly, where an experiment affects the socio-economic outcomes of different groups there are ethical issues in the use of such a setting to evaluate policy (Goldstein et al., 2018).

The use of alternative quantitative methods, such as experimental techniques examining the behaviour and decision-making of participants was also considered. This could have potentially complemented the data collected via qualitative methodologies, something particularly well-placed to support the work in this thesis relating to game theory. However, the challenges of implementing this kind of research design once the COVID-19 pandemic occurred meant that the further development and implementation of this research design were rejected in favour of the use of remote data collection such as telephone interviews.

However, other quantitative approaches remained feasible in the conditions of the COVID-19 pandemic. These include secondary data analysis or statistical modelling, given their utility in

understanding the behaviour of various actors within urban planning (Rain-Kwon and Silva, 2020).

That said, the key strength of a quantitative approach is in determining the presence and strength of the relationship between an intervention and observation (Van Bavel and Dessart, 2018). The research questions in this thesis were instead better addressed through an exploratory approach. This sought to explore the relationship between human behaviour and planning outcomes concerning pro-environmental policies and practices. In particular, it was important for the research methods to capture the meanings and motivations behind particular decisions or behaviours. This is something that is challenging for a quantitative approach to capture in the necessary detail and nuance (Farthing, 2017; Tierney and Clemens, 2011). As a result of thesis factors, it was deemed that the relative strengths of a qualitative approach meant that a decision was taken to follow this kind of approach.

The following sections will now explore the methodology underlying the three individual published research papers which make up the original empirical research within this thesis. In each case, the rationale for exploring a particular empirical issue is set out alongside an explanation of the utility of applying a particular behavioural theory in doing so. This will then set out how the thesis seeks to illustrate the versatility of this approach, by illustrating how it can effectively be employed to describe, explain and set out recommendations for policy and practice change.

4.7: Chapter 5 - How do cognitive bias and heuristics affect land value capture policy and practice: “Considering the role of negotiated developer contributions in financing ecological mitigation and protection programs in England: A cultural perspective”

4.7.1: Why examine negotiation in the land value capture system?

Levering investment from the private sector to invest in a range of public goods (e.g. affordable housing, education, health and environmental improvements) has long been an important

aspect of planning practice worldwide (Cullingworth and Nadin, 2015). In many localities land value capture tools are used to capture a variable proportion of development value, through a range of different methods (Gielen and van der Krabben, 2019). In 2018/19 the English land value capture system collected £7 billion in total (Lord et al., 2020), yet only 2% was used to fund ecological mitigation and protection programs, indicating significant scope to use funds for such purposes.

Planning policy frameworks provide information to the applicant regarding what is deemed acceptable forms of development, forming the 'opening terms' of a negotiation (Healy, 1996). The value and content of any contribution via land value capture are subject to negotiation, meaning that behavioural factors alongside policy determine land value capture outcomes (Dunning et al., 2019).

4.7.2: How does a behavioural approach support the exploration of this question?

Individual variations in behaviour within negotiations can have a significant impact on the outcomes of any given negotiation (Campbell and Henneberry, 2005; Lord et al., 2019), a behavioural approach enables the research to capture a wide range of factors which might affect negotiation and policy-making. Drawing upon concepts from new behavioural economics provides a means to capture the impact of social, personal, cognitive and ‘contextual’ factors. This provides an in-depth description and explanation of the opportunities and challenges of utilising the land value capture to increase funding for environmental mitigation and protection programs.

4.7.3: Research aims

i) Identify how the decisions and behaviours of planning supported, or prevent investment in environmental goods via the land value capture system,

ii) Illustrate the value of New Behavioural Economics in explaining how these factors collectively affect the ability to modify land value capture practice and policy change.

iii) Produce a series of policy and practice recommendations to support greater investment in environmental goods via the land value capture system

4.8: Chapter 6 - The integration of climate change objectives via planning frameworks: "Playing games around climate change–new ways of working to develop climate change resilience"

4.8.1 Why examine the role of planning frameworks in implementing climate change objectives?

Planning frameworks are a core tool in urban planning, providing information regarding the acceptability of certain types of development and providing a future vision for a given spatial location (Klosterman, 1985). They are also vital to fostering cooperation between multiple local authorities and private sector stakeholders. However, their effectiveness can be impacted by a range of contextual factors, therefore institutional arrangements interact with these factors to produce particular outcomes. The integration of measures to meet climate adaption and mitigation objectives has significant long-term benefits, however, there remain challenging trade-offs with other policy goals in the short to medium term, presenting dilemmas for planning practitioners and policy-makers (zu Ermgassen et al., 2022).

4.8.2 Relevance of behavioural insights to this question?

Influencing developer behaviour to address climate adaption and mitigation goals requires collective action amongst the public sector (i.e. multiple local planning authorities) and private stakeholders (i.e. developers). Planning frameworks are a means to coordinate, integrate and align this action to support the delivery of climate adaptation and mitigation goals within the context of competing priorities (Dhar and Khirfan, 2017; Heidrich et al., 2016). To understand this process, a series of 'toy-games' are drawn from the toolkit of behaviour game theory to illustrate the potential for conflict between stakeholders as well as an exploration of how they

may instead build trust, and foster cooperation. This chapter illustrates how the analytical approach of behavioural game theory can be applied to issues of strategic interaction in planning.

4.8.3 Research Objectives

i) Identify how the behaviours and decision-making of planners support, or undermine the integration of climate mitigation and adaptation objectives within urban planning.

ii) Illustrate the value of Behavioural Game Theory in explaining the challenges in doing so, as well as the means to overcome these challenges.

iii) Produce a series of policy and practice recommendations to support the delivery of climate adaptation and mitigation within urban planning.

4.9: Chapter 7 - Exploring modal shift toward cycling: ”Cycling in an ‘ordinary city’: a practice theory approach to supporting a modal shift.”

4.9.1: Why examine behaviour change?

Behavioural change is an important goal within urban planning, and planners influence the behaviour of individuals across a range of contexts, including transport, the focus of this question (Stieninger-Hurtado, 2018; Koszowski et al., 2019). Cycling is an interesting case study to explore since there is a wide range of factors affecting a decision to cycle, alongside a variety of public and individual benefits of a modal shift towards cycling. These include the personal attributes of the individual (i.e. skills and fitness), physical factors (i.e. presence of appropriate infrastructure) and cultural factors (i.e. the associations attached to transportation modes), with each affecting transportation decision-making (Handy et al., 2014; Pucher and Buehler, 2016). Importantly, planners have an impact on physical factors and therefore can have a significant influence on an individual's propensity to cycle.

4.9.2: The relevance of behavioural insights to this question?

Other questions within this thesis largely examine behaviour in the context of negotiations and implementation of particular policies and plans. This chapter illustrates how planning decisions and strategies can impact the behaviour of individual citizens. The variety of factors, in particular the physical environment (i.e. presence of infrastructure), influences a decision to cycle, meaning the analytical approach must include a behavioural theory which encompasses these factors (Handy et al., 2014).

There are many behavioural change approaches, including those drawing from behavioural economics (e.g. nudge), although such approaches tend to emphasise the individual over the environment in which activities take place. In contrast, this research question applies Social Practice Theory, which provides a means to explore how an individual's abilities and skills interact with cultural associations and physical factors to enable or constrain certain behaviours over others (Shove et al., 2012; Spotswood et al., 2015).

4.9.3: Research objectives

i) Identify the behavioural factors which support, or prevent an individual's decisions for modal shift toward cycling.

ii) Illustrate the value of Social Practice Theory in explaining how these integrate to affect an individual's propensity to cycle.

iii) Produce a series of policy recommendations for planners to adopt to increase the modal share of cycling.

4.10: Summary

This chapter set out the research methodology employed across the thesis, firstly by setting out the context of planning and behavioural research, this enabled an illustration of how this thesis expands and contributes to the wider corpus of planning and behavioural research. The research aims were set out within Section 4.2, which emphasises the illustration of the

versatility and adaptability of a behavioural insights approach. This thesis uses this approach to illustrate the opportunities and challenges of utilising planning policies and practices to address a suite of environmental threats presented in Chapter 1.

Following this, the detailed research methods were described, explaining the decision to use semi-structured interviews as well as describing the overall sampling and analysis processes. The final section of this chapter set out the three case studies in detail, explaining the decision to examine a particular empirical issue through a behavioural approach. The following three chapters are made up of three published articles, followed by a discussion and a concluding chapter.

Chapter 5: Considering the role of negotiated developer contributions in financing ecological mitigation and protection programs in England: a cultural perspective

5.1: Introduction:

Land value capture (henceforth LVC) is an increasingly utilised mechanism to finance a variety of infrastructure and public goods across the world (Muñoz Gielen and van der Krabben, 2019). To date, LVC practice and research has largely focused upon financing 'grey' infrastructures such as education, health, transport facilities and subsided housing. In some localities, the funds secured through LVC represent a significant source of public funding e.g. £7bn in England in 2018/19 (Lord et al., 2020), meaning there may be significant potential for LVC in addressing the biodiversity crisis.

The protection and restoration of natural habitats as well as the integration of nature-based solutions within urbanised areas are both critical in addressing this crisis (Aronson et al., 2017). Nevertheless, these programs often suffer from underfunding (Kabisch et al., 2016), even in light of increasingly stark warnings over the impacts of biodiversity loss upon ecosystem service provisioning (Díaz et al., 2020; Mace et al., 2012). For example, in the UK recent estimates suggest that an investment of £2.2bn is required annually to meet current environmental land management priorities, with a current shortfall of £1.86bn (Rayment, 2017).

While the ecological outcomes of such investments vary widely (Gibbon et al., 2018), assessing the ecological impact of such investments is beyond the scope of this paper, instead given the underfunding of ecological mitigation and protection programs, there is a need to diversify financing sources. Therefore, the focus of this paper is to explore why English local authorities utilised land value capture mechanisms to negotiate funding for other forms of public goods at the expense of the investment in ecological mitigation and protection

programs? In doing so, the paper also identifies nascent practice which currently supports investment in such programs.

In common with many developed nations, England's local authorities have experienced significant financial pressures in response to the Global Financial Crisis, leading to significant cuts to non-statutory services including planning, ecology and green space management (Theodore, 2020; Hastings et al., 2015). Although Local Planning Authorities (henceforth LPAs) continue to have a duty to protect and enhance biodiversity through planning, the national planning policy framework, most recently updated in 2021 continues to place a greater weight upon delivering housing and economic growth (Longlands, 2013; MHCLG, 2021). In response, LPAs have tightly focused upon the latter priorities, leaving limited scope to embed environmental considerations within planning, or to upskill staff on ecological issues (Whitten, 2019). These changes have also driven policy and practice innovation (Hastings et al., 2015), since LPAs have been forced to consider alternative approaches for funding plans ecological mitigation and green space management programs, although the potential role for LVC in supporting such programs has not been fully explored.

The paper will first set out the broad principles of LVC, and review recent research into the operation of LVC including a consideration of the behavioural aspects of this practice. Then, empirical evidence from a previously published study of the value of funds secured by English LPAs is presented (Lord et al., 2020). New empirical evidence is then outlined, drawing from a series of interviews with key stakeholders from a representative sample of English LPAs. The paper then explores how cultural and behavioural factors interact to support or prevent the use of LVC mechanisms for ecological mitigation, illustrating the impact of behavioural variations on planning and development outcomes.

1.1: Land Value Capture and it's role in financing ecological mitigation and protection programs:

Land value capture (LVC) seeks to capture a variable proportion of development value, which is defined as the difference between the maximum market value (i.e. the maximum sale of a completed development minus all costs of the development) and its existing use value (Cullingworth, 1980). The term LVC covers a variety of practices across different nations, with a unifying principle being that in-kind and cash payments are extracted through development and planning processes which can be used by local governments to fund the provision of public goods such as affordable housing and transport infrastructure. An important distinction between these practices is whether payments are negotiated between a developer and public authority or mandated as a requirement for gaining the necessary permissions for development through land-use plans or other development policies (Alterman, 2007).

In England there is currently a hybrid system of flat-rate fees (via the Community Infrastructure Levy) and negotiated processes (Section 106 agreements), forming what are commonly known as developer contributions (henceforth DCs) (Crook, 2016). This paper focuses upon the use of Section 106 payments, since the Community Infrastructure Levy is less commonly used for ecological mitigation programs as regulations do not permit the hypothecation of funds for specific projects, unlike Section 106 agreements (Baker, Papadopoulou and Sheate, 2018).

Their use to finance environmental mitigation purposes in England emerged alongside their use for other means in the 1980s (Whatmore and Boucher (1993), and this practice was directly endorsed by the Department for Environment (1991) via Circular 16/91, which defined reasonable use of payments "intended to offset the loss of or impact on any amenity on the site prior to development, for example in the interests of nature conservation". Despite this, the practice was relatively rare, largely implemented to address direct encroachment upon internationally recognised habitats (Cowell, 1997; Whatmore and Boucher (1993)).

However, concerns over this practice quickly emerged, with fears that it would accelerate the loss of irreplaceable habitats in the face of strong developer power (Cowell, 1997; Curry, 1993), and that this risked damaging the reputation of environmental groups through

perceptions of ‘being bought’ (Whatmore and Boucher, 1993). Despite this, Whatmore and Boucher (1993: 48) concluded that "as a potential means of allowing the private sector to acquire at least partial responsibility for environmental protection, environmental planning gain can be expected to remain on the political agenda".

Their limited use continued with Baker et al., (2014) estimating that as few as 1 in 1000 planning applications requiring compensation for ecological impacts of development. Following a DEFRA review, a two-year pilot program was developed to understand whether a nationwide biodiversity offsetting program was feasible, which ran from April 2012 (DEFRA, 2011). There was a series of difficulties in its operation including a lack of ecological expertise within LPAs, an immature offsetting market and the challenges of integrating the tool into existing planning process in a two-year timescale, although stakeholders believed the tool was successful in accounting for the impacts of development on habitats. Despite this potential, there were major concerns within the Government that the costs imposed by offsetting would slow housing delivery, a key political priority (Corbera, 2021; Baker et al., 2014).

Despite this, and to the surprise of many observers (Corbera et al., 2021) the policy was revived with a requirement for all major development to result in a 10% net increase in biodiversity units, calculated through habitat type, size and quality (see DEFRA, 2021 for details). Forthcoming legislation (DEFRA, 2021) will mandate its use, though a number of LPAs have already implemented biodiversity offsetting policies, as part of their non-statutory local planning frameworks (Corbera et al., 2021). However, as raised by Baker, Papadopoulou and Sheate (2018), given the limited value which can be extracted through LVC, this approach introduces trade-offs between biodiversity offsetting funds, and other priorities traditionally delivered through DCs, a theme which this paper focuses upon.

In parallel to these changes, many LPAs have increasingly established separate requirements for green infrastructure and ecological mitigation within their planning frameworks (Naumann et al., 2011; Mell, 2018). This provides greater opportunities to request DCs for these purposes, perhaps reflecting a localised planning culture that places significant value upon

such assets. A trio of examples in Greater London is presented by Wilkinson (2019), where significant sums were secured for a range of ecological improvements, though they found that funding remained 'crowded out' by other priorities such as affordable housing and school provision.

While these solutions are often presented as a ‘win-win’ solution, resolving conflicts between development and the environment, Apostolopoulou and Adams (2015) question the validity of using market-based instruments in resolving the biodiversity crisis, while Apostolopoulou (2020) presents an account highlighting the depoliticising nature of biodiversity offsetting, which fails to address the loss of localised environment amenity for local communities where development takes place. While these issues, and others, are an important part of lively, and ongoing debate surrounding biodiversity offsetting, this paper will instead explore the factors which lead English LPAs to prioritise negotiating funding for other forms of public goods, at the expense of funding ecological programs

1.2: The determinants of the public goods secured through negotiated developer contributions:

In common with other developed nations e.g. Turkey and the Netherlands (Turk, 2018; Muñoz Gielan and Lenferink, 2018), there has been an expansion in the scope and scale of DCs within England since their introduction (Lord et al., 2020). This has been linked to increasing house prices and development activity, particularly in London and the South East, contributing towards regional disparities in securing developer contributions (Crook et al., 2016). These disparities led to considerable debate over the key determinates of DC outcomes, with some scholars emphasising the influence of development demand and underlying land values, leaving some LPAs being in a stronger bargaining position than those where development viability is more challenging (e.g. Ellis, 2018; Ferm and Raco, 2020).

However, other work highlights the potential to moderate the influence of the economic context. For example, Dunning et al., (2019) illustrated that a suite of socio-economic indicators over five separate periods in the 2000s – 2010s failed to provide a satisfactory

explanation for differences in the value of DCs, leading to a suggestion that variations in behaviour and planning culture impact an LPA's ability to secure obligations.

1.3: 'Behavioural insights':

The insights provided by behavioural economics and psychology can help explore the role of variations in behaviour and heuristic norms. These insights are based upon the premise of bounded rationality, which states that limits to cognitive function, resources and time mean that decision-making is not always informed by a rational, utility maximisation calculation. Instead, to simplify decision-making individuals often rely upon heuristics (mental shortcuts) and are affected by cognitive biases meaning that behaviour is not always rational (Simon, 1945; Kahneman, 2011). There have been a huge number of biases and heuristics identified (see McRaney, 2014 for an overview), along with a body of work within planning research exploring the role of such factors in determining variations in planning and development outcomes (e.g. Ferrari et al., 2011; Adams and Watkins, 2014; Kwon and Silva, 2020). This paper will focus upon the role of three factors, made up of two cognitive biases; framing and the status quo bias alongside the influence of local planning cultures.

The status quo bias refers to the preference for stability in decision-making, meaning that habits, routines and default options often determine behaviour (Samuelson and Zeckhauser, 1998). This can contribute towards stability in planning and development practices since stakeholders tend to favour existing standards of practice (e.g. van der Heijden, 2015; Hu and Shealy, 2020). Framing refers to the context that information and choices are presented, which can alter preferences and behaviour (Wilkinson, 2008). Within planning the means by which information is presented can help to establish the key arguments for specific strategies, plans and decisions, helping to persuade stakeholders to take a particular action (Rein and Schön, 1993) as well as supporting the development of collective "meanings and sense-making" (Ernste, 2012: 97). This indicates that the framing of information can be used to enact changes in DCs policy and practice, as well as in providing a tactical advantage in DC negotiations.

Constraints upon time, resources and cognitive ability mean that LPA officers often rely upon heuristics, norms, values and experiential knowledge to overcome bounded rationality when decision-making (Claydon, 1998; Ferrari et al., 2010). In DC negotiations this results in the development of strategies to employ e.g. LPA officers developing their tactics in response to avoid the developers "viability charade" reducing the value of funds secured (Lord et al., 2019; 247). In Turkish LVC practice, Turk (2018) identifies the need for parties to build trust in contribution negotiations to avoid delays, while Ruming (2009) suggests that localised informal norms are an important part of Australian DC practice. Campbell and Henneberry (2005) and Raynor, Palm and Warren-Myers (2021) both emphasise the importance of individual behavioural variations in bargaining and negotiating for development contributions in English and Australian practice.

1.4: The influence of planning culture:

In addition to the cogitative biases discussed, another important explanatory factor in determining DC outcomes is the local planning culture. This can be defined as the context-specific variations in planning practice, where shared meanings are iteratively developed between stakeholders within planning and development processes, creating a shared planning culture (Knieling and Othengrafen, 2015). This establishes certain ways of working which over time become embedded in planner's behaviour (Sanyal, 2005).

One aspect of a local planning culture is "an authority's openness to development" (Dunning et al., 2019: 466), which can strongly impact DC outcomes, since this can deter or attract real estate investment, impacting the opportunity to secure public goods. Within the Netherlands, cultural conditions have also been identified as important in determining DC outcomes (Samsura et al., 2010), for example Root et al., (2016) found the values of political leadership, specifically their limited immediate concern regarding the impacts of climate change, undermined the potential of LVC to fund climate adaptation programs.

Whilst planning culture is often employed to compare practice across nations, there remains a lack of consideration of how it might affect variations in planning outcomes at a sub-national scale (Purkarthofer, Humer and Mattila, 2021). The discretionary nature of the English planning system provides an opportunity for LPAs to resist or embrace certain policy instruments (Clayton, 1998; Booth, 2007), such decisions can be interpreted as a reflection of a local planning culture. An example with direct relevance for this study is the voluntary adoption of biodiversity net gain policies, which may reflect a local planning culture that places a greater emphasis upon environmental conservation.

In summary, there are several explanatory factors for DC outcomes, the negotiated nature of DCs in many nations, including England, means that individual variations in behaviour can reinforce or moderate the influence of the economic context. This means that several behavioural factors have been identified as explanatory factors in observed DCs outcomes, particularly as decision-making is often affected by resource constraints and time pressures. The established ways of working and local policy frameworks within the authority, are a reflection of the planning culture, which also contributes towards variation in DC outcomes. It is evident that whilst there has been consideration of the role, and impacts of policy instruments such as biodiversity net gain legislation in addressing the biodiversity crisis, there remains a gap in the understanding of the potential role, and impact of utilising DCs to fund ecological mitigation and protection programs. In what follows we consider previously published quantitative evidence of the allocation of DCs, before presenting new qualitative analysis exploring this issue.

5.2: Previous evidence of the value of DCs secured within England:

Recently published data (Lord et al., 2020) provides a quantitative insight into LVC practice within England. Table 5.1 summarises the financial value of different categories of developer contributions with Open Space and Environment being the greatest source of payments for meeting ecological objectives (Rowley and Crook, 2016). Payments within the Open Space and Environment category totalled £157m in 2018/19, a very minor proportion (2.2%) of the

total £7bn that was secured in this period. Since a peak of £234m in 2007/08, there has been a reduction in Open Space and Environment obligations, with the quantum secured remaining broadly stable between 2011/12 – 2016/17, followed by a £48m increase occurring between 2016/17 and 2018/19.

However, across the full-time period (2005/06 to 2018/19) sums secured for Affordable Housing and Education have increased by 134% and 185% respectively, while Open Space and Environment reduced by 27% in the same period. Land contributions have plummeted by 81%, though used for a range of purposes, they can be an important source of land for environmental mitigation purposes (Whatmore and Boucher, 1993).

Table 5.1 – Value of agreed developer contributions between 2005/06 and 2018/19 (£ millions). Source: Lord et al., 2020.

Contribution Type	2005/06	2007/08	2011/12	2016/17	2018/19
CIL	NA	NA	NA	771	830
Mayoral CIL	NA	NA	NA	174	200
Affordable Housing	2,000	2,614	2,300	4,047	4,675
Open Space and Environment	**215**	**234**	**113**	**115**	**157**
Transport and Travel	361	462	420	131	294
Community Works and Leisure	75	192	159	146	62
Education	154	270	203	241	439
Land Contributions	**960**	**900**	**300**	**330**	**135**
Other Obligations	149	183	30	50	187
England Total	3,927	4,874	3,700	6,007	6,979

Therefore it appears that the role of LVC in funding ecological mitigation programs has been relatively marginal when compared to other priorities. This is in marked contrast to increasing concerns of biodiversity loss and other environmental pressures, and also diverges with domestic policy rhetoric surrounding the importance of environmental stewardship set out in the recent Environmental Bill (HM Treasury, 2021; DEFRA, 2020). The remainder of the paper will address the reasons behind this trend.

5.3: Methods:

The research approach sought to understand the underlying factors which influence the decision-making of LPAs to prioritise funding for certain forms of public goods, often at the expense of funding ecological provision. To ensure that the research captured the influence in variations and behavioural and planning culture there were two key conditions set when developing the study design.

Firstly, the research collected qualitative data from LPA officers who were directly involved within DC negotiations, since this ensures that a variety of experiences and perceptions of their role in developing DC policy and negotiating individual DC agreements was captured, including their use for ecological mitigation and adaption programs. Therefore, a mixture of planning and ecology officers were invited to participate, each were responsible for a variety of roles: negotiating developer contributions, developing DC policy and managing funds secured through DC. Overall, 65 invitations were sent, of which 12 interviewees from 10 LPAs responded with a willingness to participate, see a summary of participants in Table 5.2.

Secondly, the research needed to address the potential influence of ‘planning cultures’ upon DC outcomes, to best capture this diversity the researcher used the Local Authority Family typology (Lord et al., 2020). The sampling approach ensured that an LPA from the five largest of the six Local Authority Family types were included, thereby including authorities with a variety of strategic priorities and pressures within the fieldwork. A secondary criteria ensured that there was an equal balance of rural and urban authorities, given the potential and requirements for ecological mitigation and protection programs are likely to differ between

rural and urban areas. Overall, this approach ensured that testimony from a diversity of LPAs was captured, thereby enabling an exploration of the role of behavioural factors as well as planning cultures.

Table 5.2: Summary of Participants.

Participant number	Region	LPA	Local Authority Family	Role
1	West Midlands	LPA 1	Urban England	Principal Town Planner (Planning Policy)
2	South West	LPA 2	Rural England	Ecology and Habitat Regulations Delivery Manager
3	South West	LPA 2	Rural England	S106 Officer
4	South West	LPA 3	Rural England	S106 Parks, Open Spaces and Recreation
5	South West	LPA 4	Commuter Belt	Community S106 Officer
6	North West	LPA 5	Urban England	Planning Policy Head
7	South East	LPA 6	Commuter Belt	Landscape & Ecology officer
8	London	LPA 7	London	S106 Officer
9	West Midlands	LPA 8	Established Urban Centres	S106 Officer
10	West Midlands	LPA 9	Rural England	Ecology Officer
11	North West	LPA 10	Rural England	Ecology Officer
12	North West	LPA 10	Rural England	Ecology Officer

The intention to capture a diversity of LPAs meant that the responsibilities of LPA officers varied between participants, for example, some officers dealt purely with negotiating and developing DC policies for ecological purposes, while other officers had a remit to negotiate obligations across all policy areas. While this is a reflection of the researcher's intention to capture a diversity of planning practice across different LPAs it did result in discussions that

varied in content, based upon the current and past experiences and responsibilities of participants.

To address this limitation, the interview followed a semi-structured approach, balancing the need for flexibility with consistency in qualitative research (King, Horrocks and Brooks, 2018). To do so, a topic guide was followed to ensure that all main themes were addressed with each of the interviewees, with the semi-structured nature providing the flexibility to further explore the testimony provided by the interviewee. The questions centred upon the relative importance of various policy areas (e.g. affordable housing, education and transports) when compared to ecological mitigation and protection programs when considering the DC policy and practice; the key challenges and limitations when requesting funds for ecological programs via DC and the influence of private developer's behaviour upon outcomes. There was also an exploration of the impact of the adoption of voluntary biodiversity net gain policies, as well as a discussion over the potential impacts and challenges of the forthcoming mandatory biodiversity net gain policies upon the DC outcomes.

All interviews were conducted remotely via online telecommunication software between March – June 2021 and all but one (due to refusal of consent to do so) were recorded, anonymised and transcribed. A coding structure was developed and applied using NVIVO software, enabling a series of themes to be established from the patterns in the data, which is presented below.

5.4: Findings:

This section begins with a consideration of the financial and policy context in which English LPAs currently operate within, with all interviewees stressing the influence of financial austerity and changing national policy frameworks upon DC practice. Yet, it was evident that the heterogeneity in planning culture meant that they took contrasting approaches when balancing competing strategic objectives, with DC practice being an important part of these strategies. The latter section reflects upon how culture interacts with behavioural variations of LPA

officers, combining to determine the potential for the use of DC to fund ecological protection and mitigation programs.

