

**UNDERSTANDING AND ADDRESSING DYSLEXIA  
IN TRAVEL INFORMATION PROVISION**

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## **Abstract**

This thesis synthesises two previously disparate fields of study by investigating the attitudes and aspirations of dyslexic people regarding travel information provision. One of the first in-depth qualitative studies of its kind is presented, with the findings having significance for academia, professionals and government.

There are four main parts to the thesis. Part 1 considers the literature review. Part 2 presents the empirical research strategy adopted (a series of focus groups and a travel ethnography study). Following this, Part 3 presents the empirical research findings. Finally, Part 4 concludes the thesis, introducing discussion of the key findings, the contribution of the research to the fields of study, and avenues for further research in this area.

It is clear that the attitude towards disabled people is changing. However, dyslexic people are experiencing the benefits of the social model of disability at a considerably slower rate than other disabled people. This is clearly the case across the transport industry, particularly within travel information provision. At present the distinct needs of dyslexic people are being lost within a 'design-for-all strategy'. Essentially, dyslexic people are facing limited travel horizons and mobility-related exclusion as a result.

This thesis effectively supports the drive towards greater recognition and awareness of (and support for) dyslexia within the transport industry. Although the research provides much to consider, it constitutes an important opportunity to positively change this aspect of life for dyslexic people. Dyslexic-friendly travel information can ameliorate the access barriers to transport, which in turn could broaden the travel horizons of these individuals. For Government, the subsequent effects of better information access upon public transport patronage and use of the road network (and the perceptions of the transport industry as a whole) could be extremely positive. It is also certain that the research has the potential to further embed the social model of disability within dyslexia. By changing the fundamental attitudes of the transport industry towards dyslexia would provide a positive step forward in achieving greater social inclusion for dyslexic people. This in turn could provide greater access to opportunities previously unavailable, create better social opportunities, and more positive life experiences.

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<sup>1</sup> This can be found in the main text – page 122.

## Declaration

I, Deborah Margaret Lamont, declare that this thesis is entirely my own work. Where I have consulted or quoted the published work of others, this is always clearly stated. I confirm that this work was done wholly or mainly while in candidature for the degree of Doctor of Philosophy at this University. No part of this thesis has previously been submitted for a degree or any qualification at this University, or any other institution. I confirm that the contents of this permanently bound thesis are identical with the version submitted for examination, except where amendments have been made to meet the requirements of the examiners. This copy has been supplied on the understanding that it is copyright material and that no quotation from the thesis may be published without proper acknowledgement.

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Lyons, G, *et al.*, 2008. Public Attitudes to Transport - Knowledge Review of Existing Evidence. Final Report to the Department for Transport - PPR04/45/4, pp 135-136. Bristol: University of the West of England

Miles, T.R, *et al.*, 2008. Music and Dyslexia. A Positive Approach. Chapter 2 - Things That Can Go Wrong, pp 14-15. Chichester: John Wiley & Sons Ltd.

**Signed:**

**Date:**

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# Introduction

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## Chapter 1

### Introduction

#### 1.1 Background to the Research

There is a long history behind the provision of travel information within the UK. Up until 30 years ago, the responsibility lay entirely with transport service providers. However, in the last 30 years provision has also received considerable governmental attention. This is especially since the importance attributed to it in the 1998 Transport White Paper as part of an integrated transport system (Lyons *et al*, 2003).

The UK transport network has increased in size and complexity over the past decade. Furthermore, needs and levels of mobility have changed. This has created a need for multimodal travel, and hence multimodal travel information (MTI). Consequently, the availability of MTI has increased appreciably, with providers exploiting the growth of the Internet to communicate information to travellers. However, MTI services are only able to *coordinate* a number of individual travel information sources. This means that information which allows the traveller to link up each stage of a multimodal journey is not always easily available. This leads to these types of journeys being undertaken using familiar routes and modes because the individual is unable to easily explore the alternative options available to them. In order to improve the situation, the Government (as part of the Ten Year Plan for Transport) launched 'Transport Direct'<sup>1</sup>, an *integrated* multimodal travel information service (IMMI). This service provides a 'one-stop shop' web-based traveller information service, which presents the public with the opportunity to compare options for national multimodal travel across both public and private modes of transport, receive real-time information and, where appropriate, book and pay online.

The overall success of Transport Direct will be marked upon the extent to which it is being used by the public, how it informs their travel choices and how that subsequently affects their travel behaviour (Lyons, 2006). Transport Direct also has the potential to influence people's attitudes towards different modes and choices of modes by providing them with comparative information for alternative mode choice options (Haydock, 2007). However, this is providing the service has 'usability', i.e.

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<sup>1</sup> [www.transportdirect.info](http://www.transportdirect.info)

that provision is useful and useable. The Department for Transport (DfT) has a research programme in place and has engaged both internal and external expertise to support the development of a useful and useable service. To complement this, the DfT sponsored a PhD studentship, the result of which is this thesis. The aim of the studentship was to focus upon the understanding of user needs and reactions associated with traveller information services and, more specifically web-based travel information such as Transport Direct.

At the outset of the studentship, Transport and Travel Research Ltd (TTR) were commissioned by the DfT (as part of the research programme in place for Transport Direct) to undertake a research study into the travel information needs of disabled people. The purpose of the research was to explore the attitudes and aspirations of these individuals regarding travel information<sup>2</sup>. Determining how Transport