5.4.1: The impact of planning culture:

Interviewees indicated that reforms to planning policy emphasised that an LPAs role was primarily to deliver development and drive economic growth, with frequent references made to housing targets assigned by Central Government (MHCLG, 2021). It was evident that the incentives (and penalties) imposed by these requirements meant that any policy decision or change in practice was viewed through this prism. This meant that anything that could delay, or prevent the delivery of housing was met with resistance from those in leadership roles. Frequent references were also made the financial pressures that local authorities are placed under, with austerity measures meaning that the capacity and resources of local government were reduced, especially within planning and ecology departments.

LPAs responded to these pressures differently, which could be observed through their approach to developer contributions, this paper argues that these differences can be attributed to their local planning culture. Certain LPAs were characterised by their openness to new development, while others held a more pro-conservation planning culture, instead placing a greater emphasis upon the conservation and protection of environmental amenity in their authority. This factor was pivotal in shaping the potential for LPAs to use DC for ecological mitigation and protection programs.

5.4.2: Planning cultures: pro-development:

A pro-development culture was largely observed within more urbanised authorities, their stance was typified by P9: "*we have always been a very pro-development authority, so generally we do approve a huge amount of applications, it's very rare for us to turn anything down".* The pressures to secure development meant that even where the merits of securing greater financial contributions for ecological mitigation were acknowledged and valued, this possibility was highly constrained by the pressures to secure new development. Whilst the presence of this planning culture did not necessarily result in ecological impacts of development being entirely overlooked, it meant any desire to secure ecological

enhancements through developer contributions was always set against a consideration of how realistic and financially viable it was to do so, while also delivering other priorities: *"At the end of the day we are in an economy that is very driven by government privatisation of housing delivery. How can we make sure that is all viable whilst also delivering all these other things, in terms of biodiversity" P1*

It was clear this approach emerged not only due to the pressures to meet Government housing delivery targets, but also resulted from the socio-economic challenges within these authorities, and that within the current context of local government austerity, development was often perceived as one of the few means to alleviate these challenges. DCs were then viewed as vitally important in responding to increasing pressures upon local services. Such pressures often translate into objections and anxieties related to new development from existing residents (Mathews, Bramley and Hastings, 2015). Therefore, even with increasing awareness and concern over the impacts of environmental challenges amongst the general public, these risks were received as far less immediate, with limited tangible impacts of ecological degradation in comparison: *"the first thing that you tend to hear over and over, with any development, pressures on health, schools and local traffic infrastructure. That is what is immediately tangible, that is what it tends to be, I suppose they can relate to, can I get into the doctor? are there enough school places?"* P6

This lead to challenging judgements for prioritising various policy areas when negotiating DC, whilst participants resented being placed in this position, they nevertheless remained mindful of the way that such decision-making could be interpreted. The trade-offs between ecological mitigation, compared with the provision of other public goods was neatly summed up by P2: "*are you more worried about birds than people? When funding is tight for most projects anyway, it is quite often a controversial decision to spend on wildlife".*

Instead, officers suggested that due to the political salience of pressures on public services, council members were likely to formally (i.e. through planning policy development processes and planning committees) and informally lobby for DCs to alleviate these pressures as a

condition for supporting new development, thereby limiting the opportunity to secure funds for ecological measures. There was other evidence that political considerations had an impact upon the planning culture of the authority, and therefore the scope of contributions secured, as P6 explained*: "We have a Labour run authority, so meeting the needs of the more deprived people are kind of the top priority, the top aim for them […] affordable housing is for them the number 1 thing that changes their mind on development."*

In summary, development and accompanying DCs were viewed as a useful tool to tackle political and socio-economic challenges within an authority, shaping the local planning culture, resulting in a limited willingness and capacity to integrate ecological objectives within DCs practice.

5.4.3: Planning cultures: pro-conservation:

In contrast, there was a more limited acceptance of development in other participating LPAs, particular those of rural nature. While there were similar pressures to meet housing delivery targets, the central challenge in these authorities was perceived to be reconciling this with the preservation of environmental amenity within their authority. This meant the LPA was characterised by a pro-conservation planning culture, meaning the leadership of these authorities were receptive towards policies and practices which may help to resolve this tension, such as the use DCs in funding ecological mitigation programs: *"if it was very urban, people have much more of a fight to get to towards these kind of policies, but because of the way that [LPA 9] is, the biodiversity value, the species, that is why people like [LPA 9], it is why quite a lot of affluent people do move to the district, because it is quite rural and beautiful, so I think that is recognised in the council"* P10

The adoption of biodiversity net gain (BNG) policies discussed in the introductory section, was an important part of the authority's response in resolving this tension. The policy ensured that the impacts of development upon all habitats are accounted for, with mitigation payments via DCs if the net gain cannot be met on-site (see DEFRA, 2020 for details). While such measures

are currently optional, mandatory BNG policies are due to be introduced following the implementation of the Environmental Bill (DEFRA, 2020). The voluntary adoption of such measures by certain LPAs is therefore a reflection of the pro-conservation planning culture within these authorities.

Officers from LPAs who had adopted this approach were enthusiastic about its value, despite it not being a legal requirement, they believed it strengthened their bargaining position when negotiating DCs for ecological mitigation measures. This was attributed to the biodiversity metric quantifying the ecological impacts of a development proposal, ensuring there was a clear and direct link between the ecological impacts of the proposal and the content and value of the DCs requested within negotiations. This provided certainty for the developer and LPA over the ecological impacts of development, bringing them into line with more established contributions e.g. for education, helping to blunt challenges to these requests. Previously, participants admitted their approach tended to estimate the ecological impacts of a proposal, often in an ad hoc manner, which left their request open to challenge by developers. Secondly, this approach meant there was an opportunity to seek payment for impacts for all habitats, regardless of their quality or protected status. P10 described that before the adoption of these policies: *"we only had powers to work with European protected species, we now can actually get something with that, that is what biodiversity offsetting does".*

However, an over-reliance upon funds extracted through DCs for ecological programs, risks providing an LPAs with an additional incentive to permit development, may then contribute towards additional indirect impacts on ecological assets and other environmental amenities, which are unaccounted for through the metric. Conversely, a lack of development demand e.g. during an economic downturn, would reduce the value of DCs secured, thereby compromising the ongoing funding of ecological mitigation and protection programs. There was also dissent amongst some participants over the clarity provided by BNG metrics, with the guidance provided for the calculation of ecological contributions compared unfavourably to the calculation of requests for other public goods, which perhaps reflects the complexity,

and contested nature of biodiversity valuation (Tregidga, 2013). P1 felt this was an important factor in the relative underrepresentation within DCs: "*lots of different local authorities have used different ways of calculating that [the contribution], some don't even have a net gain calculator, that is a key issue with ecology and the environment. Perhaps that is something that is a bit more nebulous".*

Given that the preservation of environmental amenity was highly valued by certain LPAs, we questioned whether the ecological measures secured via DCs played a similar role to the provision of transport and social infrastructure, in fostering a greater acceptance of new development by existing residents. However, interviewees felt that they had a negligible impact at a localised scale since objections were primarily focused upon the loss of localised amenity such as open views and an ease of access to local green spaces, aligning with Apostolopoulou's (2020) case study of biodiversity offsetting and the local acceptance to new housing developments. As a result, even if development led to significant net gains in ecological terms, this was viewed as irrelevant to many objectors. Here, parallels can be drawn towards debates over greenbelt loss, where objections are often linked to the loss of local amenity, and the emotional connections to the development site in question (Mathews, Bramley and Hastings, 2015).

5.4.4: Behavioural variations:

The consequences of financial austerity upon local authority staff and expertise within planning and ecology departments often constrained an LPA's ability to integrate ecological objectives within local development and planning outcomes, which directly affected DCs practice. In particular, interviewees suggested that 'in-house' ecologists were now relatively uncommon within local authorities. Where they were retained it was an important example of the heterogeneity in LPA responses to changing local government funding regimes and can be interpreted as a sign of a local planning culture placing greater value upon conservation.

The previous section illustrated how the discretionary nature of the British planning system means that LPAs can adopt responses based upon localised challenges, however it also

provides individual officers with considerable flexibility and responsibility within decision-making. For example, the contents of DCs agreements are heavily influenced by planning policy but are ultimately determined by the site-specific context and negotiations between LPA officers and development stakeholders.

Therefore, the successful adoption and integration of ecological objectives within DCs policy and practice was a result of the dedication of individual officers in developing this agenda within their LPA. The presence of ecological expertise within LPAs with pro-conservation culture meant that they could use their skills and expertise to carefully develop this approach. They convinced the leadership of the LPA of the value of such an approach by framing the use of DCs as an effective means to reconcile the desire to enhance environmental amenities within their authority, while also meeting housing delivery targets. An important example was the adoption of biodiversity net gain policies to utilise DCs to support the financing of ecological mitigation programs. This illustrates how the successful framing of policy is used to build support amongst local authority leadership, through establishing the rationale for integrating such objectives within existing planning frameworks (Ernste, 2012).

The ecological expertise within LPAs also provided officers with greater scope to consider the ecological impacts of development and planning policy, thereby providing opportunities for formal and informal discussion of mitigation options between development stakeholders. This supported officers in securing DCs for ecological measures within negotiations, P10 described this as "*just being clued up".* In more detailed terms this was an ability to employ robust, high-quality ecological data, presented with clarity to strengthen their negotiating position. For example, they described how they illustrated the potential ecological damage impact of development as a means of persuasion: "*if there is a development there is a lot of pink for bats, it just adds to our argument, we cannot enforce, but we can use that evidence to strengthen the argument, to show this is the impact you are having".*

This is another illustration of how careful framing of information can help ensure that DCs requests for ecological mitigation stand up to scrutiny, whilst persuading developers through

the calculation and illustration of the negative consequences of development upon ecological assets. In this case, the illustration of the impact of development alongside the prospect of an additional costs (i.e. through the payment of ecological DCs) are utilised by LPA officers to encourage developers to meet ecological objectives within the development design.

In contrast, authorities that were characterised by a pro-development planning culture often lacked 'in-house' ecology expertise. This meant that unless the impacts of development were of a statutory nature (e.g. impacting upon protected species), they would unlikely to be challenged, which left limited scope to justify a request for ecological mitigation payments. Interviewee testimony also underlined the significant time and resource required to develop the appropriate policy to secure ecological mitigation payments, as well as the requirement to upskill staff to successfully implement policy and practice change. However, it was also evident that behavioural factors also limited the opportunity to negotiate ecological funding through developer contributions: *"without being rude to planning officer colleagues, there is an ease and an acceptance that those two contributions [affordable housing and recreational space] are easily defendable so they are the ones that we tend to get most of".* P9

This comment should be interpreted within the context of stringent requirements to meet housing delivery targets and decision deadlines with limited officer time and resources. In such a context, decision-making is optimised to secure development, and accompanying DCs, as efficiently as possible. This compromises the scope of public goods secured through DC negotiations since LPA officer's behaviour is affected by bounded rationality, meaning they rely upon their experiential knowledge and routinized behaviours in negotiations (Claydon, 1998; Dunning et al., 2019).

It was evident that challenging these routines was difficult not only due to time pressures, but also due to doubts over whether this would be supported by senior colleagues as P9 questioned: "*how easily you would be supported through that decision making if you were to look to reduce those contributions in favour of something else?"* This meant the expectation that particular contributions should be secured was difficult to change. Therefore, even where

convincing arguments for securing ecological contribution existed they would be unlikely to be supported if it led to delays or failed to meet existing expectations of development contributions outcomes. In this case the role of the status quo bias is evident, since where the additional complexity of negotiating for developer contributions for ecological mitigation is compared with the relative ease of negotiating contributions for the provision of more established public goods e.g. affordable housing and education there is a bias towards the status quo of the latter. This is particularly the case when the outcomes, and payoff from altering practice to support greater payments for ecological programs are relatively uncertain, given the relative novelty of this approach within the English planning system. Other researchers e.g. Hu and Shealy, (2020) and Samuelson and Zeckhauser (1998) have also previously attributed status quo bias as contributing towards a preference for stability in policy and practice in planning and development processes.

This bias therefore further compounds the financial challenges posed by changing policy and practice to secure contributions for ecological mitigation programs. This chimes with Whitten (2019) who found the scope for planners to embed ecological objectives within planning outcomes, and to upskill in this area has become more limited following financial cuts. Instead, in the absence of specific training, officers rely upon established routines, leading to a clear preference for the status quo in DCs outcomes. This helps to explain the relative stability in the value ecological mitigation secured, even in light of increasing knowledge of impacts of biodiversity loss.

5.5: Discussion:

This study sought to explore why LPAs have prioritised the negotiation of funding for certain public goods, at the expense of ecological mitigation and protection programs, which was explored through a series of interviews with a representative sample of English Local Planning Authority officers. A combination and interaction of behavioural and cultural factors were identified as important in explaining this.

The majority of participating LPAs were characterised by a pro-development culture, with officers under significant pressure to attract, and secure real estate investment. This was seen to drive local economic growth, and provide opportunities to secure developer contributions to address local socio-economic challenges through the provision of public goods such as affordable housing, education and health infrastructure. Therefore the scope for officers to develop an alternative approach to DCs, which might support the financing of ecological programs was highly constrained. With parallels to the consideration of the use of LVC for climate adaption in the Netherlands (Root et al., 2016), a change in approach to DCs failed to align to the pro-development culture, resulting in a lack of support from LPA leadership. Furthermore, any efforts to do so are compromised by resource constraints, most notably the absence of ecological expertise. This meant that deviating from routinized behaviours and heuristic norms (Claydon, 1998) when considering DCs was challenging, illustrating the influence of status quo bias in planning practice and policy inertia (van der Heijden, 2015). Such insights help to expand the arguments of Ferm and Raco (2020) who suggest there is reluctance amongst LPAs to alter negotiation practices, due to the fears that additional regulatory burdens will negatively impact local real estate investment.

Yet, the research identified that planning practice within other LPAs was influenced by a pro-conservation planning culture since preserving of environmental amenity within the authority was viewed as strategically important by authority leadership. Therefore, planning processes emphasised the need to integrate ecological objectives whilst also meeting Government mandated housing targets. This shaped an opportunity for officers to exercise their discretion to develop a strategy to use DCs to provide additional funding for ecological mitigation. In doing so, they carefully framed this approach as a cost-effective strategy to reconcile the need to deliver development with the desire to enhance and protect the amenity offered by ecological assets. This framing provided the rationale for a change in approach, thereby justifying and persuading LPA leadership to adopt changes in DC policy and practice (Ernste,

2012; Rein and Schön, 1993), thereby supporting the financing of ecological mitigation and protection programs.

Both cases indicate how heterogeneity in planning culture provides officers with a varied sense of appropriate action in DC policy development and negotiations. De Vries (2015), Gunn and Hillier (2014) and Reimer and Blotevogel (2012) each illustrate how variations in planning culture provide planning actors with differences in informal rules, and routines which influences their response to spatial challenges and behaviour in individual planning interactions. This then shapes divergence in planning and development outcomes. This paper extends these arguments, applying insights from behavioural science to illustrate how culturally informed routines can inter-relate with the impact of cognitive biases, such as framing and status quo bias, to shape the ability and potential of individual actors to exercise discretion within planning practice (Booth, 1996; Laws and Forester, 2015).

Reimer (2013) highlights the importance of experimentation in altering the routines and practices of planning action, particularly when addressing new spatial challenges. The focus of this paper, the financing of ecological mitigation programs through developer contribution in addressing the funding gap in ecological mitigation and protection programs is one such example. However, the paper illustrates how the potential for individuals to instigate and shape change in planning processes and outcomes is variably constrained, or supported by the inter-relation between planning culture and cognitive biases, thereby contributing to stability or fluidity in planning practices. This then affects the planning authority's ability to respond and address emerging crises, which has implications beyond the focus of this article, such as in the responses to the increasingly evident impacts of climatic change.

As a result of the barriers imposed by the inter-relation of cultural and behavioural factors, the research suggests that a statutory requirement to use DCs to financing measure for ecological mitigation programs (as is proposed by the Environmental Bill (DEFRA, 2020)) would be necessary to instigate widespread DCs practice and policy change to support diversification in funding sources of ecological programs. Whilst knowledge exchange activities may support

the integration of new policies and approaches between varied local planning cultures (Healey, 2011), there remains a series of implementation challenges identified through the research. For example, interview testimony emphasised the significant officer time and resources required to develop DC practices that support ecological mitigation and protection funding. Given this study echoes the suggestions that many authorities lack the necessary in-house ecological expertise (Whitten, 2019), this would appear to be a barrier to the introduction of mandatory BNG requirements. Furthermore, the findings indicate that an expanded role for developer contributions in addressing the biodiversity crisis may impact the delivery of other public goods. Without commensurate funding to deliver these services and infrastructure, there are risks that such a move would compromise the ability of local governments to address a range of socio-economic challenges, potentially exacerbating existing inequalities (UK2070 Commission, 2020).

Consequently, without the provision of additional resourcing to LPAs there are challenges over the feasibility of the implementation of nationwide initiatives to support greater investment in ecological mitigation through DCs. The political importance of boosting housing delivery to this current Government, and emphasis placed by participating LPAs in meeting the targets set by MHCLG highlights challenges of integrating, new and sometimes conflicting objectives within the planning system. In reference to DEFRA's attempt to integrate the 'ecosystem approach' within the national planning framework, Campbell and Sheate (2012) suggested the siloed nature of Government departments compromise the success of that particular initiative. There is then an implication from the evidence presented in this study that the focus of the MHCLG and DEFRA upon meeting their own siloed objectives, with limited cross-departmental collaboration (Wheatley, Maddox and Tess, 2018) may compromise the successful integration of practices to support greater investment in ecological mitigation, within current planning frameworks which emphasis the delivery of housing and economic growth through planning and development processes.

5.6: Conclusion:

The paper set to explore why, even in the face of increasing knowledge and awareness of the wide-ranging threats of biodiversity loss, the proportion of developer contributions agreed for ecological mitigation and protection continued to be marginal. The evidence presented outlines the explanatory power offered by planning culture and behavioural factors in understanding this, as well as the potential for evolution in DCs practice to support additional funding for ecological programs.

When examining the factors which underpinned the outcomes in DCs the use of an analytical lens that emphasised the role of behaviour in planning and development outcomes supported the identification of how the agency of individual officers is shaped by the combination of planning culture and behavioural biases, which then determined the scope, and nature of DC outcomes. Heterogeneity in these factors determined the willingness and ability for LPAs to alter DC practice to support the financing of ecological mitigation and protection measures. This emerged from a localised response to changing funding regimes and national planning policy frameworks. Whilst some LPA in this study embraced policy innovation, helping to resolve tensions between competing objectives, often through biodiversity net gain policies, others had a strong dependence upon development, and accompanying DCs to address socio-economic challenges. This meant the potential to re-direct these funds towards ecological purposes was limited. The combination of cultural and behavioural barriers helps to maintain this position, providing an explanation of why the proportion of developer contributions agreed for ecological mitigation programs continues to be marginal, even in light of increasing awareness of the impacts of biodiversity loss.

While the introduction of legislation mandating DC practice change through new measures and responsibilities within the Environmental Bill will help to overcome the cultural and behavioural barriers which currently limit the role of DCs in financing ecological measures, this work also highlights a series of barriers outlined in this study which may compromise the potential of this approach to diversify and increase the funds for ecological mitigation and

protection programs. The implementation challenges identified point towards a need for further research to explore how the forthcoming mandatory biodiversity net gain requirements are likely to interact with existing, long-standing, discretionary use of DCs for the provision of public goods across a range of economic contexts. Furthermore, a quantitative approach to this paper's research question e.g. exploring a relationship between land values, and a willingness to utilise DCs for ecological mitigation measures would complement this paper's findings effectively, by considering the potential for LPAs in different economic contexts to utilise DCs for such purposes.

Chapter 6: Playing games around climate change – New ways of working to develop climate change resilience

6.1: Introduction:

There is a rich literature exploring the innovative actions taken by or on behalf of governments to address climate change at every scale from the community to the international, and all points between (see, for example, amongst very many others (Kern and Bulkeley, 2009; Nolon 2009; North, Nurse and Barker, 2017)). As many of these studies have found, putting in place effective policies to plan for climate change mitigation and adaptation is complex, and analysing what works and what does not is often equally so. Taking an institutional approach to understanding climate mitigation and/or adaptation activity is an increasingly common method (Aylett 2013), for example by exploring the effects of changes to "rules-in-use" and "institutional arrangements" on "governance dilemmas" such as climate change (Patterson and Huitema, 2019: 384).

What is less common is a focus on the actions of key actors working in and for those institutions in addressing climate change – perhaps inevitably, as an institutional approach emphasises the interactions between agency and structure, a detailed exploration of what "agents" do might be seen to neglect the structural elements of governance. However, in Britain, a context of "rapid policy experimentation" in relation to urban governance (Sturzaker and Nurse, 2020: 150), where structures can come and go seemingly with the wind, a renewed focus on agency might be appropriate. Such a focus is one contribution of this paper, making use of game theory to "conceptualise the interactions that occur between planning and other market actors in the development process" (Lord and O'Brien, 2017: 218).

A second contribution is to take an unfashionably positive approach to the analysis of planners, who in recent years have often been "simultaneously criticized for being too neoliberal (by academics) and not neoliberal enough (by politicians)" (Sturzaker and Lord, 2018: 365). In this paper we identify examples of public sector planners who are challenging the primacy of the private sector development industry and playing leading roles in relation to

climate change. In contrast to a wider perceived de-professionalisation of planning activity (Clifford, 2016), we show how “planners can be agents for change and proponents of empowerment” (Vigar, 2012: 373).

This paper, then, brings to bear the field of game theory to explore the attempts of planners and related professionals to address climate change, through a series of case studies of urban governance within Great Britain. In what follows we reflect on the role of local government officers on devising and implementing policy, and the tiered “games” of influence that are played at a range of scales. Through this analysis the activities of significant “players” and the positions they take within the process of integrating development and climate change adaptation and mitigation can be better appreciated and analysed.

In the subsequent sections of this paper we first briefly summarise recent literature on policy and practice seeking to address climate change, before outlining our own analytical approach – that of game theory. We then detail our empirical methods, before presenting our results and analysis. In our conclusion we identify a clear set of findings in relation to the theory and practice of environmental planning.

6.2: Situating Climate Change policy and practice:

The growing policy attention on climate change across the UK and internationally has been a critical factor promoting engagement with issues of flooding, pollution, climatic variation and recently health and well-being, by actors in the planning and environment sectors. Reactions to climate change by policy-makers emerged in the 1960s and accelerated from the late-1980s onwards following the establishment of sustainable development as a global imperative (Hulme and Turnpenny, 2004; Gupta, 2010). A series of subsequent global protocols have been used to develop, ratify and deliver adaptive practice, for example the 1997 Kyoto Protocol. These are then followed through with further international agreements such as the Paris Accord, and transposed into (trans)national law and policy through, such tools as the EU’s European Climate Change programme and the Climate Act 2008 in the UK.

Studies of these higher level frameworks successfully demonstrate the importance of strong institutions promoting multi-level action, the influence of a robust evidence base, and a process of integrated knowledge exchange between decision-makers and market actors (van den Hove, 2000; Nieminen, Salomaa and Juhola, 2021). Researchers also acknowledge the transactional costs of creating and implementing climate-centric policy (McCann 2013). Evidence further suggests that climate change policy is most effective when it incorporates "catalysts" such as climate events or the categorisation of climate change as a wicked problem, enabling weak policy frameworks to transition into stronger ones (Meadowcroft, 2002; Clement, 2021). This has been facilitated by the growing awareness of the added-value to society of addressing climate change, the integration of evidence within policy, and subsequent delivery and monitoring (Dhar and Khirfan, 2017).

Enduring questions around the effectiveness of climate change policy include how to rationalise local needs within strategic decision-making to ensure that adaptation/mitigation measures can transcend a single policy scale, and whether it is possible to map sub-national or city-scale action onto higher level policy initiatives (Heidrich et al., 2016). The perceived distance between international/national policy and local action is an issue this paper addresses in due course.

Although institutions can act as drivers of policy change they require a level of flexibility, as well as having supportive political and economic structures, if they are to provide a continuity of information exchange between actors, decision-makers and strategic/local actions. In many instances the ongoing range of sectoral approaches lead to variation in delivery and a lack of continuity in climate policy and action (Aguiar et al., 2018). It is therefore important to understand the context of policy formation and implementation of climate change action within institutions to appreciate where blockages exist. Moreover, an understanding of scale, the complexity of environmental change, political and institutional uncertainty, and the long-term impacts of development on urban systems are needed to understand the fluidity of stakeholder agency, knowledge exchange and advocacy in practice (van den Hove, 2000).

To address the complexity of climate change policy requires an appreciation that no single policy can hold a political primacy over others. Where climate change “competes” with economic development, housing and transport infrastructure for space in the policy arena we can identify weaker targets, commitments and actions. As a consequence, it is important to consider how a nesting of policy can be utilised to aid the transference/translation of knowledge between institutions, actors and scales to promote a diffusion of knowledge within the distributive spheres of policy-making and delivery (Bulkeley et al., 2002).

It is in the interconnectedness of practice and the interaction of institutions where there may be opportunities to share best practice and formulate effective praxis at a number of scales. Where weak policy structures exist, and/or if they are employed with a lack of knowledge and institutional capacity or the use of inappropriate evidence to frame development, the focus of climate change action can be undermined due to a lack of political buy-in (Oberthür, 2009).

Addressing the disruptive nature of policy via increased agency of advocates aids the shaping of policy/practice. Where a continuity and stability of approach and collaboration between partners is visible there is a greater focus on climate change action (Oberthür, 2009). The delivery of long-term improvements in climate change policy should therefore align strategic partnerships and development objectives with an assessment of short-term (and localised) needs (Averchenkova, Fankhauser and Finnegan, 2021). Furthermore, multi-level government, aided by a strong advocacy arena, provides a level of understanding of the issues surrounding climate change allowing consideration of future-proofing options to be made (Paavola, Gouldson and Klunankova-Oravska, 2009), and helps to identify a responsible body (for example via the Climate Change Act and the Committee on Climate Change in the UK), and support policy formation at the local government scale. Thus, some have argued that there needs to be a virtuous cycle of policy formation, rationalisation, and evaluation supportive of praxis that develops via multi-partner agreements and robust evidence (Newig and Koontz, 2014). This helps to create a level of stability within government that is responsive

to shifts in the political framing of climate within policy (Rietig and Laing, 2017; Busch and Jörgens, 2005).

In the next section we present and justify our theoretical approach – that of game theory, an analytical tool as yet under-used in relation to environmental planning.

6.3: Game Theory and Environmental Planning:

Game theory originated as a branch of mathematics, used to analysis the potential strategy of economic agents, and examine the inter-dependent nature of strategies, which result in varied pay-off and outcomes (Binmore, 2007). Latterly, the insights of behavioural economics have led to the application of game theory as a behavioural theory of decision-making (e.g. Camerer and Lowenstein, 2004). Game theory can be applied in non-cooperative and co-operative scenarios. It provides an understanding of how strategy, context and information can result in varied pay-offs for different players (who typically represent individuals or organisations). By using ‘toy-games’ we can make predictions on outcomes and understand how different ‘rules of the game' can affect outcomes. In co-operative scenarios a key focus is upon the division of collective pay-off amongst a coalition (Binmore, 2007).

It began to be applied within urban planning in the late 1970s, where Batty (1977) used a co-operative game to highlight the distinction between optimality (in public-welfare terms) and stability in bargaining strength. A game-theoretical approach was advocated by Ball, Lizieri and Macgregor (1998), given the necessity for many stakeholders to co-operate within urban planning and the conflict which can emerge from this requirement. The ‘players’ within this process typically have contrasting aspirations, interests and motives, while the strategies taken by each player can be highly dependent on, and influenced by, the strategy taken by others (Samsura, ven der Krabben and van Deemen, 2010). Given that strategic interaction is a common focus for both game theory (Binmore 2007) and planning, this approach has seen increasing academic interest within planning research, yet as Lord and O’Brien (2017: 220) note it remains a “nascent” field, with significant potential for further application.

The discretionary nature of the British planning system means that negotiations, particularly at the project implementation stage, can play a central role in development outcomes (Claydon, 1998). This leads Lord (2012) to note that this is an area in which game theory is especially useful. In this space, formal and informal rules, norms, framing as well as culture can play an important role in outcomes (Claydon, 1998; Ernste, 2012; Dunning et al., 2019). Collectively such an approach can help practitioners and researchers alike understand how the 'rules of the game' are interpreted (Ennis, 1997) thereby developing our knowledge of environmental and urban management.

While engagement with game theory within planning research remains limited, it has been more widely applied in the context of environmental management, with two topics of significant attention being international climate negotiations and water management agreements. One approach is evolutionary game theory, which uses multi-agent based modelling environments e.g. NetLogo to model the dynamic and evolving process of strategic interaction (Wilensky, 2002). This approach uses decision-rules to understand the effect of changing key variables upon the result of on-going interaction such as the level rewards for defection from cooperation (Patt and Siebenhüner, 2005). For example, following this approach to examine international climate agreements Caleiro, de Sousa and de Oliveria (2019) found that a high defection reward rapidly leads to a disastrous scenario of total defection from agreement, while Santos et al., (2012) found a greater understanding of the risk of defection amongst nations increases the chance of reaching cooperation.

Another common approach, taken in this study, is the utilization of 'toy-games' to identify factors which support, or prevent co-operation in 'real-world' environmental management scenarios. For example, Ostrom (1998; 2000; 2008) developed an important body of work to identify how institutional contexts can help overcome collective-action problems. In particular, she identified the importance of social norms, reciprocity, and reputation in fostering cooperation, leading Cárdenas and Ostrom (2004: 310) to argue that "studying the context of a game is crucial because institutions affect individual's decision to cooperate". Many

strategies to manage climate risk can be framed as collective-action problems, for example the management of water resources (Hoegh-Guldberg et al., 2018). Suppalla et al. (2002) and Loaiciga and Leipnik (2000) apply the prisoner's dilemma to highlight the risk of parties 'defecting' from water use agreements to secure short-term profits over long-term sustainability, illustrating the need for credible and enforceable penalties for non-compliance (Loaiciga 2004).

Other less prominent 'toy-games' such as the Stag-Hunt and Chicken can be useful in understanding why cooperation fails to occur in such collective-action problems. For example, Lord (2012) highlights the potential of alternative 'toy-games' including the 'Stag Hunt' in understanding the necessity of building trust between parties to resolve a range of collective-actions within planning and environment management through the use of shared rulebooks. Madani (2010) uses the game of Chicken to illustrate how aggressive signalling by one party in a collapsed water sharing agreement encourages the other party to 'chicken out' and invest to restore shared water supply infrastructure. DeCanio and Fremstad (2013) use a series of 'toy-games' to illustrate how differences in the perception of risk influence a nation's decision to 'defect' within international climate negotiations.

Wang, Fang and Hipel (2011) apply co-operative game theory to examine co-operation of multiple players in the process of brownfield development, like Asami (1985) they find an 'essential player' (typically the land owner) has significant power in the distribution of pay-offs. Lord and O'Brien (2017) apply a series of principles drawn from game theory, through their illustration of planning's 'market-making' role. This includes an analysis of the mechanisms used to overcome first-mover problems and to foster coalition-building, both are of paramount importance to development. The latter issue is also of particular relevance within this paper, which examines the role of (re)introduced institutions of planning within emerging city-regions within the United Kingdom (Sturzaker and Nurse, 2020).

6.4: Methods:

The purpose of this research was to explore approaches to addressing climate change in the UK through planning at a strategic (larger than local authority/municipality) scale. We were particularly interested in statutory planning, i.e. planning policy which forms part of the "development plan", which is the document(s) against which development proposals (planning applications) are determined in the UK.

The first stage of the research consisted of a desk-based search for relevant case studies, in which the limited number of examples of statutory strategic climate planning policy in the UK quickly became apparent. This is largely due to the abolition of regional planning in England in 2010 – a decision which, when coupled with the abolition of County Structure Plans in a previous round of "reforms" in 2004, means there is no comprehensive form of strategic planning in England (Sturzaker and Nurse, 2020). One of our cases, discussed below is from Scotland, which did, at the time this research was carried out, still have formal city-regional strategic planning (this being replaced in 2019 by non-statutory regional planning) but the significantly smaller populations of Scotland, Wales and Northern Ireland means that strategic planning policy is reasonably easy to deliver at the national scale, in contrast to England.

The policy search was therefore expanded to local plans, and to emerging, rather than adopted, strategic plans. Through this search five areas were identified for narrative studies. Interviews were arranged with relevant local and strategic-scale individuals in planning or climate resilience teams, and were undertaken during summer 2019 (see Table 6.1). These interviews primarily focused on the practical challenges and key lessons in relation to developing and implementing climate policy at a resilience scale, including institutional barriers and local political contexts.

The (re)-introduction of strategic planning in England has not been straightforward, and two of the case studies (the West of England and Greater Manchester) saw their strategic plans delayed, in the first instance due to the recommendation of examiners of the Joint Spatial Plan; and the latter political contention over the Greater Manchester Spatial Framework. This does

not negate the value of studying the development of these plans or, particularly, the context surrounding them and the tactics adopted by key actors in these areas.

6.5: A brief introduction to our cases:

Our first case study is the Clyde Valley, home to *Clydeplan*, the "operating name for the Glasgow and Clyde Valley Strategic Development Planning Authority Joint Committee" (Clydeplan, 2020), the planning authority for the city-region of the Glasgow metropolitan area. The Clydeplan Strategic Development Plan, adopted in 2017, the *Clyde Valley Green Network Partnership*, and the activities of *Climate Ready Clyde*, a "cross-sector initiative funded by the Scottish Government and 12 member organisations" (Climate Ready Clyde, 2020) were all investigated by the research team.

Our second case study is the *Greater Manchester Combined Authority* (GMCA). The GMCA has been working for several years on the *Greater Manchester Spatial Framework*, a city-region wide plan which, it is hoped, will be both a "joint Development Plan Document", a plan owned by the ten constituent local authorities in Greater Manchester, and a Spatial Development Strategy on behalf of the Mayor of Greater Manchester. At the time of writing, the future of the GMSF is unclear, after Stockport Borough Council pulled out of the plan due to controversy over its plans for homes in the green belt, amongst other issues. As noted above, the processes which planners and others are implementing in Greater Manchester to address climate change are interesting in themselves, so we spoke to officers from the planning and climate resilience teams at GMCA.

Our third case study is Greater London, and the role of the *London Plan*. The *Greater London Authority* (GLA) has had statutory planning powers since its creation in 2000, making London the only city-region in England with statutory strategic planning for most of the last 20 years. There have been several iterations of the London Plan, the most recent adopted in March 2021. The long history of joint working over climate change between the GLA, its constituent local authorities and other partners was the focus of our interviews here.

Our fourth case study is the Birmingham city-region. Birmingham is at the core of the *West Midlands Combined Authority*, which as with Manchester and London has its own mayor. Unlike in those two cases, however, there has been little progress with a strategic plan. Our interviews instead focussed on the role of Birmingham City Council, the largest local authority in England by population, in leading activity in relation to climate change.

Our fifth case study is the *West of England Combined Authority* (WECA), their *West of England Joint Spatial Plan,* and Bristol City Council. WECA is the city-region encompassing Bristol, and comprises just three local authorities – Bristol, Bath & North East Somerset, and South Gloucestershire. Different in context to our other case studies, this is a smaller area in spatial and population terms. It had progressed its Joint Spatial Plan to the point of independent examination, but the plan was rejected by the UK Government's Planning Inspectorate in early 2020, and we have also explored activities led by Bristol City Council in this area, given the long history of such activity (Brownlie, 2011).

In each of these case study locations we interviewed at least one, and in most cases two, individuals who we identified as playing important roles in the development and implementation of planning policy related to climate change. The nature of the roles varied, as did the organisations they worked for. To protect the anonymity of these individuals, we have anonymised them in Table 6.1 below.

Table 6.1 – Our interviews

No.	**Area of job focus (anonymised to protect confidentiality)**	**Date**
1	Clyde Valley strategic planning	25 July 2019
2	Clyde Valley climate change	25 July 2019
3	Greater Manchester climate change	13 June 2019
4	Greater Manchester planning	28 June 2019
5	Greater London climate change	29 July 2019
6	Birmingham City climate change	5 July 2019

7	Birmingham City planning	15 July 2019
8	Bristol City climate change and planning (joint interview with two team members)	3 July 2019

Each interview was undertaken in a semi-structured format, with the broad areas of focus being upon any (particularly strategic) policies which had been adopted to address climate change; how these were developed; the range of stakeholders involved; the level of political "buy-in" for such approaches; the practical challenges faced by those involved in the development of plans and policies in the area. Interviews were recorded and transcribed, and the transcripts then analysed by coding each contribution using NVivo. These were subsequently synthesised into a series of themes which summarised the issues surrounding the implementation of climate mitigation/adaptation policy across our eight interviews.

6.6: Results and analysis:

Through a series of reforms, largely since 2010, the British planning system has increased its dependence upon market-led regeneration and development to achieve local priorities (Ferm and Tomaney, 2018). These reforms have occurred within the climate of financial austerity, with local government receiving a 49.1% cut in real terms from 2011 – 2018, leading to an overall reduction of 52% in the funding of planning departments (National Audit Office, 2019) leading a loss of vital expertise.

Throughout our discussions it was clear the reforms and funding challenges represented a fundamental constraint to planners' agency, in common with previous studies examining English climate change planning e.g. Young and Essex (2020). For climate adaptation and mitigation it means that even where additional measures have been successfully secured through a planning application, there can be an implementation gap - as described by Interviewee 1 there is "a big challenge enforcing things [i.e. compliance with the permission] and it goes back to lack of resources". These funding challenges create difficult trade-offs for

local authorities, as expressed by several participants “the actual adaptation function within local government has not been even a remotely statutory requirement”. Resources tend to be prioritised towards statutory [legally required] functions, leading to other priorities being neglected.

This situation is compounded by the perceived ambiguity of the imperatives and strategies for climate adaptation and mitigation at the national scale. This contrasts with other high-level policy-drivers such as the delivery of new homes, with centrally set housebuilding targets carrying clear consequence for failure of delivery (MHCLG, 2019). Collectively this creates a context whereby the delivery of housing and local economic growth is favoured over other concerns, including climate adaptation and mitigation. This situation therefore creates significant complexity and ambiguity in prioritising climate change objectives.

A specific example found in our work was a fear, or experience of ‘call-in’ of a policy or development decision, where Interviewee 7 describes “the very confused position around the government position […] each area is faced with the same uncertainty about how would the Planning Inspector respond and what is the interpretation of national policy?”. Participants also linked this to ambiguity in the interpretation of policy by developers and planning committees. It was seen that guidance on climate change adaptation measures e.g. green infrastructure, remained as "somewhat indicative of what we want to see rather than mandating” echoing analysis by Rydin (2013).

Despite these challenges there was evidence that changing perceptions of climate change across the private and public sectors, alongside broader shifts on the part of the public had increasingly led to a more conducive environment for climate mitigation and adaptation policy (Interview 6). The increasing public awareness of climate risks and appetite for greater levels of action by local and national governments were noted by participants in our research. In particular, participants cited Extinction Rebellion and the School Strikes movement as pivotal in this shift. Interviewee 5 remarked that “politicians at the local borough level are primed to hear solutions right now” with Interviewee 8 suggesting that political space was opening for

more radical solutions, which would previously have been deemed politically unfeasible. Participants describe a similar shift in attitudes within parts of the private sector, something that we explore later in our findings.

A contrasting view of the effects of enforced restructuring and budget cuts did also emerge from our discussions with participants, with Interviewee 6 describing how it meant that senior leadership within authorities were increasingly perceiving climate adaptation and mitigation programs as “a key linkage point, strategically and policy-wise to all those issues and health and well-being and people's quality of life is the natural environment”. There was therefore a view expressed by Interviewee 6 that such an agenda could represent a cost-effective approach, meaning it could be utilized to ‘sell’ the agenda to political leadership given it “[…] speaks to politicians in a great way but also has a link through climate change as well” who saw the agenda as not only cost-efficient but also useful to “[…] break-down silos”.

6.6.1 Dilemmas and Defection

The first section of our findings illustrated that it is a compelling moment for climate action within the UK, not least due to the impending need to adapt and mitigate to avoid catastrophic impacts (Kovats and Osborn, 2016), but also due to the interplay between factors which constrain and enable the necessary change. Local planning authorities (LPAs) are faced with significant dilemmas, with commitments and aspirations to meet environmental objectives, in the face of strong imperatives to deliver housing and economic growth.

Whilst bearing in the mind the heterogeneity of the development industry, our discussions suggested that although developers might nominally support a climate adaptation and mitigation agenda, the commitments and aspirations of LPA’s can often be at odds with those of private-sector developers. This creates an adversarial context in which discussions and formal negotiations take place. The remainder of our findings will therefore adopt a game-theoretical approach, first exploring how developers skilfully employ strategies to exploit LPA’s dilemmas, and outline the tactics employed by planners to counter this.

Our first ‘toy-game’, the Stag Hunt, uses the analogy of hunting a Stag versus a Hare to highlight the contrasts between co-operative and individualistic strategies. In our version of game the players are LPAs, a Stag represents a development outcome whereby climatic risk is minimized via greater mitigation/adaptation measures, reflected by a greater pay-off for both LPAs. The 'Hare' reflects development occurring, though with weaker environmental measures. When a single player plays ‘Hare’ the pay-offs from this investment are greater, though if both do so the investment is split, reflected in the shared pay-off. In Table 6.2 these outcomes are summarized by a pay-off table, where the four potential outcomes are represented with the respective pay-offs. The figure in the bottom left corresponds to the pay-off following the ‘game’ received by LPA 1, the top right by LPA 2.

		LPA 2	
		Hare / Defect	Stag / Co-operate
LPA 1	Hare / Defect	2 2	0 4
	Stag / Co-operate	4 0	5 5

Table 6.2 – The Stag Hunt

Co-operation and defection are important in our study as they are central to our findings. LPAs are under pressure to attract finite investment and development, meaning that not only are developers and LPAs engaged in adversarial negotiations but that different LPAs are also engaged in competition. The issue was neatly described by Interviewee 2 "I think that there is huge pressure for housing development, houses in some officers and politicians' minds equals progress and economic success [...] do we really want to refuse on this ground or are we prepared to accept something to go through. Developers are completely aware of all those

arguments”. Here, and within the other interviews, it was clear that developers were able to exploit this situation.

The first strategy employed by developers was a willingness to play LPAs off against each other. Interviewee 1 remarked that “You don’t want to see them moving to the next authority area […] It goes back to the governments to give us the power to do things and enforce things, but it needs to be standard across the borders”. This cuts to the heart of the matter, with the interviewee expressing the fear that, in the parlance of game theory, that a neighbouring authority will ‘defect’ leading to the loss of a pay-off, both in terms of environmental benefit, but also new housing and economic investment. In contrast, it may be possible for the developer to extract a greater profit from a proposal. Here, there is the risk of a vicious circle occurring whereby LPAs continually ‘defect’ in each round of the ‘Stag Hunt’, gradually eroding regulatory requirements in a bid to attract development. Interviewee 2 felt the result of this ‘game’ were already evident, “we do need houses, but we don’t want to create these awful, very poor developments.”

There was an indication from our interviewees that these issues are shaped, at least in part, by the underlying strength of the development market in the region: “In some parts of the country there may be development values much higher than in Liverpool, Manchester or Leeds, you might get slightly less pushback” (Interviewee 3). This issue has clear parallels with the wider delivery of infrastructure via planning gain, where Lord et al. (2019) described vicious (in lower value) and virtuous (in higher value) circles of investment.

A second tactic deployed by developers draws on the contrasting position of LPAs and private developers, again the contrasting effects of this strategy was dependent on the strength of the local development market and the financial resources of the local authority. Developers were willing to use their greater resources to produce evidence to avoid policy requirements, thereby reducing build costs, this might be technical evidence “technical consultants using every argument under the sun not to do something” (Interviewee 7), or the now familiar ‘viability charade’ (e.g. Crosby, 2019; Lord et al., 2019). Again we can draw from game theory

to help understand the role of such evidence, this time using the toy-game of ‘Chicken’. The formal role of this evidence is to prove development is policy-compliant or to exempt it from additional regulatory requirements. However, we conceive another, informal role of this strategy.

		Developer	
		Continue	Swerve
LPA	Continue	-3 -3	0 2
	Swerve	2 0	1 1

Table 6.3 – Chicken

As illustrated by the pay-offs within table 6.3, when playing ‘Chicken’ there is a significant incentive for both players to signal their ‘type’ (Binmore, 2007), since an indication that you are ‘tough’ shows you are unlikely to ‘swerve’. Translating this analogy to planning would mean that developers might invest significant sums on technical evidence to signal their intension to ‘continue’, thereby indicating their unwillingness to accept greater costs. An LPA’s failure to commission evidence to challenge this can be read as a signal of their weakness, and therefore a signal they may be likely to eventually ‘swerve’, thereby permitting a non-policy compliant proposal.

6.6.2: Co-operation between Local Authorities

Despite these difficulties, there remains evidence of planners successfully implementing strategies which effectively supported an LPA's response to climatic risk. There was testimony that where established, strategic authorities and policy played a key role in doing so with informal structures and relationships playing a complementary role.

We again use the 'Stag Hunt' to illustrate the importance of trust between players. As set out previously there are a variety of pay-offs for each player, which depends upon the strategy played by the opposing player. In particular, the game highlights the importance of trust, since both LPAs trusts the other sufficiently they can be confident in co-operating (playing 'Stag'), representing an outcome with development with greater climate adaptation and mitigation measures.

As highlighted by Lord (2012) an enforceable planning rulebook can offer the means to provide trust for mutual co-operation. This is especially relevant in the context of our findings whereby a strategic planning framework can set a 'level playing field' across multiple authorities. This means the strategic behaviour of developers, as outlined in the previous section, can be countered by strategic behaviour on the part of LPAs.

An example cited by Interviewee 5 was the implementation of an Urban Greening Factor (UGF), which sets out a minimum acceptable standard of Green Infrastructure that must be implemented across different types of development. The LPA's position in negotiations was therefore strengthened since the developer's ability to play neighbouring LPAs off is weakened, since all LPAs had adopted the UGF within their respective planning policy framework. In the terms of the 'Stag Hunt,' each player can be confident in playing 'Stag' since the shared framework provides the trust that the other player will also play 'Stag'.

It was also evident that trust could be further developed through informal networks. These actions were seen to be important in developing a shared understanding of the purpose of the policy in question. For example, Interviewee 5 described how "There was a lot of discussion about that [the UGF] but informally through the existing groups and the green groups […] I

think they really in a sense sort of recognise that it is helping them rather than making it more difficult for them".

These informal networks were seen as vital to sustaining action by Interviewee 8, as they explained how strong personal relationships between individuals meant that even when political control of authorities changed or when restructuring occurred there remained continuity, and trust between the authorities in question. The previous success of an authority was also seen to play an important factor in the willingness to co-operate between LPAs, with Interviewee 5 indicating that a long history of successful and widely influencing work upon resilience and environmental sustainability did translate into more effective interventions.

Interviewee 4 sets out what such an approach means "from a planning perspective they have all agreed on the headlines of principals and they can disagree on the matter of detail." The agreement's principles ensures the consistency required to maintain trust between LPAs, whilst a localised policy can continue to offer the flexibility and agency for planners, allowing the tailoring of an approach to a localised context. Given that governance arrangements within the emerging combined authorities within the UK typically require consensus agreement amongst constituent authorities (Sturzaker and Nurse, 2020) this quality is clearly of value.

Furthermore, there was an awareness across our participants that "Of course the [local authority] boundaries are irrelevant in nature, so it is a strong selling point." (Interviewee 6). One such example is overheating, since the urban heat island effect depends on the land use of the whole built-up area, which is more likely to align to a sub-regional scale of strategic planning policy.

6.6.3: Co-operation between public and private sector

Changing attitudes within some areas of the private sector (as set out earlier in the findings) was identified as an important opportunity to advance an authority's climate mitigation/adaptation strategy. Interviewee 6 illustrated this, "they [developers] want to be doing something that directly addressed the effect of climate change, sustainability and the

long-term climate resilience […] saying to their investors is we are future-proofing your investment".

The same interviewee set out an example, illustrating how planners would seek out private-sector actors whose objectives aligned with the LPAs aspirations, expressed via what is known as a *Supplementary Planning Document* oriented around the concept of natural capital. The work led to the development of a bespoke development framework via a partnership involving a range of public, private and third sector organisations. This contained 10 core sustainability criteria which could be used to assess development proposals. These criteria were then used to assess tenders for a strategically important city-centre development site owned by the local authority. The interviewee was clear that this provided the city with an opportunity to illustrate the holistic benefits of high-quality development, and provided an important place-branding opportunity for the city. They indicated that it also helped shift attitudes within the private sector and within the local authority itself, "[it] helped shift the fact that what they thought of as a local [name redacted] development project suddenly became, no this is a global opportunity. Therefore, it this whole agenda of climate change resilience urban development that is now a global agenda of interest".

In understanding how coalitions of actors might co-operate to achieve shared objectives we turn to co-operative game theory. In the aforementioned example, the authority was able to develop a mechanism to ensure that actors who were joining the coalition had no opportunity to 'defect' (and reduce their climate mitigation/adaptation measures). If private sector actors choose to 'defect' they would be left with no pay-off, and the mechanism meant that once the coalition was formed there was an enforceable contract to ensure it was stable over the duration of the development project. McCain (2010) finds that to keep a coalition stable there must be a mechanism that provides a credible threat.

What makes this situation distinct from the less encouraging accounts set out earlier is that the local authority owned the development land. In game theory terms they are an essential player since without their involvement there could be no coalition and no pay-off from

development. This then meant that the involvement of the local authority within the coalition could be conditional upon a greater pay-off for themselves, which like in the previous section was securing development with additional climate mitigation and adaptation measures.

This case illustrates the ingenuity of planners, amongst others in a local authority in developing an effective mechanism to secure a stronger position in negotiations and therefore to receive a greater pay-off, perhaps even leading to a wider cultural change within the local development market. However, in this case, and within discussions with other interviewees there was evidence that under the current planning framework such an approach was only feasible via private-public development projects or through tendering processes of development upon council-owned land. This case therefore also provides a warning that at present the formal structures of planning constrain the agency, and strategic choice of planners, placing them at a significant disadvantage in this version of the 'planning game'.

6.7: Conclusions:

This paper has illustrated the challenging position that a combination of market-led planning reforms and financial pressures have created for planners trying to introduce and implement policies to mitigate and adapt to climate change. We find a series of factors produce a constrained space for action, though we identify accounts of pro-active action by illustrating how planners and other public sector actors interact, to resolve conflict and to reach an agreement that is deliverable and acceptable for all parties. In doing so we make recommendations for planning practice and future research.

One significant contribution of this paper is its use of game theory to explore the outcomes of environmental planning activity. The 'toy games' used within this paper illustrate that the use of such seemingly abstract tools can provide new analytical insights into the activity of planners and other significant actors. There are two ways in which our approach was effective in uncovering the 'rules of the game', answering the call of Lord and O'Brien (2017). Firstly, it provides a clear account of how developers effectively exploit the dilemmas faced by local authorities in pursuit of a greater pay-off. Secondly, conflict was evident within a parallel 'game'

where local authorities compete for limited opportunities, and our use of game theory suggests how planners can be strategic in operationalising tactics to counter those used by developers.

In common with Palm and Lazoroska (2021) our work underlines the importance of building trust to foster co-operation and mutual understanding to successfully implement climate change policy objectives. This was seen by planners informally framing opportunities and policy, building personal relationships and educating actors. In this suggestion, we draw parallels to the call of Adams and Tiesdell (2010) for planners to recognise their role in framing and shaping markets, by calling on planners to shape markets to maximise the opportunity to meet climate change objectives. Second, there are formal means to build trust, such as through the adoption of shared planning rule-books. Hence, despite the on-going procedural and political challenges surrounding the development of strategic planning frameworks within England, our analysis advocates for the completion of such plans within existing City-Regions and beyond. The 'toy-games' were effective in illustrating how such frameworks can be a mechanism to provide trust, thereby providing the constituent local authorities with a strategic advantage. Not only that, but a strategic scale is likely to be more appropriate to tackle many pressing environmental challenges including flood risk, the urban heat island, and biodiversity loss. Indeed, such measures are relatively uncontroversial, when compared to the contentious issues of housing allocation and greenbelt de-designations (Sturzaker and Mell, 2016), so may provide a good prospect of agreement across political divides.

National governments are often ostensibly committed to action on climate change (e.g. the UK's commitment to reach a zero-carbon economy by 2040 [BEIS, 2019]), however such rhetorical and even legal commitments are not always translated in action. Our analysis illustrates this in relation to national planning policy in the UK, which we find conflicts with adaptation and the broader low-carbon agenda. In particular, our participants cite centrally imposed targets for housing delivery, which were seen as overriding concerns surrounding, enabling developers to operationalise an argument weakening measures based on a financialised logic of viability and deliverability. Like Ferm and Raco (2020) we find that the

context of austerity means that local authorities' pressures to deliver new housing, regeneration and economic growth are intensified. Simultaneously, it was apparent that the current planning framework weakens the position of local planning authorities, who instead pursued other means including public-private partnership and bespoke tenders to foster long-term co-operation between actors.

Another implication of our findings relates to the variable ability of authorities to extract additional value from development, either via planning gain or by ensuring that development includes the appropriate climate change mitigation/adaptation measures. Our work suggests that the ability to do so is related to underlying land values, and the strength of the development market, in line with suggestions of path dependencies in development markets (Lord et al., 2019). Following this, there is a risk of replicating and exacerbating existing regional inequalities (UK2070 Commission, 2020). There are two consequences of this. The first is that a failure to invest sufficiently in adaptation measures risks exposing areas with an existing economic weakness to increased environmental shocks and stresses. Dunning and Lord (2020) note this is likely to begin to translate into declining market values and investor confidence thereby inducing vicious circles, further compromising the ability to act upon climatic risks. Secondly, there are important implications for climate justice, since those in areas of greater deprivation tend to have a lower per capita contribution to the net greenhouse gas emissions (Büchs, 2013), yet are most likely to be impacted by increased climatic risk and are least able to adapt and cope with additional risk (Preston et al., 2014). Our findings suggest that a continued reliance upon the private sector to deliver climate adaptation and mitigation measures, without reforms to effectively share costs nationally will intensify climate injustice within the UK.

The remit of this study was limited to the approach, and perceptions of, public sector actors in the implementation of climatic change adaptation and mitigation strategies. We advocate for further research which explores how actors in the private sector approach these issues, particularly in examining the tactics employed within negotiations to achieve their objectives.

This would add to our findings 7and provide another perspective on these processes, improving our understanding of development negotiations and thus the outcomes observed.

Chapter 7: Cycling in an ‘ordinary city’: A Practice Theory approach to supporting a modal shift

7.1: Introduction:

The COVID-19 pandemic has severely disrupted the operation of public transportation networks due to social distancing measures, and there have been suggestions that fears of infection may have an impact on the individual’s modal choice (e.g. Douglas et al., 2020). If true, in the short to medium term there are plausible scenarios in which a modal shift towards private motor vehicles occurs. Such a scenario risks increasing inequalities in accessing economic and social opportunities, as well as exacerbating a suite of existing environmental and health challenges. However, encouraging and facilitating a shift towards active travel e.g. cycling, will even in the event of a shift towards private motor vehicles help to mitigate such impacts.

Globally a quarter of adults are classed as inactive (Guthold et al., 2018), and 9% of global deaths are attributed to a lack of exercise (Lee et al., 2012). There is a wealth of evidence that regular cycling delivers health benefits, both in terms of lower incidences of cardiovascular disease and cancer (Celis-Morales et al., 2017), and in terms of well-being and quality of life (Anokye et al., 2012). Many urban areas exceed legal limits for air pollution (WHO, 2015), cycling has been identified as a key means to reduce airborne pollutants within the transport sector, resulting in further health benefits (Holgate et al., 2016). The pandemic has provided a pertinent example of how these factors can influence a population’s resilience to current, and future health risks, with obesity and poor air quality both being tentatively identified as factors increasing the risk of COVID-19 hospital admissions (Lighter et al., 2020; Wu et al., 2020).

However, despite numerous strategies which acknowledge the positive effects of increased rates of active travel (e.g. DfT, 2017b in England), away from exemplar case studies cycling

rates remain stubbornly low. In England for example, and even despite a small rise over the past 15 years, cycling still only had a 2% modal share in 2018 (DfT, 2019). Similarly, whilst many of the UK's urban areas have implemented cycling strategies they have enjoyed mixed success, reflected in wide variations in cycling rates across local authorities (DfT, 2019).

Though short-term increases in cycling following COVID-19 have been observed e.g. in the UK (DfT, 2020) the longer-term modal share indicates that to capitalize upon this and to achieve local policy ambitions for cycling, there is a need to understand what factors are most important in encouraging and sustaining individuals to cycle. In this spirit, this paper examines some of these issues through a case study of Liverpool, UK. Whilst acknowledging the research which suggests that the understanding of local contexts is vital for a successful approach to cycling (Larsen, 2017b, Sheldrick et al., 2017), in contrast to exemplars (e.g. Copenhagen or Amsterdam), we argue Liverpool embodies the shortfall in cycling uptake. As such we believe this study can have relevance to urban areas in many developed nations.

To achieve this aim, we draw upon the principles of Practice Theory (Shove et al., 2012) to consider both the potential barriers and enablers to cycling. The following section introduces this theory, underlining its relevance to urban cycling, before considering the everyday barriers and enablers of urban cycling.

7.2: Practice Theory:

To address the aforementioned urban challenges there is a need to shift travel behaviour from private motor vehicles towards other modes (i.e. cycling). In popular policy discourse, the focus of this behaviour change is placed at the individual level (Shove et al., 2012). Following this, interventions seek to change the conditions in which decisions are made, in a bid to influence an individual to make the preferred choice. For example, an application of the Theory of Planned Behaviour advocates marketing campaigns to change attitudes and values, which subsequently drive behaviour (Ajzen, 1991). Approaches informed by behavioural economics

similarly place the individual at the center, creating 'choice architectures' which incentivize 'good' choices (Thaler and Sunstein, 2008). In contrast practice theory emphasizes the practice itself, instead of the individual as the ‘unit of analysis’ (Reckwitz, 2002).

Reckwitz (2002: 249) defines a practice as a ‘routinized type of behaviour’ undertaken by a carrier (e.g. a cyclist). This work builds upon that of earlier authors such as Taylor (1973: 27) who sees ‘meanings and norms implicit in […] practices not only in the minds of actors but out there in the practice themselves’. Bourdieu (1990: 52) sees practices and habitus in a recursive relationship, with the latter ‘always oriented towards practical function’. Bourdieu and Wacquant (1992) see an explanation for the regularity and predictability of social life within the habitus. While the theory of structuration sets out the study of social science as ‘neither the experience of the individual actor, or the existence of any form of social totality, but social practices ordered across space and time*’* (Giddens, 1984).

As part of the second generation of practice theorists, Reckwitz (2002) drew together this philosophical work to set out ‘ideal type’ of practice theory which defines the key distinction from alternative cultural theories - that the social is located within the practice (Everts et al., 2011). Schatzki (2001: 12) sees the theory as one that seeks to understand relationships between everyday activities and wider society, where the ‘practice [is] the source and carrier of meanings, language and normativity’. The practice is therefore seen as the site where agency, structure and materials act recursively to reproduce patterns of activity (Reid and Ellsworth-Krebs, 2019).

Reckwitz’s (2002) ‘ideal type’ of practice theory defined practice as the combination and interrelation of three separate elements: materials, competencies and meanings. A practice will then reflect the changing circulation and relationship of each element. So to understand and influence the trajectory of a practice we must understand the nature of elements which

comprise it. Researchers have done so examining a range of activities e.g. showering (Hand et al., 2005) and like this study, cycling (Watson, 2013, Larsen, 2017b).

Shove et al., (2012: 14) further define these elements. Materials are 'things, technologies, tangible physical entities and the stuff of which objects are made', in the case of cycling this includes the bicycle, roads, storage facilities. Competencies refer to understanding and practical knowledge – including 'skills', and 'technique', e.g. the ability to ride their bicycle and navigate road-traffic networks. Meanings are considered as the emotional, social and symbolic significance of the practice.

In short, practice theory is a framework which enables the study of routines of practice to provide a better understanding of the social and infrastructural conditions in which these practices can flourish (Shove and Spurling, 2013), thereby supporting behavioural change. However, whilst Keller et al. (2016) sets out its value in informing policy-makers, Shove (2014) instead is sceptical of its applicability without a reconfiguration of policy-making processes. The move away from the individual can highlight non-individual-centered interventions which can be more effective in stimulating change (Gill and Gill, 2012).

7.3: The materials of cycling:

Cycle design guidance focuses upon improving the environment (materials) in which a bicycle is operated, and, in doing so, typically identifies five factors which have the biggest influence on cycling: 'Coherent, Direct, Attractive, Safe and Comfortable' (CROW., 2016). This approach relies upon the logic drawn from a rational decision-making process, whereby a series of factors are traded off against others, which can result in choosing a different mode if they cannot be satisfied (Parkin et al., 2007).

A perception of risk is regularly cited as the primary barrier to cycling, and through a systematic review Lorenc et al., (2008) finds this perception is closely linked to the quality and quantity of

cycle infrastructure. Furthermore, Reynolds et al., (2009) review of safety literature found clearly marked cycle-specific infrastructure was consistently safer than on-road riding. Buehler and Pucher's (2012) study of cycle lane provision and cycling rates across 90 US cities estimated that a 10% increase in cycle lanes leads to a 3.1% increase in cycle commuting. Buehler (2012) analysed data in districts with contrasting cycling rates in Washington DC, estimating that an additional mile of cycle lane per 1000 population leads to an 11% increase in the chances that an employee cycled to work.

The literature also indicates that the presence (or absence) of materials beyond cycling lanes can be important in shaping cycling in a locality. In their study of Dutch, German and Danish cities where cycling strategy had been credited in sustaining high rates of cycling, Pucher and Buehler (2008) argue that while separated cycle facilities were a cornerstone of safety, alone they could not guarantee a significant increase in cycling rates. Other materials included safe and adequate cycle parking at home, work and in urban realm. Studies in European and American urban areas found such infrastructure reduced crime, and fed into notions of cycling as a safe activity and supported cycle commuting (Aldred and Jungnickel, 2013 and Buehler, 2012). Providing effective cycle parking can also tackle ‘fly-parking’ which Larsen (2017a) found creates negative connotations of cyclists, even in cities with an established ‘cycling culture’ such as Copenhagen.

7.4: The variation, circulation and interrelation of elements:

Where certain materials are lacking it can lead many to choose an alternative mode of transport, but for others it leads to an adaption of their cycling behaviour. For example, Latham and Wood (2015) describe how, in the absence of dedicated infrastructure cyclists in London 'recolonize' the road network by breaking rules e.g. by running red lights or pavement-riding. Though some cite safety as a motivating factor, others cite gaining a time advantage.

Both re-enforce an image of cyclists being a nuisance, e.g. Fincham's (2006) work in London suggest that running red lights is the cyclist behaviour which most annoys drivers. As well as undermining latent sympathy towards an unfriendly cycling environment, the negative meaning of deviance can also discourage others from taking up cycling, as found in Hull and Cambridge, two cities with historically high cycling rates (Alred, 2013).

The perceived need to invoke certain behaviours whilst cycling also requires practitioners to possess certain competencies to adapt to the car-dominated urban environment. This is a barrier to recruitment, and a perceived inability to possess, or develop these competencies is likely to be related to an individual's personal characteristics, or through concern on behalf of significant others e.g. children (Pooley et al., 2013). Studies in five UK urban areas with an varied participation in cycling found that individuals who do not cycle may perceive cycling as an activity for 'sporty' people – alienating those who are either unwilling or unable to embody this meaning (Steinbach et al., 2011; Aldred, 2013).

Building upon this, Pooley et al., (2013) argues that how cyclists are perceived alone is enough to discourage people from cycling. For example, in places with a low cycling modal share, someone who travels regularly by bicycle may be seen as 'odd'. Villamor et al., (2008) suggests materials (e.g. Lycra) worn by cyclists may play a significant role in the characterization of cycling, particularly in localities where cycling holds a small modal share, contrasting with 'typical' cyclists in places with higher modal share e.g. in the Netherlands, who wear 'everyday clothes', reflecting cycling's status as a mainstream means of transport.

De la Bruheze's (2000) historical perspective of cycling in Britain supports this analysis, speculating that a threshold was crossed, whereby the shift towards motorized transport meant that cycling struggled to maintain legitimacy as a means of transport. Whilst it is clear it was the changing materials of transport that were fundamentally facilitating this shift, Shove (2012) highlights that the marginalization of cycling meant the practice became associated

with sport and leisure in the UK – and therefore something not considered 'normal', thereby re-enforcing, and accelerating the modal shift which was underway. Shove (2012) draws comparisons with Netherlands and Denmark, where cycling rates were initially higher than the UK, and never dropped so low, meaning that cyclists were never marginalized, preserving its status as everyday transport.

Going further, Steinbach et al., (2011) argues certain individuals may associate cycling with being ‘poor’ or of a ‘low social status’, whilst other groups (e.g. middle-class professionals) may instead emphasis the utilitarian nature of cycling, which allows them to combine exercise with journeys made in the optimum time. We can began to see how different meanings are attached to a practice by different groups, perhaps contributing towards large variations in rates of cycling between different groups, e.g. in London a cyclist is disproportionally likely to be affluent, white and male (Steinbach et al., 2011). Here, Fishman et al., (2012) study of cycle-hire participation in Brisbane (which is characterised by a lower modal share) suggests that when people see those ‘like themselves’ cycling they are encouraged to try it out. These studies are important in illustrating the way that practitioners themselves can influence the meanings which are attached to cycling, and where class and ethnicities might affect how meanings are attached to a practice: something that appears at odds with the de-centering of the individual through practice theory.

7.5: Approaches to cycling research:

Overall, Practice Theory is useful in exploring the different environments in which cycling takes place and how this influences the sometimes contradictory meanings which are then attached to the practice In the cases of materials for cycling we can see the illustrations of the interactions between materials and the meaning attached to cycling.

This review has underlined the diversity of cycling research, studies which use systematic reviews and statically driven analysis can effectively identify factors which are likely to drive

cycling participation. However, such an approach often neglects the inter-related nature of these factors, whilst also failing to capture locally specific factors. Research which focuses upon single (or small number of) localities, instead can command a richer understanding of locally specific factors and, importantly how these factors interact. These might relate to materials, meanings or competencies which then disproportionally attract or detract potential recruitments to cycling. Watson (2013: 24) conceptualizes such factors as ‘systemic sticking points’ which can limit recruitment or promote defection from cycling, and as we argue an approach which focuses on a particular locality is likely to be more successful in accurately identifying these factors.

Overall, therefore, practice theory is a useful framework to understand and evaluate which elements either support or undermine urban cycling. It gives weight to the material factors commonly identified as important to supporting mass cycling, but also integrates the important role and consequences of personal attitudes, attributes, social and cultural norms (Handy et al., 2014) in the competencies and meanings of a practice. Clearly, much can be learnt from localities considered as ‘successful cycling cities’ (e.g. Pucher and Bueler, 2008), but as we will argue a focus upon areas where cycling is more marginal can be revealing in understanding the plethora of factors which attract, or detract different groups to participate in cycling. Importantly, and per Larsen (2017b), these factors are often interconnected and, in most instances, would not represent a 'silver bullet' in isolation.

Now, we will explore these issues within the context of Liverpool, UK. Here, and in a city that is both emblematic, and symptomatic, of broader malaise towards urban cycling, we explore the extent to which a variety of factors influence cycling within the city and how they might be overcome.

7.6: Methodology:

Liverpool serves as the focus of this study for two reasons, firstly we see the city as ‘ordinary’ in cycling terms, it lacks an established ‘cycling culture’, and cycling occupies a similar modal

share to the UK average at just under 2% (DfT, 2019). However, in other ways the city is unusual, since 2010 the Liverpool City Council (LCC) has managed one of the largest budget reductions in England, a 63% decrease (Liverpool Express, 2019), whilst ranking as the fourth most deprived local authority in England (ONS, 2019). It lacks significant cycle infrastructure, lagging behind other UK core cities and leading European exemplars (Nurse and North, 2013), which is reflected by an appalling road safety record, in which 201 cyclists were killed or seriously injured between 2012-2016, the highest of any English metropolitan borough (DfT, 2017b). We argue that Liverpool, by virtue of its distance from exemplar status, can offer useful policy lessons to urban areas in a similar position.

That said, LCC is not without a coherent cycling strategy and the Liverpool Cycle Revolution (Liverpool City Council, 2014) represents the most recent articulation of this. The strategy's key target is that 10% of all trips will be made by bicycle by 2025. LCC admits that this is not without challenges, particularly when LCC cannot meet the minimum spending of £10 per head per year as recommended by the 'Get Britain Cycling Report' (APPCG, 2013). Going further, the strategy has limited detail on specific projects, instead placing a greater emphasis on 'developing' plans for cycling, and investment in enforcement and cycling education programs. In planning terms, the Liverpool Draft Local Plan (Liverpool City Council, 2018a) also seeks to maximize accessibility by active travel, most notably with a policy which protects existing and planned schemes as a means to continue developing a comprehensive cycling network. Latterly, in response to COVID-19 the City Council has planned to implement a series of 'pop-up' cycle lanes (Liverpool Express, 2020).

7.6.1: Site Selection

To explore some of the barriers and enablers to cycling further, we focus on the single ward of Princes Park. Selected because of its ability to capture many of the issues discussed previously, the site affords insights on two main fronts. Firstly, the wide leafy boulevard of Princes Avenue is a key cycle commuter thoroughfare to the Liverpool city center, connecting

the urban core to the South of the city. Despite this, there currently is limited cycle infrastructure on Princes Avenue itself, although a major upgrade is planned which includes a segregated cycleway[1]. Secondly, our site selection reflects our desire to examine an area where there is significant potential to increase cycling participation. Therefore our approach deliberately targeted both those living within the Princes Park ward and those who live and work beyond the area. The Princes Park ward is one of the most deprived in both Liverpool, and England as a whole (Liverpool City Council, 2018b), whilst 2011 Census data indicates that 66% of households within the ward have no private vehicle access. Yet despite its proximity to the city center, of those in employment, just 3.4% cycle to work as their main mode of travel (overall participation in cycling is likely to be higher, though no such data exists at ward level), with 26% currently walking to work (ONS, 2013). While this somewhat limits the scope for environmental benefits, a modal shift towards cycling may facilitate enhanced access to economic and social opportunities (Rajé and Saffrey, 2016). Combined, therefore, Princes Avenue, along with the surrounding streets contained within the Princes Park ward, provides a platform from which to explore the barriers and enablers to cycling in Liverpool.

7.6.2: Study Design

Participants were recruited within the Princes Park ward as they traversed the area either by bicycle or walking, with data collection taking place across eight different sessions, split throughout the day across weekdays and a weekend. In total there were 95 interview participants: 55 cyclists and 40 non-cyclists, who were made up of a mixture of those living within Princes Park and those working within or travelling through the area.

The views of these interviewees were supplemented by detailed interviews with key cycling policymakers and stakeholders – each focusing on the themes discussed thus far, and the broader efforts made by the city in overcoming them. Those interviewees included a Transport

[1] https://liverpool.gov.uk/parking-travel-and-roads/better-roads/better-roads-schemes/princes-avenue-step-scheme/ (accessed 27th Feb 2019)

Planner from LCC, members of a local cycle advocacy group, and a local social enterprise promoting cycling.

The study collected data via a mixed methods approach, incorporating a survey and follow-up interviews, the survey was primarily a recruiting tool whilst also producing quantitative data. An initial question established a differentiation between cyclists and non-cyclists, the former being defined by cycling at least three times a week (DfT, 2017c, Cycling UK, 2017a). This allowed the researchers to explore the differing experiences and perception of cycling in the city (i.e. their choice to cycle or not). The survey also informed the interview approach, which provided an opportunity to discuss the specific issues raised in greater detail, allowing the researchers to gather a richer account of cycling and mobility decision-making.

The interviews explored the everyday experiences and perceptions of cycling such as the infrastructure, benefits and challenges of cycling. Some interviews had a greater focus on the absence of infrastructures, where we invited participants to elaborate upon their expectations of infrastructure, and to propose interventions to support cycling. Another focus was upon the competencies of cycling, and how other forms of mobility (e.g. walking and driving) impacted their experiences of cycling.

As previously discussed Practice Theory attempts to de-centre the individual, however it is inevitable that different individuals possess contrasting experiences and perceptions of the social world, and these differences are captured through our discussions. We transcribed, coded and analysed this data, placing each code within the materials, meanings and competencies framework. In some cases this posed a significant challenge, which we discuss further in our analysis.

7.7: Study findings:

Our findings are presented across four sections, each representing the broad themes which emerged from our work. First is the centrality of materials in defining a practice reflecting a tendency of both groups of participants to link the (lack of) materials with the meanings they attached to cycling. As we explore in the second section the competencies of participants allowed them to overcome the deficiencies in materials, and the tensions between different mobility practices – the focus of the third section. In our analysis we reflect upon our experiences of applying practice theory in the context of cycling research, deriving several conclusions for policy-makers to support further recruitment toward cycling and suggestions for developing the utility of the frameworks for future research.

As part of the survey participants were asked to rate their perceptions of the cycling experience in the city. The mean scores (with five representing the maximum) of both cyclists (2.9) and non-cyclists (3.0) revealed that in broad terms both group's perceptions do align – i.e. neither presented an overly-pessimistic nor overly-optimistic view. Reflecting the discussion above they acknowledge that Liverpool is something of an ordinary city in cycling terms – neither utopia nor death trap.

7.7.1: Materials define meanings

Where cycling in Liverpool is perceived as poor there was a broad alignment with previous literature (e.g. Lorenc et al. 2008), in that perceptions of cycling as a dangerous activity was the greatest deterrent for many non-cyclists. Here, the provision of materials for cycling was inextricably linked to the perceptions of danger and safety.

In accordance with studies suggesting that a lack of cycle lanes inhibits cycling rates, both cyclists and non-cyclists bemoaned a lack of safe cycling infrastructure – with nearly two-thirds (60) mentioning cycle lanes. In particular, 27 non-cyclists cited the lack of cycle lanes as the

major preventative factor in taking up cycling, whilst others said if they did cycle they would only consider pavement-riding. Cyclists frequently raised the dangers of particular roundabouts and roads, typically linking this to an absence of dedicated cycling infrastructure. The discussions regarding the roads were, therefore, overwhelmingly negative. The most frequent complaint from cyclists regarded the poor road surface (i.e. ‘potholes’), particularly on side streets which participants felt could otherwise be attractive for cycling. This criticism extended to the limited number of segregated cycle lanes that did exist, with cyclists complaining about the poor design of dedicated lanes – particularly where their design led to potentially dangerous re-entry onto the main carriageway. However, there was praise for dedicated infrastructure which did exist, including advanced green lights for bicycles. These were seen to make cyclists feel safer – illustrating how dedicated infrastructure can have a positive impact on the meanings attached to cycling.

When cyclists discussed potential changes, many advocated the implementation of segregated cycle lanes, emphasizing their role in creating a safer cycling environment. Many added that any money spent providing cycle lanes must also be accompanied with enhanced maintenance and enforcement programs, perhaps reflecting the condition of existing infrastructure. Conversely, one cyclist dissented from the prevailing view, arguing that implementing lanes meant accepting that cyclists do not belong on roads. Whilst this was a minority view, the provision of materials may have the unintended effect of validating negative meanings of attached to cycling i.e. cycle lanes are needed due to dangers of cycling.

Whilst discussions largely focused upon aspects of cycling in motion, it was clear that materials supporting the bicycle ‘at-rest’ also had the potential to shape meanings. A lack of secure cycle-storage facilities was regularly cited as a factor which discouraged regular cycling, supporting Aldred and Jungnickel (2013), this was often linked to living in a flat or shared accommodation with no significant storage space. In public spaces, particularly within the city center, there was seen to be a lack of 'official' cycle parking, forcing cyclists to resort

to 'fly-parking'. These material deficiencies result in participants associating the parking of cycles with danger and theft, with nine participants recounting their own experiences of theft – suggesting perceptions of risk were not unfounded.

Six cyclists discussed the need for greater access to showering and changing facilities at work, with one respondent describing efforts by his employers as ‘tokenistic’ – something which, perhaps, reflects the broader view of the provision of materials for cycling in the city.

Notwithstanding the evidence of a stressful and problematic experiences of cycling in the city (typically attributed to the material deficiencies described above), it was it was clear that almost all participants who cycled derived significant enjoyment from it, especially during summer months. Four cyclists felt that it helped them reach a positive mental state – especially when part of their daily routine – with one respondent likening their cycle commute to meditation, saying it put them in a ‘good headspace’ before work. Indeed, the broader evidence does support this beneficial characterization of the practice (Pooley et al. 2013, Anokye et al. 2012), and that cycling, alongside walking, is seen as the most enjoyable mode of transport (DfT, 2017a). It is clear that there is a contradiction: even though cycling may be perceived as ‘bad’, it’s still good.

7.7.2: Competencies and material deficiencies

While it was clear that materials had a significant impact upon the meanings, and subsequent recruitment to the practice of cycling in the city, there was a sense that this may be overcome through increased confidence (e.g. through experience and appropriate skills training). For example, 43% of cyclists saw Liverpool as a dangerous cycling environment, but qualified this by describing how their own competencies enabled them to overcome this. For example, statements referring to material deficiencies were often followed up with references to competencies, such as cyclists suggesting they had the confidence and skills to overcome the

danger from narrow roads by cycling in the middle of the carriageway, (see Cumming, 2012). However, a repeatedly-made point from non-cyclists hinted at a vicious cycle within the current situation, questioning how they could be expected to develop the necessary skills and confidence on busy roads with no cycling infrastructure. In response, participants frequently evoked a strategy of 'rule-bending' (Latham and Wood, 2015) to deal with the combination of a lack of materials and competencies, such as pavement-riding, even when they felt unease in doing so.

Corresponding with Aldred's (2013) work, there was also a perception that cycling was something for 'sporty' people, with some non-cyclists suggesting that they felt too unfit to cycle, or that ill-health now prevented them from cycling. In both instances there are inherent Catch-22s at play – not least where people are dissuaded from cycling because they perceive it as 'not for them', yet a key way to instigate change is if more people like 'them' take part.

There were some indications from participants regarding how these issues might be combatted. Supporting work by Akar and Clifton (2009) on workplace and public services for cycling were seen by two cyclists as an important space for building competencies and thereby enabling recruitment to cycling. Primarily this focused on gaps in repair skills, but also was seen as an opportunity to discuss and develop competencies such as route advice and riding techniques, which might then aid less-confident cyclists to overcome material deficiencies. Beyond this, one interviewee commented that their street-based service means 'people can see us and join in: visibility is very important', suggesting a dual-function of cycling education and promotion.

7.7.3: Tensions between mobility practices

A key theme present throughout the research was the tensions between different mobility practices, primarily between auto-mobility and velo-mobility. These factors were problematic to clearly categorise within a practice theory framework, which we explore in detail in section

5.1. This often stemmed from the aforementioned lack of materials for cyclists (e.g. dedicated cycle lanes), which compels practitioners to share materials (e.g. road space) with other road users. Here, the dominance of auto-mobility in the urban environment was clear, firstly through high volumes of road traffic, particularly at 'rush-hour' and in the city center – both key times and spaces for cycle commuters. Secondly, parked vehicles were seen to introduce additional hazards and compromised efforts to support cycling, e.g. parked vehicles blocking cycle lanes. Both points were seen to increase perceptions of danger, therefore influencing a decision not to cycle.

However, whilst the issues are connected, both cyclists and non-cyclists instead more frequently cited the behaviour of drivers as a greater factor in creating a dangerous cycling environment. This varied in severity, from a lack of signalling to an incident of assault. In many cases, it was clear that this perception of danger emerged as a cumulative effect of many minor incidents. This aligns with the work of McKenna and Whatling (2007) who described how drivers can create a hostile atmosphere for cyclists on the road through intimidation and 'near-miss' incidents. This might be interpreted as an indication that certain practitioners of auto-mobility lack the necessary competencies, to drive in the presence of cyclists, or perhaps to drive more fundamentally. Yet there are also more extreme examples of aggression towards cyclists – illustrated by an incident where one female participant was assaulted, whilst another was told 'get off the road you fat b****' by a driver. In both cases the participants explicitly linked these incidents to their gender, aligning with the work of Heesch et al. (2012), who suggested women were more likely to cite aggression from motorists as a constraint to cycling. Whilst some practitioners are able or willing to use competencies to overcome the inherent tensions between mobilities in urban areas, others are less able to do so. For example, Steinbach et al., (2011), concluded that white males have greater confidence to ride 'assertively' to defend against such aggression.

The sharing of materials also may threaten some of the meanings which some participants attached to driving (when they referred to their experiences of interacting with cyclists whilst driving), which may help explain some of the hostility described above. The presence of cyclists (or indeed the materials of cycling) can be seen as a threat to the qualities of driving e.g. cycle lanes replacing the convenience of on-street parking or a cyclist blocking an 'over-taking' manoeuvre, leading to some practitioners of driving to respond with hostility.

There can be a tendency to classify the practices of walking and cycling within a user group of 'active travel' there were also tensions between these practices that, to some extent, mirror the aforementioned tensions with auto-mobility. In this case 'deviant' cyclists threaten some of the cited qualities of walking e.g. safety and relaxation, which are partially derived from separation from other motilities. A lack of awareness, excessive speed and pavement-riding were all raised by participants who were critical of cycling. Respondents were particularly critical of those relying on cycling as an economic function (i.e. couriers) with one participant saying '[Couriers] seem to behave especially badly', alongside those cycling for sport – often conceptualized as being 'Lycra-clad'. Whilst participants did express sympathy toward pavement-riding (i.e. to avoid the dangers on roads) there remained anger at cyclists for doing so. This ire also singled out cyclists riding through parks – ironically, often part of the national cycle routes, and one of the few places where off-road cycling infrastructure was provided.

This highlights a critical issue for a modal shift towards cycling in urban areas: in the absence of dedicated infrastructure, where should potential recruits build up the necessary competencies? While some are willing to 'rule-bend' and use pavements, these comments highlight that others are not willing to do so, and may even view seemingly appropriate open spaces such as parks as inappropriate for cycling. Logically it would seem that these individuals are unlikely to even experiment with cycling in the absence of dedicated spaces for doing so.

We can also see that experienced (i.e. 'Lycra-clad') and inexperienced (i.e. 'pavement-riders') cyclists alike can themselves contribute to the negative meanings attached to cycling. This reinforcing of negative stereotypes, even those stemming from entirely lawful actions, can, perhaps, represent a vicious cycle resulting in negative meanings being perpetuated, thus creating a further barrier towards the recruitment of cyclists.

7.7.4: Local Institutional and Political Commitment

In our discussion of practice theory we acknowledge that the three elements do not exist in isolation, but rather overlap and interact to shape a practice. However, through our study, we found that there was one issue – consistently raised by participants – which did not readily map onto any individual element of practice theory. Rather, we observed that this element could be the creator of materials, maker of competencies and generator of meanings. Or not. This was the commitment of the local authority in encouraging and facilitating cycling in the city.

As discussed above, both Liverpool City Council and the city region of which it is a part are ostensibly committed to cycling – evidenced through cycling policies which explicitly include commitments to supporting cycling (Liverpool City Council, 2014, Liverpool City Region, 2018). The strategies emphasize measures on bicycle education and enforcement programs, but often lack details on investment and implementation of materials (e.g. dedicated cycle lanes). Whilst there is evidence in this study that such an approach may support recruitment to cycling, it does fail to tackle the more substantial issues around material deficiencies, the tension between competing mobility practices and the subsequent influence upon meanings and competencies attached to bicycling.

Given the backdrop of financial austerity (Sturzaker and Nurse, 2020) in a challenging socio-economic context, we inferred that this bias in spending reflects the relatively higher costs of provisioning materials in comparison to other measures. Yet, as one of our interviewees

argues, whilst it can be difficult to get funding for cycling infrastructure, there are opportunities, for example through the city-regional Combined Authority Growth Fund, and the national Transforming Cities Fund. Instead, the same interviewee perceived the greater barrier to be technical – e.g. lack of road space to implement cycle infrastructure.

Whilst the interviewee framed these issues as technical matters, they suggested that the local political leadership on the promotion of cycling did also create additional barriers to investment, and that the decision to prioritise certain road users e.g. private motor vehicles over cyclists was in reality a political judgement. Elsewhere, evidence does support this, for example Steve Rotheram, the current Metro Mayor did include active travel in his manifesto (Rotheram, 2016), but failed to respond to specific pledges set by Cycling UK during the election campaign (Cycling UK, 2017b), even when other candidates did. Furthermore, though Rotheram did appoint a city-region Cycling Commissioner, he was amongst the last of the city region mayors to do so. Similarly, Joe Anderson, the City Mayor, did not mention active travel in his 2016 election manifesto (Anderson, 2016) whilst his actions as Mayor, such as the scrapping of Liverpool's bus lane network in 2013 were seen as deeply harmful to cycling provision.

Regardless of the cause, this lack of implementation and, perhaps, the absence of local political leadership over a long-term period was perceived by respondents as a lack of commitment by the local authority, with some saying that, as cyclists, they felt like 'second class citizens' whom the local authority did not care about. Whilst this may be an issue of communication – with many responses suggesting an unawareness of council policy towards cycling, it also represents dissatisfaction with the perceived piecemeal approach followed thus far.

7.8: Analysis:

Like others before us (Larsen, 2017b, Spotswood et al. 2015, Watson, 2013) practice theory has proved a useful conceptual framework in understanding the variety of factors that influence a choice to cycle or not. In particular, it allowed us to understand the links and interactions between elements to support or limit recruitment to cycling.

This allows us to reach one of our fundamental findings: in contrast to 'cycle-friendly' cities like Copenhagen (Larsen and Funk, 2017), the lack of provision of cycle infrastructure in Liverpool places limits upon the recruitment to the practice. This then shapes the largely negative meanings attached to cycling and places a greater need for certain competencies (e.g. riding skills and alertness) to confidently cycle in the city. Practice theory also highlights how competition for materials results in tensions between competing mobility practices, which often perpetuates the negative meanings attached to cycling.

Whilst previous research suggests understanding the local context is important for a successful approach in supporting mass cycling (Larsen, 2017b, Sheldrick et al. 2017), we instead argue that, given the centrality of materials as an explanation for the stubbornly-low modal share for cycling, in urban areas which currently lack the materials identified as supporting the practice, these conclusions will, in fact, have considerable relevance.

The evidence indicates that supporting sustainable mobility patterns in urban areas, when public transport capacity may be limited, requires a reversal of the marginalization of cycling. To do so the provision of on-road infrastructure is essential to reduce the inherent tensions between mobility practices and to shape cycling to place fewer demands upon competencies of would-be cyclists, thereby broadening the recruitment pool.

Whilst in the wake of COVID-19 many urban areas have implemented temporary cycle lanes, even if these are to be made permanent, this study found this alone is not sufficient to support mass cycling. Instead, there is a need to also consider the provision of other materials such as showering and storage facilities in workplaces, residence and public spaces. In the case of Liverpool the variability of this material provision clearly placed a further barrier upon the recruitment to cycling. Moreover, we reflect upon the secondary role that materials can play in signalling support for cycling. For example, in workplaces they meet a practical purpose (e.g. showering prior to work), but also provide signal support from the workplace, contributing towards positive meanings of cycling. Greater provision of materials may also play an important role in signalling support from political institutions (and the city as a whole), and in this case the deficiencies in visible materials may instead contribute to negative meanings, expressed in this study as 'feelings' that the city was 'unfriendly to cyclists'.

Going beyond the role of materials, and in support of previous work which highlights the central role supportive politicians play in promoting a cycle-friendly city (Larsen, 2017b), our study found that both non-cyclists and cyclists alike saw the local authority as unenthusiastic at best, or anti-cycling at worse, further contributing to the aforementioned ‘feelings’ of a city ‘unfriendly to cyclists’. Such an attitude from local political leaders was also seen to reduce the legitimacy of cycling in the eyes of local authority officials. In the context of COVID-19 there is an additional opportunity for political leaders to advocate for active travel as an altruistic choice, contributing towards increasing public transport capacity as well as reducing environmental and health risks from transport pollutants.

Practice theory has strengths in understanding how the bicycle is not only a material of mobility, but also a practice which can encompass a series of functions including exercise and relaxation, helping the understanding of the ‘corporeal experience’ of cycling (Sheller and Urry, 2006). These factors aid in understanding the process by which positive meanings are associated with cycling, even in sub-optimal conditions observed in this study. This is an

illustration of how contradictions between meanings are observed, and it indicates that once an individual is recruited to cycling positive meanings, which are derived from experiences of cycling, may began to displace, or at least counter the negative meanings that they previously attached to cycling.

Despite the widespread knowledge of such benefits, and modelling tools to account for them e.g. HEAT tool (WHO, 2019), there remains a focus upon the utilitarian aspects of time and efficiency in transport modelling (Simpson, 2017), contributing towards low investment in cycling infrastructure (Mulley et al. 2013). Analysis through practice theory can help combat this bias by illustrating show that when many motilities are competing for practitioner's time and resources (Shove et al. 2012, Watson, 2013), cycling can ‘beat’ other modes of travel, not only in time and money but also in capturing the ‘corporeal experience’ of cycling.

In times of disruption it is essential not only to adapt to changing needs, but also to pro-actively shape the outcomes of disruption (Reeves et al., 2020). The insights provided through the lens of practice theory can help shape policy interventions to do so, which Watson (2013) describes as the ‘motor of change’, and which can add momentum and create new positive feedback loops enhancing recruitment to the practice of cycling. We therefore side with Keller et al. (2016) in that practice theory can provide a useful framework through which policy-makers can be informed. In this case, it highlights the centrality of material provisioning in driving recruitment towards cycling, meaning that if policy-makers wish to both manage the challenges of sustainable mobility following COVID-19 and to meet their long-term ambitions for cycling (e.g. Liverpool City Council, 2014), then this must be their focus. Practice theory shows that materials firstly reduce the need for certain competencies, and secondly play a key role in shaping the meanings of cycling, which subsequently have a significant influence upon a decision to cycle.

7.8.1: Limitations of Practice Theory

Practice theory clearly has significant utility as a model of social life enabling researchers to understand practices such as urban cycling, and in doing so it can inform interventions to alter the nature of a practice, thereby broadening the recruitment pool to achieve policy objectives. However as previously discussed some of the themes identified through our analysis did not easily fit into one of three elements (meanings, materials, competencies). In this section we set this out in greater detail, and consider how we can resolve this.

This challenge is likely to be present when analysing many other social phenomena. When doing so we cannot escape that all elements of a practice are ultimately connected to the wider 'socio-technical system (Geels, 2005) that cycling, like all practices, lies with. Here, we reflect upon Schatzki's (2002) suggestion that all reductive frameworks including practice theory run the risk oversimplifying social life, since the social world is a made up of a series of practices, which are all too a greater or lesser extent connected. Nevertheless, like any analytic lens practice theory must simplify the social world in a bid to understand it, but this creates limitations and inconsistencies.

For example in this study 'driver behaviour' was regularly discussed, but could not readily be categorized, instead we discussed such behaviour in the context of tensions between completing practices. In this context, the sharing of materials between auto-mobility and velo-mobility (e.g. road space), which then leads to tensions, offers a logic to this approach. Yet there is a less-clear rationale for considering the wider, contextual factors in the same way, an important example is the political commitment of the local authority.

We might overcome this issue by excluding the political commitment in our analysis, citing ontological challenges in integrating actor-centred action within practice theory (e.g. the endorsement of cycling by local political leaders). Yet, if we believe that practice theory can inform policy-making (Keller et al., 2016), we must accept that our findings are ultimately

enacted by the same institutions we are overlooking in our analysis, thereby leading to a contradictory position.

Instead, Larsen (2017b) illustrated the possibility of re-applying practice theory to certain factors, in their case, the actions of political institutions of Copenhagen. However, given many of the challenges surrounding cycling in our study centered upon interactions with auto-mobility, should this also be separately re-examined as a practice? In both cases, following this logic creates a fresh divide between the factors which are re-examined using practice theory and those which are not. Ultimately, we ask: how do we identify the factors which are deemed worthy of re-examination as practices in their own right?

Therefore we find that practice theory does not clearly account for these wider, contextual factors without either the consideration of these elements as practices as in their own right, or by overlooking such factors, both of which we view as an unsatisfactory position. To overcome this, we suggest the introduction of a heuristic device in the application of practice theory, which attempts to 'isolate' such factors. The selection of these factor will require care, and we suggest that they must fail to clearly fall within Shove et al., (2012) existing framework of element and must directly interact with the elements of the practice under examination. We tentatively call this addition to the framework 'action of others'.

The behaviour of drivers is one such example, this cannot fall within the three elements, and also directly affects the availability of materials of cycling (e.g. road space). A second case is the actions of political institutions, again this cannot be seen as an element, but it directly affects the provision of new materials of cycling (e.g. safe cycle parking). In doing so we make detailed, consistent analysis of factors influencing the elements of the practice under examination, whilst avoiding the arbitrary selection of certain elements for re-examination. It also circumvents the alternative of an iterative process of re-examination of each factor that influences a practice, which given the complexity of social process risks providing an

unnecessarily complicated, and potentially less functional model of the practice under investigation. The application of this suggestion, we hope will add even greater utility to practice theory as a means to consider all kinds of activities – not least urban cycling – and we would invite others to utilise this suggestion in future research.

7.9: Conclusion:

Across much of the UK and in many other developed nations there has been a persistently low modal share for cycling, even despite the wealth of evidence the contribution of a modal shift towards cycling can make toward many urban agendas. As policy-makers turn to cycling as a potential solution to cope with changing mobility patterns post COVID-19, there is a pressing need to understand the factors which encourage, or hinder recruitment towards everyday cycling. This study used Liverpool, UK, as a case study to do so, a city we argue is an 'ordinary city' in cycling terms, standing in contrast to studies which focus upon exemplars in urban cycling (e.g. Copenhagen and Amsterdam), as such we believe this results in findings which have broader relevance to many urban areas. The perspectives of both cyclists and non-cyclists allowed for a rich understanding of the factors which influenced a decision to cycle or not, and to explore the potential impacts of various interventions to support a greater modal shift toward cycling.

Like a number of cycling-related studies, we deployed Shove et al's, (2012) reading of practice theory as a framework to analyse these factors, separating each into materials, meanings and competencies. This analysis led to the conclusion that the limited and variable provision of materials for cycling is the key explanation for cycling's stubbornly-low modal share within many urban areas. Participants consistently linked negative meanings (e.g. danger and fear) to the lack of appropriate materials for cycling in a car-dominated environment. It was clear that the provision of infrastructure (e.g. segregated cycle lanes) is vital to overcome these negative meanings, not least since participants felt this provision shapes the competencies required for cycling. In the absence of this infrastructure, there is a Catch-22 situation which

limits cycling's modal share – where do potential recruits build the confidence and competencies which they feel are required to cycle?

More positively, the study found that cyclists cited a wide range of personal, and societal benefits of cycling, as well as simply enjoying the corporeal experience, comparing the mode positively in comparison to other mobility options despite the aforementioned issues. This is an indication of how positive experiences of cycling can create new meanings, creating positive feedback loops, providing an individual can be supported in beginning to cycle.

The application of practice theory was particularly useful in understanding the interaction between each of the three elements, and how this shapes the practice of, and recruitment towards cycling. However, we found some difficulty in clearly defining a number of themes raised by participants within Shove et al's (2012) framework. One approach to manage this is to reanalyze these factors using practice theory, though there is not clarity in how such factors should be identified to avoid the pitfalls of arbitrary selection of factors for reanalysis. We also considered the exclusion of these factors from our analysis, which were largely actor-driven actions, however as we have argued we believe that practice theory can provide useful recommendations which we hope can be implemented by the same actors which this would exclude. Instead we advanced the suggestion of the introduction of a heuristic device, 'action of others', which 'isolates' actions which interact with the practice under examination. We suggest that further application of this framework in other contexts may test, and provide greater clarity to this suggestion.

Overall, the research has shown that whilst Liverpool is far from a cycling utopia, neither is it an environment in which urban cycling is incompatible. Therefore if cycling is to not only be part of the shorter term solution to COVID-19 mobility challenge, but also in contributing towards tackling the longstanding challenges of ill-health, congestion, climate change and poor air quality then investment in cycling must be increased. In particular, this will require

measures which reduce the tensions between cyclists and other road users (e.g. cycle lanes), but also by through ensuring businesses premises and development include supporting infrastructure (e.g. secure storage and shower facilities). The prevailing view of ambivalence, or even outright hostility, to cycling by the political institutions in the city, (and for some the city as a whole) illustrates an important role for local political leaders in signalling support for cycling.

Whilst accepting the caveats of the importance of local context (Larsen, 2017b) and limitations of policy transfer (Sheldrick et al., 2017) we believe these findings can be applied to many other urban areas where cycling is a marginalized mobility choice, both in the UK and beyond.

Chapter 8 Discussion

8.1: Introduction

The thesis began by introducing a trio of anthropogenically driven environmental challenges, climate change, biodiversity crisis and poor air quality. Whilst the character of these challenges differs, each will impose significant costs in terms of human health, lives, biodiversity and infrastructure and development. Therefore, significant changes to everyday life are required, firstly mitigation actions to reduce the future impact of these challenges, and secondly adaptation activity is necessary to manage and minimise the impact of these environmental issues. In both cases, behaviour is central, since meeting these needs requires significant and rapid shifts in individual behaviour as well as major changes across all sectors of the economy.

Given the need for wide-ranging change, there is an important role for Spatial Planning as a mechanism to coordinate, develop and implement the changes necessary to address environmental challenges. This is because planning frameworks and powers can influence the nature of future land use and development, thereby exerting an influence on the behaviour of individuals, private companies and organisations. By doing so, it can support meeting environmental policy goals such as reducing carbon dioxide emissions, improving air quality and the protection of biodiversity. Mechanisms to do so include statutory policies which mandate particular forms of development e.g. low-carbon housing. Non-statutory frameworks can incentivise particular land use patterns and infrastructure provision which encourages the use of public and active transport. Other planning tools such as land value capture can be directed towards the financing of mitigation and adaptation activity.

Historically many planning theories have failed to fully consider the role of behaviour in planning, meaning that the influence of behaviour was poorly considered in land use plans through early post-war planning approaches. Subsequent theories such as comprehensive rational planning made assumptions that planners could feasibly consider the relative costs

and benefits of different policies in a rational manner, instead, the practical and cognitive limitations meant that maximising the outcome of these policies was unrealistic.

More recent theories of planning including communitive planning theory emphasised communitive rationality, incorporating values and experiential knowledge in planning processes. However, its weakness was its failure to consider the possibility of strategic behaviour, meaning that many actors easily exploited communitive approaches to maximise gains from particular planning policies and practices. Other forms of planning theorising focus on developing new approaches to tackle particular issues, including environmental challenges. These approaches differ greatly, however, each tends to avoid the procedural challenges in the implementation of new policies and practices within Planning. In particular, these issues often relate to the behavioural and cultural factors that characterise spatial planning, meaning that they poorly consider the implementation of innovative approaches.

An alternative approach, drawing from psychology, neurosciences, sociology and economics to produce a ‘behavioural’ approach to planning can help to address several of the weaknesses described above. Such an approach conceptualise the role of behaviour more accurately by integrating the concept of ‘bounded rationality’ which prevents individuals from undertaking perfectly ‘rational’ decision-making, meaning that maximising utility is highly challenging. It also provides a means to understand the role of strategies, heuristics and biases within decision-making and how such factors can impact the outcomes across a range of contexts. Beyond this, it also provides an insight into the impact of the context of decision-making, and how different socio-cultural and physical factors can affect behaviour. Since there is no ‘dominant’ behavioural perspective there is a diversity of theories and concepts which can be drawn upon to more completely and accurately consider planning practices across a range of contexts.

Collectively, this approach is well suited to understanding how planning policies and practices might most effectively respond to the environmental challenges facing humanity. This is partially due to the need to influence the behaviour of a variety of stakeholders to meet

adaptation and mitigation objectives. The development and implementation of new pro-environmental planning policies and practices within existing planning processes also requires careful consideration of behavioural factors, which can offer opportunities and challenges for planners and policy-makers. This thesis applied three behavioural approaches, which were Behavioural Economics, Game Theory and Social Practice Theory, representing theoretical approaches from across the spectrum of behavioural theory.

This approach introduces bounded rationality, which states that the limits of human cognition and the conditions in which decisions are made can lead to deviations from rational behaviour. Planning practice is often characterised by conditions of risk and uncertainty, meaning that such an approach is well suited to the analysis of planning. The concepts of behavioural insights, most prominently a suite of cognitive biases and heuristics can help to describe and understand various challenges and opportunities when introducing new planning practices and policies. Other aspects of bounded rationality relate to the role of experiential knowledge and the socio-cultural environment in which decisions are made. These factors lead to norms, attitudes and habits becoming embedded within decision-making processes, thereby impacting the behaviour of individuals.

Game theory is another theoretical approach which is useful in understanding the strategic interaction of stakeholders, helping to explore how different actors interact within a variety of planning scenarios. This approach can integrate the concepts of norms, attitudes and experiential knowledge when considering the decision-making of actors. Other aspects of a behavioural approach focus on understanding behavioural change, Social Practice Theory is one such example. This provides a means to understand how the combination of physical, symbolic, cultural and personal factors integrate to influence a particular behaviour. This framework can be useful in identifying how particular behaviours can be best encouraged or discouraged thereby providing policy-makers with evidence regarding investment or planning policies to support such change.

By applying a variety of behavioural approaches this thesis illustrated how a behavioural approach can provide a means to address the weaknesses of many theoretical approaches to planning. In doing so, it also illustrates the diversity and versatility of a behavioural approach, providing a set of concepts and tools to examine a wide range of issues within planning, not least the environmental challenges discussed in this thesis. This provides empirical material which can then lead to policy and practice recommendations, providing policy-makers and practising planners with knowledge and guidance concerning the issues discussed in this thesis.

There were three research questions set out which were collectively addressed across Chapters 5, 6 and 7 as well as within this chapter. The first set out to identify a series of factors which affected the ability of planning authorities to engender pro-environmental policy and practice changes. The second question relates to the value and experiences of applying a behavioural approach in this thesis, providing a critical reflection upon the theoretical framework used in this thesis. The third explores how empirical research can provide a set of policy and practice recommendations for policy-makers and practising planners.

8.1.1: Structure

This chapter begins with a summary of the three papers, this summary sets out how each of the papers addresses the research questions set out in Chapter 3. The findings are then synthesised to provide a set of common themes which are present in each of these case studies, responding to research question 1. The next section reflects on the utility of applying a behavioural approach within urban planning research, considering how the application of a particular set of concepts and theories enabled novel insights to be uncovered. Section 8.4 then uses the published papers, alongside the analysis in Section 8.3 to provide a series of policy and practice recommendations, addressing research question 3. Following this, there is a consideration of the challenges and experiences of the research process, including the data collection and peer review. The chapter ends with a section setting out several avenues for future research, which can build upon the research set out in this thesis.

8.2: Summary of published papers:

8.2.1: Considering the role of negotiated developer contributions in financing ecological mitigation and protection programs in England: A cultural perspective

This paper explored the use of land value capture to fund ecological mitigation and protection programs. It found the context of the local authority, expressed through the 'planning culture' interacted with a set of behavioural biases and heuristics to shape the potential to alter planning and policy practices to support local ecological mitigation and protection programs.

The application of concepts from New Behavioural Economics enabled an analysis which illuminated the role of bounded rationality in shaping the behaviour of local authority stakeholders. New Behavioural Economics provided a theoretical framework in which the day-to-day interactions involved in the development and implementation of planning policy could be conceptualised, with the effect of behavioural biases and heuristics identified. In this case, it was evident these biases were interrelated with the 'cultural' conditions within local authorities. This provided a means to explain how in combination this determines the extent of stability or fluidity in planning practices. Specifically, the status quo bias and reliance upon routinized behaviours in negotiations led to resistance to change and a lack of policy innovation within an authority. The framing of information was found to help engage individuals and trigger practice and policy changes in a planning authority.

The conditions of bounded rationality could be mitigated through greater resourcing within a local authority. A lack of financial resources and time created practical challenges when developing innovations in policy and practice, whilst also creating resistance to enacting policy and practice change. The research suggests that cultural and behavioural biases prevent voluntary change within planning authorities, indicating that mandating policy change is required if the stated ecological objectives are to be supported through land value capture mechanisms.

8.2.2: Playing games around climate change – new ways of working to develop climate change resilience

This chapter examines how climate adaptation and mitigation measures are integrated into spatial planning practices. The research found the financial context and the related strength of development pressures had an important bearing on the ability to integrate climate objectives within new development projects, alongside other key priorities including economic development, transport and housing.

The application of a series of 'toy games' drawn from Game Theory provided a toolkit which enabled a simplification of the complex processes surrounding the integration of climate change objectives with other competing strategic priorities. The use of the 'Stag-Hunt' game illustrated the incentives which supported an 'under-cutting' of standards between local authority areas, leading to sub-optimal outcomes in terms of climate change objectives, particularly within regions with weaker socio-economic conditions. The 'Chicken' game then illustrated how the financial power of private developers, compared to local authorities undermined the ability to bargain and negotiate within development control.

The analytical framework of game theory also provided the means to identify where a local authority could mitigate these outcomes through building trust with neighbouring authorities and private sector actors. Authorities could also develop trust through the development of shared planning rulebooks, fostering interpersonal relationships and educating private and public development actors. Beyond this, localised development frameworks also served as a means to proactively shape the course of development, further strengthening the ability of planning authorities to meet climate change objectives.

8.2.3: Cycling in an 'ordinary city': A practice theory approach to supporting a modal shift

This chapter explored the factors which supported or hindered a modal shift towards cycling within urban areas. It found there was a wide range of issues that affected the uptake of cycling, most prominently the lack of appropriate infrastructure, including, but not limited to, cycle lanes. The Social Practice Theory framework also ensured that the impact of competing mobility practices upon cycling was considered, identifying how competition with motor vehicles shaped the physical and symbolic environment that cycling takes place within, impacting the uptake of cycling within a locality.

The application of the analytical framework of Social Practice Theory ensured the impact of factors beyond infrastructure was fully considered i.e. symbolic and cultural factors as well as how personal attributes affected modal shift to cycling. Importantly it emphasised that these factors were inter-connected with the material factors raised above. The scarcity of cycle-specific infrastructure not only failed to provide the means to enable safe and pleasurable cycling but also contributed to forming negative associations with cycling, most prominently the association with danger.

This meant the research further underlined the need for greater investment within a range of cycling infrastructures since they provide the physical requirements for safe and enjoyable cycling, but also by promoting positive associations with cycling. The model also provides evidence of the role of non-physical factors in supporting a modal shift, including fostering a 'pro-cycling' culture through positive leadership and cycling training programs.

8.2.4: How can these findings be combined to provide broader insights?

The three essays are unified by their focus on pro-environmental practices in planning and development. They each focus on identifying and understanding the role that human behaviour plays in the development and implementation of such practices. The thesis deliberately selected a set of cases which spanned the diverse context in which environmental

planning takes place, thereby encompassing the diversity of planning practices. The roles of a range of stakeholders were also considered, who operate within diverse decision-making environments. The diversity of the empirical material examined within the thesis also helps to illustrate the versatility and adaptability of a behavioural approach within planning research. This provides an opportunity to reflect upon the collective conclusions, and implications within this chapter, since a combination of findings can help to reveal broader insights that have relevance beyond the individual empirical challenges examined.

The research sought to consider a range of tools and approaches to meeting environmental objectives through planning. This includes the consideration of behavioural change amongst individuals through their mobility behaviour and choices. It also examined the integration of climate change objectives within strategic planning and considered the use of land value capture to finance ecological mitigation and protection programs. Together the papers illustrate the opportunities and challenges in developing and implementing a variety of environmental policy and practice changes, in particular highlighting the role of behavioural factors.

The research also illustrates the utility of applying different theoretical approaches for examining these empirical challenges, addressing research question 2. Different theoretical approaches revealed the impact of various factors on practice and policy change. Therefore, this provided an opportunity for a critical reflection on the utility of different behavioural approaches, provided in Section 8.4.

8.3: Research Question 1: How do behavioural factors impact the decision-making of planners regarding the implementation of pro-environmental policies and practices within the British planning system?

The research identified that there were four core themes which ran across each of the three papers, each of these were behavioural factors which altered the decision-making of planners. Often this led to challenges in the implementation of new practices and policies to support the implementation of new environmental objectives. Though there were also many instances of

these factors successfully supporting new planning initiatives which are also discussed in the following section.

The first of the four themes begin with the long-term and uncertain nature of environmental challenges, which create disincentives to tackling said issues through mitigation and adaptation. Second, is the impact of the market-led context that planning and development processes take place within, this section considers how behaviour is affected by these conditions. This is followed by two sections outlining the importance of the cultural context and the role of an individual's skills and experiences in shaping the integration of environmental policies and practices. Together, these themes can help to explain how behavioural factors have a strong impact on the development and implementation of pro-environmental policies and practices within urban planning. Whilst these alone do not explain the challenges and opportunities relating to planning addressing environmental issues, they do represent an important set of themes, which ran across the diversity of contexts examined within the thesis. As a result, they are likely to be present in many other contexts and situations examined within urban planning.

8.3.1: Long-term, uncertain and intangible benefits of adaptation and mitigation activities

The research indicated that local authorities have the necessary evidence and understanding of the need to mitigate and adapt to a range of environmental risks. However, this section will discuss how the character of these challenges and the uncertain outcomes of mitigation and adaptation activities hindered the development and implementation of pro-environmental policies and practices.

The threats from environmental challenges such as climate change are typically viewed as distant, and long in the future (Palomo Vélez and van Vugt, 2021; Gilbert et al., 2010). The example offered within Box 1.1, set out why this perception can often lead to the approval of development in areas of increasing flood risk. However, this issue can also mean that the

benefits of action are typically viewed to be relatively intangible (McDonald, Chai and Newell, 2015). The recipients of benefits of mitigation activity are unknown, rather than being part of the local population (Gollier and Tirole, 2015). Such conditions are strongly associated with the 'free-rider' problem since the appropriate incentives to resolve environmental challenges are absent in many circumstances (Aquino, Steisel and Kay, 1992; Hardin, 1968).

This issue was present across each of the papers in this thesis. In Chapter 5, a key conclusion was that the short-term benefits of the use of land value capture mechanisms to tackle a series of socio-economic pressures (e.g. health and education) outweighed the benefits of the use of such mechanisms to tackle biodiversity loss. This was attributed by participants to the tangible and more immediate payback for the former.

Similarly, in Chapter 6, there was a perception amongst local authority stakeholders that the delivery of development was the key priority, largely due to its role in driving local economic growth and meeting housing needs. This progress was identified not only through job creation and inward investment but also through tangible, visible change, especially relevant on prominent or strategically important sites within a locality. This contrasted with the less evident benefits of implementing measures for climate mitigation and adaptation.

In Chapter 7, which examined modal shift toward cycling, the theme of tangibility was also important, with the local government citing the challenges of funding infrastructure provision to adequately support a modal shift towards cycling. Here, the pace and magnitude of benefits of a modal shift (e.g. reducing carbon emission and improving air quality) are uncertain, thereby affecting the incentives to implement such investment decisions.

Therefore, it is evident that local governments fail to enact particular planning policies and practices due to the limited incentives to take action. Therefore it is not in their short-term interest to take action to enact policy and practice changes (van Vugt, Griskevicius and

Schultz, 2014). This is particularly true when the benefits are not necessarily experienced within their local authority (Musgrave and Musgrave, 1989; Walker et al., 2011). This is pertinent when local authority resources remain constrained, an important theme raised in this thesis and elsewhere e.g. Barnett et al., (2015) and Porter, Demeritt and Dessai (2015).

The behaviour of private sector actors was also central to the successful implementation of policy and policy change. Their incentives are largely shaped by increasing the certainty and quantum of financial profit, with private sector actors often adopting a short-term mindset in doing so (Payne, 2013; Adams, 2015). This shapes their interactions with local government and affects the ability of environmental policies and practices to be successfully implemented. The adoption of measures to address environmental risk typically increases the construction costs of new development. The uncertain and long-term nature of environmental threats also affects the extent to which such measures confer additional development value, which risks profit margins being reduced (Fuerst and McAllister, 2011).

This issue was observed in Chapter 5, where local government participants described the difficulty of influencing and persuading developers to implement climate change adaptation measures within new developments. Similarly, in Chapter 4, participants from the local authorities reported that there was a reluctance amongst developers to accept the imposition of additional costs upon new development through additional land value capture payments. This helps to illustrate that the incentives in place for private developers to implement pro-environmental practices remain limited (Bhatti, 2001).

Therefore, the free-rider problem can help to explain the challenges in adopting pro-environmental policies and practices across a range of empirical challenges and contexts illustrated within the papers. However, this does not fully explain inaction, because there are circumstances where the effects of pro-environmental practices and policies do lead to direct benefits within a local authority. In particular, actions related to the adaptation to threats driven

by climate change such as flood risk and overheating are important examples, since these are experienced at a localised scale.

In such cases, the free-rider problem fails to explain the observed actions and outcomes. However, the perspective of local government stakeholders can be placed within the context of short-term political cycles. Therefore, even where there are direct benefits derived from adopting pro-environmental practices, the benefits can be uncertain and experienced in the future, well beyond the near-term political cycle. This means that inaction, delay and dilution of pro-environmental policy are observed in this thesis, similarly observed on a national scale e.g. Kurz et al., (2010) and Sharman and Perkins (2017). This inaction can be partially explained by drawing upon temporal discounting (Frederick, Loewenstein and O'Donoghue, 2002; Critchfield and Kollins, 2001). This states that an economic agent, such as an individual or organisation tends to place a greater preference for utility (i.e. benefits) experienced in the present rather than greater utility experienced in the future (Daly and Wilson, 2005).

This means that despite the evidence of benefits of pro-environmental action, either in terms of reduced future losses (e.g. a decrease in flood risk) or future benefits (e.g. improved air pollution) there is a tendency to take policy decisions which result in more immediate, certain benefits (Daly and Wilson, 2005; Van Lange, Joireman and Milinski, 2018). As a result, there remain disincentives to delivering pro-environmental policy, which aligns with the findings of Dupuis and Knoepfel (2013) and Bierbaum et al., (2013), who both found the remote nature of climate risk contributes to local government inaction.

The application of concepts drawn from behavioural insights are particularly relevant in contexts where outcomes of action are uncertain, and therefore when decision-making is made under risk (Tversky and Khaneman, 1984). Therefore, the application of behavioural economics can provide a provides a set of concepts which can help to capture how cognitive biases discussed in this chapter can lead to irrational behaviour by a variety of stakeholders

in planning. These concepts were drawn upon most prominently within Chapter 4, where the status quo bias was identified as preventing policy change to address a shortfall in funding for biodiversity programs. Equally, the use of 'toy-games' from game theory within Chapter 5 highlighted where actors (in this case LPAs) might benefit from 'free-riding' on the decisions of other actors, thereby failing to effectively resolve collective-action problems such as climate change at a regional, or national scale. By understanding the impact of these biases and opportunities for 'free-riding' there is an opportunity to identify how planning policy can be adjusted accordingly, thereby combatting the effect upon the implementation of environmental policies and practices.

8.3.2: Competition

The market-led model of development in the UK means private developers are one of the most important stakeholders in shaping the urban environment (Coiacetto, 2000; Gillen and Fisher, 2000). Competition between private stakeholders, therefore, acts as a challenge and opportunity for local planning authorities to implement environmental objectives through development (Greenberg, 2015). However, the context in which urban development takes place means that different cities, and regions compete with each other, which heavily shapes the behaviour of actors within these spaces and places.

Healey (1996) speculated that increasing competition between stakeholders might reduce the ability of development stakeholders to build consensus, this thesis illustrates this issue, using environmental objectives within planning as an example. This issue was raised early in this thesis, within Box 1.2, which introduced the challenges of being the 'first-mover' in introducing new regulations to protect and enhance biodiversity. These place barriers to new investment, and as result can place the authority who is the 'first-mover' at a competitive disadvantage. Hence, the strength and nature of competition within a region, or nation can have a significant impact on the behaviour of development stakeholders.

This research identified that the competitive nature of the market-led model of development, had a differential effect on outcomes, depending on the economic context. Authorities within weaker market conditions were in a relatively weaker position to stipulate strong environmental standards (e.g. energy efficiency or climate adaptation measures) through development in comparison to those in more buoyant conditions. Forester (1987) illustrated how lower-income authorities were at great risk of such 'under-cutting'. Chapter 6 illustrated this point, with authorities in weaker market conditions describing that their aspirations for greater environmental measures were balanced against the risk of loss of investment and development within their local authority. The competitive nature of the development market risks such investment being directed to other nearby, local authorities, with whom they compete for real estate investment.

Therefore, inter-municipal competition risked reducing the environmental and social benefits of development projects (Kang and Homsy, 2020). This illustrates how the core goals of planning, expressed by Campbell (1996) as economic, social and environmental conflict, leading to difficult trade-offs for planners. Developers can exploit these tensions (Been 1991), with the market-led system exposing local authorities to the pressures of competition.

Kang and Homsy (2020) also found that authorities in weaker economic conditions were most exposed to the risks of 'undercutting' standards. Been (1991) finds this also reduces the ability of authorities to shape urban development projects, with developers being adept at exploiting such conditions to their advantage. This aligns with the findings in Chapter 5, where local authorities located in areas of lower development value challenged the introduction of new ecological mitigation and protection policy requirements. Authorities within locations where the development demand was lower had a more limited scope to introduce new measures.

In contrast, in localities with greater development demand (i.e. within London and the South East), there was a stronger competition to secure a finite number of development

opportunities, which altered the behaviour of developer actors. Chapter 6 identified how this created an opportunity space for local authorities to introduce policies and bespoke development frameworks designed to maximise the opportunity to meet environmental objectives. This provided an opportunity to ensure that new development met a more stringent set of environmental standards and objectives. Similarly, in higher value areas there was greater scope to utilise land value capture instruments, meaning that authorities in such a position used this approach to secure financial resources to address ecological objectives in their authority.

This section could be considered in neo-classical economic terms, with competition being exogenously driven, with stakeholders competing with each other to maximise profit-making through securing and delivering development opportunities. This would view the preference of private sector development towards certain markets (i.e. those with greater development value) as being reflective of the potential for greater profitability and lower risk, with a corresponding reluctance to engage with development in weaker markets, particularly where there were greater costs of construction imposed by environmental policies.

Adams and Watkins (2014) present an alternative perspective on development markets, suggesting they can also be viewed as being ‘socially constructed’ with the decisions of stakeholders often being irrational (when viewed in neo-classical economic terms). This links closely to the Old Behavioural Economic view of markets, which states that the decisions of others (e.g. competing developers) can influence the decision-making of stakeholders. Therefore, competition might be strong in ‘higher value’ markets due not only to the greater opportunity for profit-making but also due to collectively held preferences for particular locations or development types, irrespective of their market performance (Henneberry and Roberts, 2008). Therefore, the patterns described in this section may also reflect the socially constructed nature of markets, with strong competition in certain markets (i.e. the South East and London) being reflective of the commonly held preference for such markets, irrespective

of the additional policy costs due to greater environmental standards for development. This view of the market also emphasises that many development stakeholders hold socially and culturally embedded perspectives (Guy and Henneberry, 2002). These views and practices are likely to be strongly held and have a powerful influence on decision-making, however, in certain markets where competition is strong, there has been a need to adapt these values and norms to meet the expectations of the local authority regarding environmental policies and practices to secure development opportunities.

8.3.3: Culture matters

A 'cultural' explanation for a failure to adopt pro-environmental practices was evident across all three papers. Culture can be interpreted as shared attitudes and values (Hayden, 1988). Cultural explanations for planning outcomes have long occupied an important area of debate in the planning literature (Sanyal, 2005). Healey (2010) argues that the idea of a shared 'planning project' is similar across complex, developed and urbanised contexts, yet differences arise where cognitive frames, practices, norms and values diverge (Othengrafen, 2010; de Vries, 2015). These differences can be captured through a planning culture, and have a significant impact on the observed outcomes, as illustrated through each of the three papers in this thesis.

Within Chapter 5, differences in land value capture policy and practices between authorities were evident since the core objectives of planning differed between authorities. Changes in pro-environmental policy were challenging to engender where the core focus was placed on securing new real estate investment and development. Therefore, the use of particular pro-environment policy instruments is more, or less straightforward to develop and implement depending on the cultural backdrop. Foss (2018) provides a similar account of local authorities in the USA, with the core focus of planning being fostering economic development, meaning the cultural frame for planning action provided limited rationale for undertaking pro-environmental action. This context provides ample opportunities for actors to oppose the introduction of such policies and practices (Adger et al., 2013).

Within Chapter 5 cultural explanations were important in understanding some of the challenges and opportunities surrounding the use of land value capture to support greater ecological investment. Here, there was a view expressed that the 'culture' within an authority could create, or limit the opportunity for individuals to exercise agency to support pro-environmental action, aligning with Malekpour, Brown and Haan's (2015) work examining the implementation of strategic infrastructure. They emphasised the importance of developing a proactive planning culture, which tackles future environmental challenges. Lawrence and Haasnoot (2017) emphasised the importance of culture in providing a backdrop which enabled, or prevented particular climate adaptation pathways.

Chapter 5 illustrated that 'cultural' factors were highly challenging to alter since they become heavily embedded within the day-to-day practices of an LPA, meaning that culture is sustained and reproduced. This aligns with Zandvoort et al., (2017: 23) who found that decision-making on climate adaptation planning is heavily influenced by the "default thinking of how things ought to be done". In Chapter 6, this was particularly evident where resources and time were limited, which led to a greater reliance upon heuristics and 'rules of thumb'. This narrows the scope for practice and policy innovation, given the pressures to deliver existing priorities and objectives, most prominently meeting house-building targets (MHCLG, 2019). In this context, the authorities had a weaker ability to undertake pro-environmental action, Spilková and Perlin (2010) both attribute this to the wider cultural frame of planning, which emphasised the delivery of housing and economic growth.

In the case of Chapter 7, 'cultural' factors were also important in understanding the observed outcomes since an individual's decision to not cycle was influenced by the absence of a 'cycling culture' within the city. This marked individuals out as undertaking an 'abnormal' mobility choice, thereby attaching potentially negative meanings to this practice. Whilst the

conception of ‘culture’ differs from that discussed above, it links closely to the idea of attitudes towards particular practices shaping the ability, or preference for individuals to cycle.

Stakeholders within this local government also held an ambivalent attitude towards cycling, which formed part of the ‘cultural’ conditions in which decisions were made. This reduces the likelihood of investment in cycling infrastructure, also identified by Nikitas (2019) and Hardinghaus and Papantoniou (2020). This drove a vicious cycle of negative attitudes towards cycling amongst the general population, and local government stakeholders in the locality. This echoed the analysis in Chapter 5, which identified a failure to undertake changes in practice and policy as being at least partially driven by a long-standing ‘pro-development’ planning culture, with previous development practices further embedded by the status quo bias.

The planning culture in place can also act to support pro-environmental actions, which was evident in Chapter 6. Here, several strategic authorities made use of experiential knowledge, and their influential position within the local development market to alter the localised development culture. This helped to foster new standards and expectations of the inclusion of climate mitigation and adaptation measures within new development. This is an indication of how the powers of influence within a planning authority can be deployed to meet pro-environmental objectives, beyond the use of ‘harder’ forms of regulations. Buitelaar et al., (2007) suggest that the development of innovative practices is a means to 'bypass' long-established rules and norms embedded within a dominant ‘planning culture’ of a nation, thereby achieving desired objectives (de Vries, 2015).

In Chapter 5, a ‘pro-conservation’ culture within some local authorities meant that policy experimentation was supported within the local government. Here, a shared understanding had developed between a public authority and the private sector over the value and purpose of such measures. These influences convey through symbolic means within development

framework and strategies, which helped to organise social relations between diverse stakeholders echoing Dembski and Salet (2010) and Savini and Dembski (2016) who illustrated the role of symbolism in organising social relations. Gualini (2007) terms this process as institution-building, with new rules and symbols of planning forming new 'rules of conduct' and shared perspectives over desirable development. Such processes, therefore, help to develop shared perceptions and a collective narrative of action and change which were embodied within new planning frameworks and strategies. This is supported through a behavioural analysis, with Katona (1975) and Simon (1986) emphasising the role of the cultural environment, in developing shared understandings and norms, which are often conveyed through symbolic means.

8.3.4: Individual skills and experiences

Despite the challenging circumstances outlined in the previous section, there was also evidence in the thesis that individuals had significant agency to shape planning and development outcomes to meet environmental objectives.

The importance of interpersonal relationships and trust between key stakeholders across different planning authorities was a key theme throughout Chapter 6. The informal relationships between individuals could act as a driver of action and help foster a context of cooperation and collaboration. This could act as a counterbalance to incentives which drive competition between planning authorities, as also found by Lee and Koski (2012), Feiock et al., (2009) and Thurmaier and Wood (2002).

These relationships could be utilised to build a shared understanding of the purpose and need for particular financial measures to support ecological mitigation and protection programs, as illustrated in Chapter 5. The interdependence of actors to meet a mutually satisfactory outcome means that building relationships and agreements points to why negotiation skills are, as concluded by Holsen (2020), a core aspect of a planner's competencies. This is because building positive relationships and trust is necessary to facilitate a successful negotiation (Lewicki and Polin 2013; Butler, 1999). In Chapter 5, the knowledge and

understanding of LPA officers helped to identify the shared interests and barriers to reaching an agreement from a private sector perspective. This meant they were able to reach a position of common gain through negotiation enabling cooperation to occur (Fisher et al., 1999; McMarty and Hay, 2015).

Here, the ability to frame information, and make use of data to support the arguments and counter challenges, spoke to the importance of interpersonal skills in supporting positive environmental outcomes, something shared by the work of Krizek, Forsyth and Slotterbak (2010). Interpersonal relationships within a planning authority were also an important influence on the ability to implement pro-environmental practices. In Chapter 5 the lack of support from senior colleagues was an indication of how interpersonal relationships can also entrench the policies currently in place. This also limits the potential for deviations from present policy or the ability for innovation of planning practices and policies.

In the same chapter, interpersonal relationships within local authorities meant there was an opportunity for officers to employ their knowledge and skills to frame the policy change in a manner to foster support from colleagues. The existing positive relationship between officers and leadership was identified as being important in facilitating this approach. This combination of interpersonal skills and knowledge was also identified by Consoli et al., (2016) and Johnson et al., (2019) as being important in implementing successful environmental management programs.

Despite the challenging financial circumstances found within many local authorities in Chapters 5 and 6, the authorities who were able to retain staff with experiential knowledge, and specific environmental skills to address the environmental challenges were in an effective position to develop new pro-environmental practices and policies. For example, participants in Chapter 5 emphasised the need for this knowledge to successfully develop and implement policies to support financing through land value capture mechanisms. Equally, in Chapter 6 the authorities who most successfully implemented environmental policies and practices were those who had the resources to devote to training and retaining staff with the necessary

knowledge surrounding a suite of environmental issues. As a result, the personal qualities of an individual i.e. their skills and knowledge were identified as a strong influence on the ability of planning authorities to enact pro-environmental practices.

The influence of individual agency was observed in Chapter 7. Whilst Social Practice Theory emphasises a move away from the individual, the conclusions of this study highlighted the importance of such factors, with the skills (termed competencies) of the individual being identified as a core indicator of the prosperity to cycle. Like in the other papers, the presence of particular competencies (i.e. confidence and ability to cycle on busy roads) was important in overcoming a range of contextual barriers, in the physical environment i.e. a lack of appropriate cycling infrastructure.

This section has illustrated the scope for an individual to exercise their agency to develop particular planning policies and practices, as well as the ability to engage with particular sustainable practices, including cycling. The ability to do so is partially shaped by their skills and experiences, however, there are many other factors which can limit their agency, which are typically the circumstances and context which they operate within. For example, the financial circumstances in which decisions are made can constrain the opportunity space, with particular priorities privileged e.g. the delivery of housing, limiting the scope to introduce pro-environmental practices and policies. As discussed earlier the cultural conditions in which decisions are made can also limit the agency of an individual to enact change, even where they possess the necessary skills, knowledge and experience to do so. In other circumstances the physical environment places limits upon an individual to adopt particular practices, limiting the scope for widespread behavioural change. Beyond this, the responsibility and power which an individual holds is another important factor influencing their ability to exercise agency. As a result, this means that the ability of individuals to exercise agency is variable, and in many situations is limited.

8.3.5: Summary

This section set out four key themes which relate to behavioural aspects of the process of developing and implementing environmental policies and practices within urban planning. These were developed across three separate empirical studies, which were diverse and covered several of the contemporary challenges within urban planning. Yet, it was evident that despite the differences in the challenges examined there remained several common themes across the papers. These themes illustrated several key challenges in developing and implementing pro-environmental policies and practices. These themes were related to the nature of the impacts of environmental challenges, which are often experienced in the long term, with the pay-offs of adaptation and mitigation activities being uncertain. The context in which planning and development take place also impacts the ability of planning authorities to address environmental threats, creating resistance to the development and implementation of new policies and practices through market and financial pressures, collective behaviours and cultural norms.

There was also an indication of how these norms, alongside individual skills, knowledge and experience can provide agency for individuals to enact innovation policies and practices, enabling mitigation and adaptation activities to occur. These themes are drawn upon and extended later in the chapter, where a set of recommendations for policy and practice are outlined in section 8.3. Before doing so, there is a consideration of the value of a behavioural approach in identifying and explaining these themes.

8.4: Research Question 2: How does the application of a behaviour approach support the identification and explanation of the impact of the behaviour of planners?

This section will reflect upon the methodological approach taken within this thesis, it begins with a short introduction to behavioural theories, which is followed by a description and consideration of reasons which underpinned the selection of different behavioural approaches in the thesis. This includes a consideration of differences between the theoretical position with a focus on how rationality is conceived, and how different approaches consider, and

understand the different factors which influence behaviour. This is followed by a reflection on the utility of behavioural approaches, which underlines the value of such an approach in the inquiry in this thesis.

8.4.1: An introduction to behavioural approaches

The purpose of any theory within an academic inquiry is to provide a means to describe and explain a given phenomenon, which leads to the production of new knowledge and understanding of a given situation (Silverman, 2017; Strauss and Corbin, 1994). This thesis applied a selection of theories, which encompass a diverse range of theoretical perspectives which account for human behaviour. This diversity is illustrated through the heterogeneity of disciplines from which a behavioural approach draws, including psychology, sociology, economics and neurosciences (London School of Economics, 2012; Rain-Kwon and Silva, 2019). Therefore many different models of behaviour exist, some of which have a series of ontological and epistemological differences (Sovacool and Hess, 2017). As such there are approaches which largely utilise quantitative approaches e.g. agent-based modelling, and others such as Social Practice Theory rely upon qualitative methods.

Whilst these approaches are diverse there is a commonality in their utility in identifying and explaining the factors which motivate (or demotivate) decision-making and behaviour by individuals and economic agents (Morris et al., 2012). Planning processes necessarily involve the interaction of multiple stakeholders, individuals, developers and local planning authorities, each of whom holds a diversity of values and interests. These stakeholders interact in diverse socio-cultural environments, which shape the conditions in which decisions are made. A behavioural approach ensured the research focused on decision-making and the interplay with the context in which decisions are made.

The thesis used a behavioural approach to facilitate an understanding of the implementation and development of pro-environmental policies and practices within planning and development. Therefore, the methods sought to explore the activities and processes of

planners (Watson, 2002), using a behavioural approach to identify how particular activities are enabled or constrained by several factors.

The following section will set out how the application of a behavioural approach provides a framework producing a rich, and detailed set of explanations for the observed behaviour and outcomes. As a result, this section will also illustrate how a behavioural approach can contribute to the tradition of planning research informing or influencing future practice and policy recommendations. Therefore, the application of behavioural theory can provide a research output which enhances the effectiveness of the particular policy instruments (Farthing, 2015; Davies et al., 2015).

8.4.2: The selection of behavioural theories

This thesis selected three theoretical approaches which form part of a wider 'behavioural approach', to illustrate the versatility and adaptability of such an approach. The adaptability ensures that a variety of stakeholders' behaviour can be described, explained and predicted. This thesis illustrates how a behavioural approach can reveal useful insights across a wide range of contexts, illustrating the flexibility of this approach (Davies et al., 2015). However, the application of such theories had been limited within planning and development, in comparison to many other disciplines within the social sciences (Rain-Kwon and Silva, 2019). This illustrated the need for further application and experimentation, as was undertaken in this thesis.

Behavioural models differ in their treatment of the decision-making processes, different models' variability places a lesser or greater weight upon cognitive processes, the physical environment and the socio-cultural environment. This means that they model the decision-making processes and the formation of economic agents' intentions and motivations in different ways.

8.4.3: A rejection of 'rational' decision-making models

Behavioural theories based upon the rational economic model provide simplicity in understanding economic agents' behaviour, by assuming that all decision-making is driven by maximising individual gain, with no limits placed upon information gathering and processes (Becker, 2013; Barnes, 1988). However, this thesis chose to reject this approach. Firstly, as set out in Chapter 3 such theories were underpinned by several previously dominant normative theories of planning, most notably systems and procedural planning theory (Allmendinger, 2017). These approaches had a core weakness, which was their reliance upon the assumption of individual rationality, rather than integrating the limitations of bounded rationality (Simon, 1976; Kahneman and Tversky, 1982). Therefore, the assumptions that any issues could be solved so long as a 'rational' process was followed proved unrealistic, due to information limitation as well as the bounded rationality of individuals (Taylor, 1997; Allmendinger, 2017).

Through the research process, it was clear that the context in which many decisions were made was characterised by resource limitations, time pressures and incomplete information regarding the outcomes of decision-making. These conditions are aligned with those of bounded rationality (Forester, 1984; Zhang, 2019). This meant that the decision-making observed in this thesis was made under conditions of risk and uncertainty, where the conditions of bounded rationality affect rational decision-making to the greatest extent (Kahneman and Tversky, 1982; Angner, 2012). By rejecting a notion of rational decision-making (as set out through the standard economic model), the application of a behavioural approach opened up the possibility of integrating a wide range of variables which can affect human decision-making.

8.4.4: Integrating bounded rationality

The extent to which deviations from rational decision-making are considered varies between different behavioural models. New Behavioural Economics represents a position that deviations from substantive rationality result from the influences of cognitive biases and heuristics. This approach emphasized the cognitive processes of individuals, illustrating their

fallibility in maximising utility when decisions are made under conditions of risk and uncertainty. In this case biases and heuristics provided explanatory power to understand observed outcomes, which are ignored by rational decision-making models (Becker, 2013; Angner, 2012). The acceptance of bounded rationality also reflects the reality of decision-making in planning with an acceptance that stakeholders balance multiple influences, alongside their personal preferences and influences of multiple biases and heuristics (Allmendinger and Tewdwr-Jones, 2002; Tait and Campbell, 2000).

This approach was applied in the exploration of decision-making processes within local authorities utilising land value capture processes to fund ecological mitigation programs in Chapter 5. This focused on the role of framing and the status quo bias, which were seen to facilitate or hinder changes in practice and policy respectively. However, there is a wide range of cognitive biases and heuristics which affect decision-making, each of which can impact the ability of economic agents to maximise utility.

8.4.5: Integrating the socio-cultural environment

However, a focus purely on cognitive processes failed to account for the wider context of decision-making. The papers in this thesis dealt with these factors differently. In Chapter 5 the concept of 'planning culture' was drawn upon, which encompasses the sociological environment in which decisions are made (Knieling and Othengrafen, 2015; Sanyal, 2005). This provided a means to describe how collectively embedded norms, routines, values and attitudes within organisations impacted decision-making. As a result, it was found that this could constrain or enable the development and implementation of particular policy instruments.

This approach can be closely linked to the view of rationality set out through Old Behavioural Economics. This emphasises that decision-making can be influenced by experiential knowledge alongside the sociocultural environment. These factors shape an individual's

norms, attitudes and habits. In particular, Chapter 5 illustrates that these factors can be captured through a ‘planning culture’ within particular LPAs, which acts as a decision-making heuristic, providing a ‘logic of appropriateness’ that bounds the scope of behaviour.

Chapter 6 illustrated the impact of the decision-making environment through an application of game theory. This approach holds no theoretical position on the context or content under examination and instead provides a framework in which an understanding of 'rules of the game', and instances of strategic interaction can be examined. Pure game theory relies upon the foundations of the rational economic model, which states that ‘players’ make decisions purely based on maximising their utility (Osbourne, 2004; Binmore, 2007). Whilst this provides an understanding of the competitive dynamics at play in decision-making, this thesis illustrated that this provides an incomplete and partial account of the dynamics and interaction between development stakeholders.

Instead, a behavioural game theory indicates how norms and institutions might exert an influence on the strategies employed by development and planning stakeholders (Camerer and Fehr, 2004; Golman, 2020). In particular, Chapter 6 illustrated the importance of fostering cooperation and building shared institutions, in doing so this helped both parties meet mutually beneficial outcomes, often overcoming challenging financial and socio-economic conditions. This illustrated how this analytical framework might be employed to better identify and understand how altering informal and formal institutions (i.e. trust and shared planning frameworks) might be more likely to result in certain outcomes over others.

In both cases, the application of common concepts drawn from ‘planning culture’ and Old Behavioural Economics ensured that the social context of planning and development processes was accounted for, reflecting a conception of property markets as being socially constructed (Guy and Henneberry, 2000; Christie et al., 2008). This means there is an important role for personal relationships, trust, reciprocity and peer networks in determining

planning and development networks. Similarly, social relations were found to influence transport decision-making, with the collective decisions and attitudes within a locality affecting personal mobility decision-making (Lucas and Jones, 2012).

Therefore, challenging the notion of rationality as set out in the standard economic model meant that the analysis encompassed the influence of socio-cultural context, skills, experiences, values and personal relationships (Simon, 1986; Kahneman and Tversky, 1982). The thesis argues that a reliance upon cognitive processes alone fails to encompass the effects of the context of decision-making, and instead provides a potentially more narrow set of explanations for seemingly irrational behaviour. Instead, integrating concepts of Old Behavioural Economics, which includes factors which encompass values, norms and attitudes provided a more complete conception of behaviour. In doing so, the notion of individual utility maximisation (or satisficing) was not rejected, instead different forms of rationality were considered, thereby capturing a variety of factors influencing decision-making.

8.4.6: Integrating the physical environment

The sociological environment forms a central aspect of Social Practice Theory (SPT). This approach conceives attitudes, values, and symbolic and cultural factors as 'meanings' as part of a three-part framework of elements. In this way, there are similarities with Old Behavioural Economics, since both identify such factors as being significant drivers of decision-making. Here, the application of the SPT framework enabled the research to identify the cultural factors which can support or hinder an individual's decision to cycle within a particular locality i.e. associations with freedom or lower social status.

However, Social Practice Theory expands the identification of 'external' factors to encompass the influence of physical factors in decision-making. Such factors may be of lesser importance when analysing certain contexts of decision-making e.g. the implementation of new environmental policy (as illustrated in Chapters 5 and 6). However, in many other situations,

particularly in the analysis of behavioural changes including cycling they are central in the explanation of outcomes and understanding of how to induce desirable behavioural changes.

SPT also more emphatically moves away from individual rationality, by challenging the conception of individual rationality altogether. Instead, it seeks greater distance from the individual, instead distributing behavioural influences between the mind, the physical body and the surrounding socio-cultural and physical environment (Warde and Southerton, 2012; Lizardo, 2012). This means that the focus moves from the individual, instead viewing all factors as potentially equally important in shaping behaviour, not just as external factors which interact with individual cognition (Keller et al., 2016). As a result, the model offers many routes and possibilities to influence desirable behavioural changes.

8.4.7: A flexible approach to behavioural theory

As discussed above, the research applied three separate theories which differ significantly in their conception of rationality and their treatment of external (i.e. the contextual, material and socio-cultural environment) and internal (i.e. cognitive) influences upon behaviour. This thesis sought to apply a variety of theories, with each leading to a varied description and understanding of the situation under examination. When considering the application of different behavioural traditions, the thesis sought to follow a flexible approach, combining and exploring the application of theories and concepts drawn from a diversity of behavioural traditions.

This approach was based upon Haack's (2004) reading of philosophical pragmatism, which offered the analogy of a crossword, representing a given research problem, with different 'pieces' of evidence 'solving' a problem through the use of a range of different theoretical approaches. Such an approach necessarily requires a researcher to be flexible, and open to new concepts, ideas and theories. This approach is illustrated through the variety of behavioural perspectives and traditions applied within this thesis. The value of this approach was illustrated in earlier sections of this chapter since the application of different theories

highlights different aspects of decision-making, and points toward various avenues for change to occur. Therefore, the application of a diversity of theories through planning research led to a rich set of findings.

The application of Social Practice Theory led to the broadest, and perhaps the most diverse explanations of behaviour, since the three-part framework encompasses many potential explanatory factors for behaviour, and combined them into a model of practice. This provides a means to integrate a variety of factors, producing multiple explanations for the role of different factors which supported, or hinder the uptake of cycling.

In contrast, the analysis in the other chapters integrated concepts from multiple theoretical positions. For example, Chapter 5 discussed how previous studies utilised the concept of planning culture to illustrate how embedded norms and attitudes created routinized behaviours within planning organisations. However, none had illustrated how such routines could interrelate with cognitive biases to further shape the potential of actors to exercise discretion within planning practices. Therefore, the combination of different theories and concepts provided a novel explanation of the observed behaviour and outcomes of policy development and implementation.

Similarly, and as argued above, the application of 'pure' game theory, would have failed to fully capture the influences of behaviour within strategic interaction, by simply focusing on utility maximisation. Instead, integrating concepts such as norms and experiential knowledge, drawn from behavioural economics, provided a richer and more complete explanation of behaviour.

Wilson and Chatterton (2011) argue that different models of human behaviour can co-exist since different theories focus on different aspects of human behaviour. The differences in theoretical frameworks within this thesis meant that different descriptive and explanatory

factors were emphasised across each of the three papers, illustrating the diversity of factors which can drive human behaviour and influence particular planning and development outcomes. In doing so, this revealed richer insights into human behaviour and the outcomes of such behaviour. The integration and comparison of the insights from different theories, therefore, provided a means to address the relative weaknesses, or gaps in certain conceptions of behaviour (Sovacool and Hess, 2017; DellaValle et al., 2018).

8.4.8: Summary

In Chapter 1 the thesis set out several examples of how behaviour can help to explain sub-optimal outcomes in environmental objectives in urban planning within Boxes 1.1 – 1.3. Later, within Chapters 2 and 3, the thesis set out what was termed a 'behavioural gap' in planning theory. Here, an argument was developed that previous attempts to theorise planning often failed to fully consider the role of human behaviour, or embedded unrealistic assumptions of behaviour. This section has reflected upon the experiences of the application of a variety of behavioural theories within varied planning contexts. This diversity was useful in underlining and explaining the value of this approach.

Firstly, the approach can reflect the competitive nature of planning and development, accepting that an important driver of decision-making is the desire to maximise (or satisfice) utility, alongside other influences set out in this discussion. This helps to avoid the naivety of the communicative planning approaches, and more accurately reflects planning practice, by integrating bounded rationality the pitfalls of unrealistic assumptions of the standard economic model are avoided. Beyond this, the section has illustrated that an embrace of a wide range of behavioural theories can lead to an identification of the importance of the socio-cultural environment, with particular attitudes, values and norms being important influences of behaviour. Rather than the theory embedding assumed values and norms, the application of a behavioural approach supported a neutral, 'analytical' perspective within the three case studies.

Overall, the application of a behavioural approach in this thesis has illustrated its adaptability and utility in exploring the challenges and opportunities when developing and implementing new planning practices and policies. Each approach ensures there was a tight focus on human behaviour and decision-making, with a wide range of the drivers of this behaviour placed at the forefront of the description and analysis. This ensures that the often overlooked agential factors in planning practice are placed into the centre of the inquiry, by doing so it was possible to develop a series of suggestions for the alteration of planning policy and practices to effectively tackle a series of environmental challenges.

8.5: Research Question 3: How can the application of a behavioural approach support the development and justification for the adaption and adoption of existing and new pro-environmental practices and policies within urban planning?

Each of the chapters explicitly sought to provide a set of contributions for planning practice and policy, and this formed a key aspect of the thesis. Therefore, this research question reflects this, setting out how the application of a behavioural approach can be used to develop and justify changes in planning practices.

Whilst each paper examined a different aspect of planning practice there were a series of common recommendations which develop and expand the material presented in Chapters 5, 6 and 7, as well as the synthesis developed in response to research questions 1 and 2 in this chapter. This section will therefore consider how this approach can develop a series of insightful, and potentially novel recommendations for planning practice and policy-making (Blaike, 2000; Farthing 2015). Firstly, the particular strengths of this approach will be discussed, and then as an illustration of these strengths, a series of recommendations for the adaptation and adoption of existing and new pro-environmental practices and policies within urban planning will be set out.

The use of behavioural theory is particularly well-suited to developing insights for planning practice and policy-making due to a number of its strengths. As was discussed in detail within

Chapter 3 there are attributes of everyday planning practice as well as more strategic policy-making processes which are inherently uncertain with inaccurate or incomplete information being common (Forester, 1989; Tait, 2009). This means that the insights drawn from behaviour economics, e.g. ‘bounded rationality’ align particularly closely with planning practice. Other common aspects of planning, such as the strategic interaction of a range of actors, each with their values, intentions and objectives, are well suited for analysis through Game Theory (Lord, 2012; Adolfsson and Brorstrom, 2020; Claydon, 1998). This approach helps to conceptualise the strategic behaviour of actors, which may undermine or exploit planning procedures to maximise a pay-off (Lord, 2012).

The thesis also illustrated how behavioural theory can identify, analyse and explore the impact of a wide variety of influences on behaviour. This enables a researcher to identify and explain the implication of these factors. These range of socio-cultural issues are often embedded within everyday behaviours such as ‘planning culture’, ‘meanings’, procedures and routines (Adams, Croudace and Tiesdell, 2011; Knieling and Othengraften, 2015; Sanyal, 2005).

Behavioural concepts and theories such as those drawing from behavioural economics and sociology provide a means to identify and structure these influences and their impact on planning outcomes (Shove et al., 2012). Equally, they also provide a means to structure the influence of other factors such as economic strength and competition in negotiations and these can limit, or enable particular courses of action (Lord, 2012; Samsura and van der Krabben, 2012). Finally, the use of social practice theory in this thesis also illustrates the importance of the physical environment in shaping behaviour, since planners often have an (in)direct influence upon this it provides a toolkit to direct the provision of physical assets and changes which are necessary to meet particular objectives (Shove et al., 2012; Spotswood et al., 2015).

The adaptability of a behavioural approach means that is it particularly useful for planning research, given the diversity of issues which planning faces (Rain-Kwon and Silva, 2020). Planning takes place across a range of scales, addressing, balancing and assessing a range

of policy areas (Couch, 2016). This means that the adaptability of behavioural theory is well suited to the research of planning.

The following sections will illustrate the utility of this approach by setting out the implications for planning policy and practices of this research. By doing so it seeks to provide an example of the utility of behavioural theory, not only within the Academy but in providing novel and useful recommendations for those with planning practice and policy-making.

These themes encompass the opportunity offered through strong leadership, governance change and physical change alongside the need for additional funding to support environmental policies and practices.

8.5.1: Strong Leadership

The importance of 'cultural' factors across each of the studies indicates that even within a context of limited financial resources, and misaligned incentives the 'culture' within an organisation was a strong determining factor in driving the observed outcomes. Given this, it is important to consider how a culture supporting the implementation of environmental policies and practices might best be developed within local authorities. Strong leadership within an organisation has previously been identified as being important to foster a pro-environmental culture (e.g. Busch and McCormick, 2014; Revell, 2013). Aitken (2007) also outlines how the actions and behaviours of an organisation's leaders are central to shaping an organisation's culture.

Within a local authority, this means leaders assume the role of a policy entrepreneur, Kingdon (1984) suggests their defining characteristic is a willingness to invest resources, which might be financial, but also reputation, time and energy into fostering and promoting a particular policy or practice. The analysis presented in this thesis indicated such actions provided an important opportunity for staff to develop new policies and tools as well as innovation in pro-environmental planning practices.

Whilst the action of leadership figures might be dismissed as largely symbolic (Krause, 2011), this research indicates that such activity is important in altering policy and practice. This aligns to work examining the role of organisational leaders in creating strong pro-environmental norms, which then stimulates and encourages other employees to take 'pro-environmental' decisions (Norton et al., 2015; Onwezen, Antonides and Bartels, 2013). The research in this thesis indicates that individuals developing and implementing pro-environmental policies felt supported where leadership understood and developed such norms in their organisation.

Beyond the local authority, our research indicated that strong leadership can also help to influence development actors outside of a local authority, with action to broker agreement and disseminate knowledge through collaboration and networking (Mintrom and Luetjens, 2017). Doing so supports a range of development stakeholders to be aligned to an environmental agenda and policy platform within a local authority, something also identified beyond the environmental policy (Guy and Henneberry, 2000; Henneberry and Parris, 2013).

8.5.2: Governance change

The evidence regarding the lack of appropriate incentives to implement pro-environmental practices amongst local authorities and private development stakeholders suggests that new mechanisms to provide incentives for the latter to take pro-environmental action are necessary to encourage a variety of actors to enact pro-environmental practices. These can help to build trust and collaboration between local authorities and private developers through a range of institutions (Healey et al., 1999). Examples might include the agreement of voluntary targets as well as the development of relationships between parties.

Such arrangements can be formalised through shared planning rulebooks across several local authorities, or developed through bespoke tenders and localised development frameworks for individual sites or neighbourhoods of an urban area (Friedmann, 2004). By doing so, this enhances consistency between LPAs across a given area (e.g. a region) meaning that the

need for authorities to compete for investment is less easily exploited by private market actors, which encourages the implementation of pro-environmental policies and practices.

These arrangements could also involve financial incentives, in return for the implementation of pro-environmental development practices through subsidies for land remediation and allocation of public development sites (Thornton et al., 2007; Ferm and Tomaney, 2018). Alternatively, concerning the often lengthy time involved in planning processes (Ball, Allmendinger and Hughes, 2009), expedited planning consent for developments meeting certain environmental standards might act as a powerful incentive to meet environmental objectives. As well as providing incentives for action, these actions can also develop trust and positive relationships between public and private development stakeholders (Switzer, Janssen-Jansen and Bertolini, 2013).

A stronger regulatory framework at a national scale, would, like the regional, or localised rulebooks described above, provide a minimum level of standards which would prevent the 'undercutting' of standards, in response to competitive pressures between local authorities. Mandating local planning authorities to provide a higher level of environmental protection would also tackle internal challenges to policy and practice changes to support pro-environmental practices (Goldsmith and Page, 2010). External targets and pressures to drive change across the planning and development also exist in other areas of planning, not least, house building targets, which Chapters 5 and 6 illustrate as one of the strongest drivers for development decisions and policy-making within local authorities (Ferm and Raco, 2020). This indicates the potential power which top-down measures command, something that could be feasibly replicated with environmental standards.

That said, the introduction of national minimum standards may risk lower-value localities receiving less investment due to greater construction costs, especially in the context of viability-based planning approaches (Colenutt, Cochrane and Field, 2015; Ferm and Raco, 2020). This may then perhaps reduce their scope to tackle a range of socio-economic challenges directly, or indirectly through development, creating a divide between localities

where conditions can support such activities versus those that fail to do so (UK2070 Commission, 2020; Dunning and Lord, 2020).

8.5.3: Resources

The analysis indicated that the financial context that local authorities operate within also has a significant impact on their ability to develop and implement pro-environmental practices and policies. This formed a key explanation for the weak negotiating and bargaining position that many authorities are placed within. In such circumstances, there are financial incentives for private sector stakeholders to exploit this position for short-term gains (Greenberg, 2015; Kang and Homsy, 2020).

The lack of financial resources also results in a dearth of resources to develop new policies and practices, upskill staff and invest in the necessary services and infrastructures to meet environmental objectives, weakening the ability to meet such objectives (Whitten, 2019; Mell, 2020). This means that authorities' budgets must be increased in all authorities, especially those in economically deprived regions (Gray and Barford, 2018). Without doing so they will fail to have the capacity to undertake the necessary actions to address the suite of environmental risks facing local authorities. Without such funding, local authorities will continue to prioritise their resources towards ‘core’ frontline services, with environmental objectives given a lower priority (Bramley et al., 2012; Eckersley and Tobin, 2019). The current heavy reliance upon the private sector actors means that authorities are less able to proactively fund, shape and implement pro-environmental interventions to address and mitigate environmental risk (Hastings et al., 2015; Eckersley and Tobin, 2019).

The costs of investment to reduce environmental risks including biodiversity loss, climate change and poor air quality require a high scale of investment. These financial demands can often conflict with a range of policy areas, however, the medium to long-term costs of inaction are much greater (Koop and van Leeuwen, 2017), creating greater fiscal pressures for a wide range of policy areas in the longer term. As a result, there is also a financial imperative to

commit to the allocation of funds to support activities to address and manage environmental risk effectively. This will inevitably lead to challenging trade-offs for local authorities, which may lead to negative consequences for many socio-economic priorities (Armingeon and Burgisser, 2021).

8.5.4: Physical Change

The importance of physical factors in shaping behaviour was initially introduced within Box 1.3. This considered the impact of the spatial patterns of development and the provision of sustainable transportation infrastructure on transport behaviour and decision-making. This was considered in greater detail within Chapter 7, where physical factors were found to be crucial in shaping several factors relating to mobility decision-making. Physical change includes urban design approaches to increase physical activity (Forberger et al., 2019) and addressing road safety through highway design (Choudhary et al., 2022). Chapter 7 highlights that the physical changes within a locality can have a significant influence on the behaviour of individuals, thereby supporting, or hindering a modal shift. However, it was clear that this does not act to influence behaviour alone, instead, Chapter 7 illustrated that physical change can also embody symbolic or cultural associations, which can further enable or hinder particular behaviours.

This was also observed in other studies in this thesis, for example, Chapter 6 pointed toward the symbolic value of physical change, in the context of development illustrating economic vitality or success within a locality. This illustrates the importance of the physical environment in shaping the attitudes and perspectives of a population. Therefore, by encouraging and implementing development practices which provide physical changes e.g. the implementation of green infrastructure within new development and the urban realm there is potential for individuals and a range of development actors to attach new, positive meanings (e.g. positive aesthetic values) to such changes, as found by Lamond and Everett (2019). These changes can also set new precedents of environmental standards and raise expectations of new development, thereby improving environmental standards within new developments.

8.5.5: Implications for Planning Education

The analysis also reveals several issues of relevance for the education of planners. It was evident that planners must possess the necessary skills and knowledge to support the development, implementation, and negotiation of a range of pro-environmental policies. This can range from the benefits of active travel infrastructure to building standards to address heat stress and flood risk. Here, and in agreement with Hürlimann et al., (2022) and Carter and Sherriff (2016) there is a need to sustain and expand education regarding the drivers, impacts and potential adaptation and mitigation measures to address environmental risks. Given the research identified the vital role of such knowledge, this ensures that planners are well-placed to understand and advocate for policies and strategies which can support the adaptation and mitigation of a range of risks within the development sector (Crawley, 2019).

The thesis also illustrates the need for the inclusion of the role of behavioural theory in planning education. An understanding of different behavioural models can help planners to identify where values, norms and biases might affect the implementation of environmental policy response. For example, an understanding of the importance of framing information might enable planners to develop and present particular policy responses to foster support amongst their local authority colleagues and private sector stakeholders. Behavioural theory also emphasises the diversity of factors involved in decision-making, this can help to overcome assumptions that actors are motivated by profit maximisation alone. This would assist in identifying and understanding the role of motivating factors such as values and norms, and in doing so could support environmental objectives by altering their approach to policy-making and development negotiations through the identification of shared values, norms and objectives.

Other theoretical approaches presented in this thesis e.g. Social Practice Theory might be applied to identify the variety of factors that can influence the uptake of particular sustainable

practices among individuals. By doing so planners can identify how policy and investment decisions can lead to the greater provision of particular infrastructures or the use of policy frameworks and strategies to foster positive cultural associations with particular practices e.g. the implementation of sustainable technology in residential development.

Secondly, and in support of the calls of Claydon and Chick (2005) and Taylor and Close (2020), there is a need to further develop the negotiation skills of planners. In particular, to develop an understanding of how the implementation of environmental measures might be secured through land value capture negotiations. This might include raising the understanding of the role of negotiation in planning practice or identifying the range of strategies to influence private sector actors to best support pro-environment action. This may also require an enhanced understanding of development viability and economics to support participation in such negotiations (Taylor and Close, 2020; RTPI and Enventure Research, 2017).

8.5.6: Summary

This section has set out five areas which draw upon the analysis provided throughout this thesis to inform policy, practice and educational change within the planning sector, addressing research question 2. If implemented these broad recommendations could improve the ability of the planning system to address the suite of environmental challenges described in Chapter 1. Many of these themes are related to changes which can be implemented by planning authorities themselves. This includes changes to the leadership style and behaviour, which then has a significant impact on the behaviour of other individuals within a local authority. These leadership changes can also drive changes in the governance arrangements and funding of planning initiatives supporting pro-environmental policies and practices, two themes raised in this section. These recommendations also have relevance for Central Government, since they have significant legal and financial powers to more effectively support pro-environmental planning policies and practices at a local level. Finally, there are recommendations for the education of planners, which will enhance the skills and knowledge

base of practising planners, thereby enhancing their agency to develop and implement pro-environmental policies and practices within local authorities.

The final sections reflect more directly upon the research process, setting out the ongoing impact of this research as well as a reflection upon the experiences of research and publication of this research.

8.6: Societal, Theoretical and Scientific Relevance:

To highlight how different aspects of this thesis have relevance to different audiences and within different contexts, three areas of relevance are set out below. These are the societal, theoretical and scientific relevance of this thesis. Clearly, there is overlap, and connections between each of these three areas, however for clarity and to underline the particular relevance of different aspects each area is considered below in its own section. This section clarifies the core contribution of the thesis, this is set out ahead of a wider reflection upon the research processes.

8.6.1: Societal relevance

This thesis focuses on how planning might seek to mitigate and support the adaption to several environmental issues, which together represent some of the most pressing threats to humanity (UNEP, 2021; IPCC, 2022; IPBES, 2019). As a result, the conclusions are highly relevant to planning practitioners and policy-makers.

Firstly, the thesis added further evidence to the calls for increased funding of planning functions of local governments to effectively support their efforts in addressing environmental threats (Hasting et al., 2015; Whitten, 2017). The use of behavioural theory enabled the thesis to underline how limitations in funding are likely to limit the ability of local planning authorities to implement the necessary changes in policy and practice in a range of ways. This included affecting the incentives to alter policy and a failure to possess the necessary information to make effective decisions. Furthermore, it also creates competitive pressures between local planning authorities, often resulting in negative environmental outcomes in the aggregate.

Secondly, the thesis underlined the need for policy-makers to closely consider the impacts of overarching spatial governance structures in which planning operates i.e. local to regional authorities. Chapter 6 highlighted how contrasting structures can help to foster or undermine collaboration in the development and implementation of environmental objectives in planning.

Thirdly, the thesis illustrated the agency that individual planners possess. Despite the challenges of balancing conflicting objectives often with limited resources, there was extensive evidence that many participants in the research work still managed to address environmental issues effectively. This was often a result of their negotiation skills, knowledge and experience. Therefore, this links closely to the earlier point that planning authorities must be adequately resourced to attract, and retain those with the necessary skills and experience to address the environmental threats which face society today.

Overall the research presented within this thesis adds to a body of literature that urges society to recognise the vital role that planning and planners play in addressing environmental threats. This represents the core societal relevance of this thesis.

8.6.2: Theoretical relevance

The thesis utilised a variety of behavioural theories to underpin its theoretical framework, by applying these theories to explore the role of planners and planning in addressing environmental threats. In doing so, it also presented the utility of behavioural theory within planning research, which Rain-Kwon and Silva (2019) and others (e.g. Lord and O'Brian, 2018; Dunning, 2017) note as underdeveloped. This section will set out the core theoretical relevance of the thesis.

The thesis began with a review of several prominent planning theories, concluding that a core and common failure of these theories was the lack of consideration of the role of behaviour within planning. Several examples were drawn out in the early chapters of this thesis. This includes the failure of Communicative Planning to consider the role of strategic behaviour. Another approach, rational planning approaches, fails to integrate the concept of bounded rationality in their understanding of behaviour within planning practices. The thesis goes on to

illustrate how the conditions of bounded rationality are often highly relevant to actors within planning and development processes, given the limitations in resources and often conflicting and uncertain objectives within planning.

The thesis then presents the utility of a behavioural approach to planning theory through the presentation of three case studies in Chapters 5 - 7. This supports a core argument that the variety of behavioural theories means that researchers can select a particular theory to explore and explain how planning processes and outcomes are affected by behaviour in a variety of contexts. This support one of the thesis's core argument, surrounding the suitability of behavioural theories within the study of planning, both due to the adaptability of this approach as well as its compatibility with the context in which planning is practised.

8.6.3: Scientific relevance

The non-theoretical findings of the thesis are summarised in this section. Since the empirical focus of the thesis was divided into three separate studies, the scientific findings are partially disparate, yet there were also a set of common themes which ran across the three published Chapter. Some of these have already been discussed when the societal and theoretical relevance of the work was set out.

Across each of the three papers, there was a common theme which set out how different aspects of structure constrained, or enable the agency of different actors to enact particular behaviours or make particular decisions which would support meeting environmental objectives within urban planning. These factors were discussed in the earlier chapters and were made up of the physical, socio-cultural and financial structures. The different cases illustrate this through diverse contexts. Through the synthesis of these studies, it was evident that the combination of these factors creates the conditions which often lead to failures in addressing environmental challenges through urban planning processes.

Financial structures, such as resource limitations or the strength of many private development actors within negotiations and the development arena meant the development and implementation of particular planning policy initiatives were often unsuccessful. Other socio-cultural factors, such as the perceptions and meanings attached to planning i.e. ‘planning cultures’ are often linked to the potential for policy change, meaning that those in leadership positions are unwilling to change policy and adapt practices to meet environmental objectives. Finally, physical structures, such as infrastructures can limit the scope of behavioural change whilst encouraging and perpetuating unsustainable behaviours.

Therefore the core scientific finding of this thesis is to underline the importance of a variety of structures which bound the agency of the planner to enact the decisions and behaviours which support the development and implementation of environmental objectives.

8.7: Research Impact:

The three publications within this thesis have been published in international peer-review journals. The papers have received citations from authors across a range of nations, indicating the relevance of research beyond a British context.

Beyond the journal articles, the research has been disseminated through other forums, with the research underpinning Chapter 6 being presented at two international conferences: The UK-Ireland Planning Research Conference in September 2021, and the Planning Law and Property Rights Conference held in Belgium in July 2022.

The research was also adapted for a practitioner audience and presented at the Institute of Ecology and Environmental Management 2022 Spring Conference, an annual conference for professionals within the ecology and environmental management sector, illustrating the research's relevance beyond an academic audience. Chapter 6 was also adapted for practitioners, initially as a presentation of recommendations for officers within the Liverpool City Region Combined Authority, and subsequently developed into a Royal Town Planning

Institution Research Paper entitled '*Strategic Planning for Climate Resilience'*. The research underpinning Chapter 7 was also adapted, and published as a short article in the University of Liverpool's Sustainability Newsletter, setting out some key recommendations for the city council and other key institutions (e.g. the University) to support cycling as well as a presentation to MerseyCycle, a cycling advocacy group in Liverpool.

8.8: Reflection on the Research Process:

This section will reflect on the research process. This includes the processes of data collection as well as the reflection upon the peer review process, which was important in shaping the overall outcomes of the thesis.

8.8.1: Data collection through the COVID-19 pandemic

The implementation of the research plan was largely successful, despite sections of the fieldwork being undertaken during the COVID-19 pandemic. The data collection for Chapter 5 occurred during a period of lockdown restrictions meaning travel to interview participants in person was not possible. To adapt to this constraint the interviews were conducted via teleconferencing software. This proved an effective replacement to collect the data, although Deakin and Wakefield (2014) point out the inability to collect non-verbal communication such as body language and a more challenging context to build rapport with participants, which can support the discussion of sensitive or controversial content. That said, participants remained engaged throughout the interviews, and were content to frankly discuss disagreements and challenging experiences within their work.

8.8.2: Resource constraints within Local Planning Authorities

The pressures placed upon those working within British Local Planning Authorities have been widely reported (e.g. Hastings et al., 2015). This was a factor affecting the fieldwork, with many invited participants within Chapter 6 being willing to take part in the research, yet ultimately declining to do so citing the significant pressures on their time. This was an anticipated issue, and although the research did not offer a financial reward for participants to mitigate this, the invitations to participants emphasised the potential benefits of participation. The research

captured the experiences and challenges which resource constraints placed upon those working in authorities, meaning there was potential for their participation to highlight the impact of these constraints. As a result, there was potential for the research to contribute to a larger evidence base raising these challenges, thereby potentially influencing future Planning policies and funding decisions.

However, I was aware that this issue may lead to an unrepresentative sample of participants, thereby weakening the findings of the study. To mitigate this, purposeful sampling was used. In Chapter 5 the Local Authority Family Typology (see Lord et al., 2020), which categorises LPAs based on a range of socio-economic and demographic data was utilised in the sampling strategy, thereby enhancing the representativeness of participants in the study.

An alternative targeting strategy was used in Chapter 6, since the research was focused on strategic planning authorities, there were a lower number of such authorities meaning the risk of declined invitations impacting the representativeness of the sample was higher. Therefore, a decision was made to make use of the researcher's existing contacts within those authorities to support access to key decision-makers. This meant that these participants were more willing to take part in the research, mitigating the risks of low participation, even in light of the significant pressures placed upon planning authorities.

8.8.3: The opportunity for 'on-street' recruitment

The recruitment of participants in Chapter 7 took place within the field as they travelled through the study area. This meant there was scope to directly engage and encourage individuals to take part in the research. This meant the risk of low participation was lower than in the other chapters. The incentives for participants to take part in the research were raised during the recruitment process since their participation meant that they provided data relating to the day-to-day experiences and perceptions of cyclists and non-cyclists. The research output could then be utilised to potentially influence future policy and investment decisions within the locality.

Overall, the recruitment of participants was not always straightforward, yet the implementation of different recruitment strategies ensured that the data collected was sufficient to form a representative sample in each study.

8.8.4: The peer review process

Each of the three papers were developed in response to the comments provided through the peer review process. This led to a range of improvements to the papers and provided the opportunity to engage in scholarly debate, at times challenging the reviewer's comments. This also supported the development and clarification of the understanding of the value of applying a range of behavioural theories to resolve environmental challenges within planning. In turn, this was instrumental in effectively developing a coherent research framework within which the three papers sat and developed my ability to critically reflect upon the methodological challenges within such an approach.

Chapter 7 underwent two rounds of review, which helped to reshape the core contribution of the paper. This was the first paper submitted to a journal of those included in the thesis, and as a result, helped to clarify the direction of the overall thesis. One reviewer in the first round of review commented on the opportunity to reflect more completely upon the utility of Social Practice Theory in understanding the modal shift to cycling. This provided an important moment of reflection during my PhD. The conclusion of which was that the focus of the thesis was to test and reflect upon the utility of various behavioural theories in tackling the development and implementation of pro-environmental practices. As a result, this formed an important moment in developing and clarifying the focus of the thesis.

One reviewer questioned the value of Social Practice Theory in illustrating the benefits of cycling, this encouraged greater consideration of the particular qualities of this approach in identifying factors which evaded quantification. These were largely in-tangible benefits including experiences and feelings, which contrasted with alternative, rational and utilitarian evaluation frameworks within transport planning such as the HEAT tool (WHO, 2019).

Within the peer review process of Chapter 6, a reviewer encouraged me to develop an analysis of the interactions and relationship between an individual's psychological processes (i.e. biases and heuristics) and the sociological environment in which decisions are made. This led to a significant revision of the paper to emphasise how these can interact to create, or constrain the space for particular actions to be taken. Whilst the comment was concerning Chapter 6, this became a core aspect of the thesis since each paper considered these interactions in different ways. The various theoretical frameworks used emphasised the role of the physical and/or sociological processes to a different extent. Therefore, this comment was important in encouraging me to reflect more completely on the impact of the emphasis placed on different aspects of decision-making.

In contrast, there were relatively few amendments required within Chapter 6, largely centring upon the need to provide a more complete review of the use of game theory within urban planning and environmental management. This ensured that the empirical content was placed more robustly within the context of previous research across fields beyond urban planning.

8.9: Avenues for Future Research:

The research identified a series of issues which can hinder or support the adoption of planning policies and practices to support addressing poor air quality, climate change and the loss of biodiversity, representing three of the most pressing environmental challenges facing humanity. It also illustrated the utility of a behavioural approach when doing so. However, there are a range of different behavioural approaches and research methods which can be applied to examine this issue. Therefore this section will outline several areas which can further develop and expand the research presented in this thesis.

8.9.1: The effect of policy innovation and development

New strategies and policy agendas have been implemented since the empirical research was undertaken, changing the policy environment in which Planning sits. This includes policies of direct relevance to those examined in this thesis, including Biodiversity Net Gain, the UK Net-Zero Strategy, Gear Change (a new national cycling strategy) as well as updates to the National Planning Policy Framework (DEFRA, 2021; BEIS, 2021; DfT, 2020; MHCLG, 2021).

Such changes create new opportunities and challenges within the planning and development sector. Any given study captures a given moment in time, therefore new studies could usefully expand upon this thesis, by examining and reflecting upon the impact of such changes. This research could continue the focus on the behaviour and decision-making of stakeholders across the planning and development sector. The findings of this research could then be compared to the findings presented within this thesis.

The conclusions and implications of the papers within this thesis raised a set of potential challenges concerning the implementation and innovation of such policies, which often were connected to resourcing and staff constraints. Therefore, where policies have been implemented there was an opportunity to examine the experiences and perceptions of policy and practice change amongst a range of development stakeholders.

8.9.2: Use of focus groups

The studies within this paper largely relied upon interviews with individuals, either those in an expert capacity or members of the public. This provided an insight into the perceptions and experiences of a variety of stakeholders within the planning and development sector. Whilst this approach proved to be successful, there was also scope to apply alternative methods to examine the same issues. This could include utilising focus groups to provide the means for participants to discuss the challenges and opportunities of integrating environmental objectives within planning practices and processes in a collective context. The environment of a focus group provides an opportunity for dynamic interaction, often providing insights into collectively held attitudes, beliefs and perceptions (Carey and Smith, 1994; McLafferty, 2004). The collective experience also provides an opportunity for participants to question each other, perhaps clarifying or challenging their understanding of a given experience. By involving colleagues from the same local authority, may also gain a deeper understanding of the impact and importance of interpersonal relationships within a local authority.

8.9.3: Experimental methods: 'toy-games' and randomized controlled trials

Whilst this thesis largely focused on qualitative methods, behavioural research tends to be dominated by a quantitative approach (Van Bavel and Dessart, 2018). Chapter 4 discussed

the various alternative approaches which were considered to explore and address the research questions set out. There were a range of practical and theoretical reasons why these methods were not applied. Yet, this decision also provides an avenue for future research through the application of quantitative methods to explore the questions examined in this thesis.

The application of the 'toy-games' used in Chapter 6 provided a useful analytical tool to understand the dynamics and develop new insights concerning these issues. However, these games can also be deployed in an experimental context by drawing upon the experimental methods developed within economics. Such approaches have been implemented by others within urban planning research (e.g. Glumac, Han, Schaefer and Van der Krabben, 2015; Li et al., 2020).

Participants would assume the role of a local authority planner or developer in these games, and the research would record decisions of their strategic choices, modelling negotiations in planning practice. Preferably these participants would be those currently assumed within these 'games' in Chapter 6 i.e. those working for a local planning authority, or private developers. Participants would be provided with an information set and decisions would provide a dataset regarding decision-making. The recommendations set out in the concluding section of Chapter 6 could then be implemented and the games replayed, providing a set of data pre- and post-treatment, this could then support or challenge the conclusions.

Another methodology to apply in examining the issues within this thesis is the application of randomized controlled trials (RCTs). This approach is regarded as the 'gold standard' of research in many disciplines e.g. Economics and Medicine (Neves, de Castro Neto, & Aparicio, 2020; Pearce & Raman, 2014). Therefore, this approach would provide robust evidence surrounding the evaluation of policy. For example, RCTs could be employed to explore two groups of LPAs, one of which was assigned a particular policy instrument (i.e. to extract greater funds for ecological mitigation, a topic explored in Chapter 5), and the other a control group, with no policy change applied. Following a period of time, the quantitative

outcome of the policy (i.e. total funds secured) could be assessed and compared, providing insights into the effectiveness of the policy approach. As well as providing evidence of the likely success of a policy, this would also further illustrate the diversity and utility of a behavioural approach in urban planning.

However, the implementation of such an experiment within the context of urban planning is challenging (Athey & Imbens, 2017), partially due to the challenges of fair comparison. Given the complexity of policy implementation, there are a plethora of factors which might impact the outcomes of the policy. This means that the effects of a given policy can become entangled with other confounding factors, making robust comparison challenging. Secondly, where the implementation of a policy experiment can impact socio-economic outcomes there are ethical issues in the use of such a setting to evaluate policy (Goldstein et al., 2018). To avoid this, an opportunity might arise where a natural experiment occurs, in which certain authorities, or a group of authorities are adopting a policy instrument, and another group is not adopting this measure. Whilst this cannot be deemed an RCT, since subjects are not randomly assigned, this remains a pragmatic means to emulate the methodology of RCTs.

8.9.4: Research beyond a British context

As described in the methodology chapter this thesis focussed on fieldwork within a British context, since it sought to develop a rich understanding of the particular issues and challenges regarding environmental practices and policies within planning and development within Britain. Although the findings, implications and conclusions of this work are likely to have relevance to other national planning and development systems, there are challenges when translating and applying insights between different national contexts. This is due to the myriad of differences between different contexts, which is captured in the planning cultures literature (e.g. Sanyal, 2005).

Therefore, a potential avenue for future research is a consideration of the same challenges, using a similar, behavioural approach across a range of national contexts. This would firstly provide a set of additional materials providing a description and understanding of a particular

context. There would also be scope for comparative studies, helping to reveal the differences in the approaches, behaviour and outcomes across a range of national contexts. This then could lead to the development of additional policy and practice recommendations across national boundaries, whilst also further illustrating and developing a behavioural approach to planning research.

8.10: Summary:

This discussion chapter has directly addressed the three research questions set out in Chapter 4, these were directed at three areas of inquiry. The first synthesised the findings of each of the three empirical studies in this thesis, situating the findings within the wider literature. Four themes were presented, which together help to provide a description and explanation of the behavioural challenges and opportunities in the development and implementation of planning policies and practices to mitigate and adapt to a series of environmental challenges. These themes are related to the long-term, uncertain nature of these challenges and the diffuse impact of action to address these challenges. Other themes considered the impact of market conditions, competition and the cultural context in which planning is situated, which both had a significant influence on the ability of planning authorities to adopt environmental policies and practices. This section also highlighted the role and limits of individual agency, with the skills, knowledge and experiences of individuals having an important influence on observed outcomes.

Next, the chapter reflected upon the theoretical approach applied in this thesis, addressing research question 2. This considered how different behavioural theories conceived the rationality of individuals and other key stakeholders, which contrasted across the different behavioural theories applied. The treatment of factors which could influence behaviour differed, New Behavioural Economics placed an emphasis on cognitive processes, whilst the integration of the concept of planning culture captured a myriad of socio-cultural factors. Social Practice Theory provided a means to consider the influence of physical and environmental factors in driving behaviour, whilst also offering a framework to illustrate the interplay of a

variety of factors. This chapter therefore illustrated the value and adaptability of a behavioural approach, illustrating the rich toolkit of concepts and theories which can be drawn upon to examine a diversity of scenarios within planning and development practice.

Section 8.5 addressed research question 3, by considering how a behavioural approach to planning theory has significant utility in developing policy, and practice recommendations. It illustrates this value, by setting out how the empirical research and synthesis of these findings could be developed into a set of recommendations for practitioners and policy-makers. These were related to the leadership of local authorities, the governance structures in place, the resourcing of planning initiatives to address environmental challenges and the potential of physical change to drive action. There was also a reflection on the value of the thesis for planning education, with a set of recommendations to provide future planners with the skills and knowledge to best address the environmental challenges of the present, and future.

The remainder of this chapter was comprised of a description of the research impact of the research of this thesis, and a reflection upon the research process underpinning this thesis. This includes a consideration of the experiences of data collection, including the challenges and how these were overcome and mitigated alongside the outcomes and experience of peer review.

The next chapter will conclude this thesis, providing a summary and synthesising each chapter of this thesis, underlining the empirical and theoretical contribution, directly addressing the three research questions set out at the beginning of this thesis.

Chapter 9: Conclusion

This thesis began by presenting evidence of the risks of three of the most pressing environmental challenges. These are biodiversity loss, climatic changes and poor urban air quality. Together, these risk catastrophic damage to human life, infrastructure, homes and businesses. The extent and magnitude of risk vary depending upon local climatic and geographical conditions, though the risks are concentrated within urbanised areas due to the concentration of population and development within these areas.

These challenges are driven by human and economic activities across the globe. To date, there has been considerable progress in developing technical and natural solutions and global and national regulatory frameworks addressing these risks. However, there remains a significant gap between current and required mitigation and adaptation actions to manage and minimise the risks to biodiversity, human life and natural and built assets. Many of the actions require behavioural changes, by a range of actors to drive the rapid and systemic transformation needed to meet adaptation and mitigation objectives.

Spatial planning is well-placed to support these behavioural changes. It can be utilised to manage development and land use patterns through a variety of statutory and non-statutory frameworks and policy instruments. These powers provide a mechanism to address the drivers and risks of environmental degradation through a range of actions. These include influencing land-use patterns and structures, access to appropriate services and amenities, infrastructure provision, design codes, and the provision and protection of natural and open spaces.

The next section of the thesis reviewed a series of key schools of planning thought, which have predominated in the literature. These approaches were diverse, and drew from a range of different academic traditions, though a common critique was their failure to comprehensively understand human behaviour within planning practices. For example, rational planning through design fails to consider how a variety of environmental and physiological factors might

influence behaviour. Where human behaviour was more completely considered e.g. rational comprehensive planning there was reliance upon a set of unrealistic assumptions of human decision-making. This approach also failed to reflect the involvement of political factors, and value-based decisions, and therefore also failed to accurately reflect the 'messy' world of planning.

In contrast, communicative planning sought to remedy the failings of rational approaches through the introduction of communicative rationality. This sought to integrate the values and perceptions of stakeholders and provided practitioners with a set of guidelines to ensure that a diverse set of stakeholders could meaningfully participate in planning discussions. Whilst this addressed the absence of meaningful participation in the development of planning frameworks the naivety of this approach meant that stakeholders representing powerful interests (such as private developers) could easily manipulate the process to their advantage.

A different approach to planning theory moved away from grand, often abstract theorising of planning, and instead sought to develop substantive approaches to focus upon particular planning challenges. This was partially in response to the critique of scholars, and practitioners over the perceived gap between theory and planning practice, therefore this approach sought to provide tools and approaches to tackle contemporary planning challenges. Such approaches include the ecosystem approach, 20-minute cities, and nature-based solutions. These each provide policy-makers and practises with a set of tools and practices to address the environmental threats presented in this thesis. However, the implementation of such tools was often overlooked by these approaches, with the integration of new approaches within planning often requiring significant behavioural and cultural change. Therefore, whilst these approaches do provide a useful toolkit to address environmental challenges they fail to properly address the challenge of policy implementation.

This thesis sought to address the weakness of the previous approaches to planning theory by presenting a behavioural approach to planning. This mirrors the infusion of behavioural theory into many branches of the social sciences, particularly economics and public policy.

Behavioural theory is diverse, and this thesis applies three behavioural approaches, which were Behavioural Economics, Game Theory and Social Practice Theory, representing approaches from across the spectrum of behavioural theory. Each approach rejects the notion of rationality as set by the standard economic model to a different degree and instead integrates a wide range of factors which influence behaviour and decision-making.

The thesis argues that the character of planning practice means that it is well suited to a behavioural approach. Planning decisions are often made with incomplete, or inaccurate information, and must integrate a diversity of values held by development stakeholders. Emotions, negotiation tactics, cognitive biases and sociocultural contexts affect the decision-making processes. Together, this can help to explain why planning and development outcomes often deviate from what a rational, utility-maximising model might predict. Planning is also integral to changing the behaviour of individuals and stakeholders across the economy. This means that behavioural change frameworks and theories provided within a behavioural approach are highly relevant to understanding how planning can best contribute towards the implementation of policies and practices to address the environmental challenges facing humanity.

The thesis presents three case studies which applied each of these behavioural approaches to examining a trio of issues, which represent a sample of the spatial planning approaches which address the environmental challenges set out earlier in the thesis. First, was the introduction of policies and practices to encourage a modal shift to cycling, which reduces carbon dioxide and particulate emissions, which represent drivers of climate change and poor air quality. Second, is the use of land value capture mechanisms to finance the ecological protection and mitigation programs, addressing the drivers and risk of biodiversity loss. Third, was the use of a strategic planning framework to support the mitigation and adaption of climate change.

Collectively the research illustrated that despite the diversity in empirical material there were a set of themes which each highlight how different aspects of human behaviour impact on the

ability of planning authorities to develop and implement policies to address environmental challenges. The first was related to the character of environmental challenges since the impact of these threats was perceived to be experienced in the long-term with the outcome of mitigation and adaption activities being uncertain. This meant that the incentive for planning authorities to implement new policies and practices to address these threats was lacking.

This was compounded by the competitive nature of development markets, with the implementation of new environmental regulations imposing additional costs upon development within a locality. The market-led nature of the development market sets the context for the development and implementation of planning practices and policies. Therefore, this has an important influence on decision-making regarding the implementation of pro-environmental policies and practices. Authorities introducing these policies risked losing inward investment to localities without such policies. Therefore, competition for finite economic investment, especially in areas with lower development pressure was an important theme shaping the response to environmental threats. In contrast, areas with greater development value with strong competition for limited development opportunities had a larger scope to introduce new measures, even where they imposed greater costs upon development. This is partially a result of the preference for particular areas (i.e. London and the South East) amongst private developers, even where more profitable development markets existed.

The use of behavioural theories helped to illuminate the influence of planning culture within an authority, despite the concept of planning being similar across a nation, there remain localised differences in its operation. This can be related to localised political challenges or due to particular socio-economic challenges, both of which can alter the emphasis of planning policies and practices. This impacts the day-to-day practices of planners and investment decisions. As a result, this was identified in this thesis as creating or limiting the agency of individuals to innovate within the development and implementation of new policies and practices to address environmental threats. This could also interact with cognitive biases and heuristics to further entrench stasis in policy and practice. Cultural factors were also seen to

be important in influencing an individual to begin cycling since this helped often negative attitudes and perceptions to be attached to cycling.

The role of an individual was important in determining the outcomes observed in this thesis. This had several facets, firstly an individual's ability to build and sustain positive interpersonal relationships with others within their own local authority, between different authorities as well as with those in private sector organisations. Such relationships were vital in establishing and developing an understanding of the need for new policies and practices to address environmental threats. Beyond this, such relationships could also complement skills in negotiation, both of which can support mutually beneficial development outcomes. The possession of skills, knowledge and experience pertaining to environmental risks, and strategies to combat these risks at a local scale is another important area to support the successful implementation of pro-environmental policies and practices. When examining the uptake of cycling, the skills and experience of an individual also strongly shaped the propensity of an individual to begin cycling. The thesis illustrated how an individual agency, of which the skills and experiences possessed is a significant indicator of the ability of that individual to support and enact change within an organisation or through their engagement with environmentally sustainable practices.

The focus of research question 2 was a reflection and articulation of the utility of a behavioural approach in examining the development and implementation of planning policies and practices. All these approaches focus on identifying and explaining the factors which motivate (or demotivate) decision-making and behaviour by individuals and economic agents. The decision to present and illustrate the application of a diverse set of behavioural theories meant that a wide range of factors which can influence decision-making and behaviour could be considered in the analysis. This enabled the researcher to examine why the outcomes of pro-environmental policies and practices differed across the authorities studied in this thesis, thereby enabling the research to develop recommendations to enhance the development and implementation of such approaches.

Previous research pointed to the failure of behavioural theories which relied upon rational decision-making models, such approaches set out that decision-making is solely determined by utility maximisation. This means that a plethora of influences upon behaviour set by the context of decision-making are overlooked, these include the socio-cultural and physical environment. Going further, this approach fails to accurately consider limitations in cognitive processes and information availability. As a result such approaches poorly reflect the reality of day-to-day planning practice, where time and resource limitations often impact decision-making.

Instead, approaches applied in this thesis integrate bounded rationality, which sets out that cognitive biases and heuristics can affect the ability of individuals to maximise utility in decision-making. These, alongside the norms and attitudes held by individuals, can mean that decision-making appears irrational. For example, the status quo bias was identified as contributing towards stasis in policy-making limiting the ability for the introduction of new measures to address environmental threats, even where the evidence for such measures supported their introduction. Old Behavioural Economics help emphasise the role of the socio-economics environment, and the concept of planning culture shares this facet. Together, they encapsulated the importance of many of these factors, in particular, the collectively held attitudes, norms and values of planners. This also ensured that the perspective of the property market as being socially constructed was illustrated, with evidence of the importance of personal relationships and trust in determining development outcomes. The use of game theory to examine strategic interaction, illustrated this effectively, in contrast, the application of ‘pure game theory’, relying upon the standard economic model would fail to identify the importance of such factors in determining the strategies of stakeholders.

The role of physical factors in determining behaviour was identified through Social Practice Theory, which challenges the concept of individual rationality by focusing the analysis upon a given behaviour (or practice). Instead, this encompasses an important role for the physical environment alongside an individual’s attitudes, perceptions and skills. This approach

provides a framework in which a combination of these factors shaped the nature of a practice (or behaviour), and in doing so illustrates the potential for an extensive selection of interventions to alter behaviour.

Overall, the thesis presents a set of theoretical approaches which differed significantly in their treatment of factors which can potentially influence behaviour. It does so pragmatically, with different empirical challenges requiring the application of different approaches, with the combination of concepts and theories providing a more complete and accurate reflection of behaviour. This also meant that theories from across the behavioural spectrum could be presented, illustrating the rich potential for the behavioural approach to planning research.

The third research question was then addressed, which focused on the ability of behavioural theories to develop recommendations that can be implemented within planning practice and policy-making. This section discussed this approaches strengths, in particular the diverse and flexible nature of behaviour theory, which is well-suited to the contexts in which planning is practised.

To illustrate this strength and to provide an example to further support the response to the research question, this section drew upon the empirical studies and synthesis of this work which then provide the basis for a series of recommendations for policy-makers, planning practitioners and the education of planners. These recommendations provided guidance which could enhance the ability of planning to address the environmental threats outlined at the outset of this thesis. Firstly, the analysis underlined the importance of leadership within a planning authority, since this can help to foster a pro-environmental culture, thereby opening the opportunity space for the development and implication of new policies and practices. Those in leadership roles can invest resources in promoting and resourcing new pro-environmental planning initiatives, helping to overcome behavioural and cultural resistance to changes in policies and practices, both within their organisation and within the wider development and planning market.

The research also pointed toward the importance of resourcing within planning authorities. A lack of resources limited an authority's ability to upskill staff with the necessary skills and knowledge to meet environmental objectives. Furthermore, weak financial circumstances were associated with a weaker negotiating position, further undermining an authority's ability to secure environmental goods through the planning system. The education of planners was also a key theme of recommendations, with the research illustrating the value of a behavioural approach. In doing so, it also pointed toward the value of integrating behavioural theory into the planning curriculum. This can help the planners of the future understand and identify how norms, biases and values may affect the implementation of new planning policies and practices. In particular, it can illustrate how planners can take advantage of the framing of information and help them identify the variety of motivating factors of stakeholders in the development and planning processes. By doing so they can exploit this, enabling the effective implementation of policies to address environmental challenges.

Other recommendations centred upon the role of institutional arrangements within planning. There were several examples within the empirical studies of how the current structure encouraged an 'under-cutting' of standards between authorities, instead, the development of a shared planning framework with minimum standards strengthens the negotiating position of authorities. Finally, the importance of physical change was emphasised in the research, with physical change helping to influence behavioural change, which can cumulatively contribute towards meeting environmental objectives. Beyond this, physical change can also set new precedents and raise expectations of new development, thereby enhancing environmental standards within the local development sector.

The end of the thesis presents a set of areas which warrant further research. The first advocated for new research examining the effects of newly introduced policy agendas within Britain, many of which have direct relevance to the topics examined in this thesis. This presents an opportunity to revisit the topics examined in this thesis, considering the impact of these policies. Equally, new research could apply a behavioural approach to examine the

implementation of environmental policies and practices within different nations beyond Britain. This would present an opportunity for comparative research, examining the differences in approach in Britain presented in this thesis with those in other nations.

A different set of methodologies could also be applied to study the topics examined in this thesis, for example, the use of focus groups could provide an opportunity to gather data in a collective context, which can trigger debate and discussion amongst participants. Alternatively, quantitative methods could be applied to examine the questions set within this, such as randomized controlled trials and the use of game theory in an experimental context. These would provide new insights, complementing those gathered using qualitative approaches in this thesis.

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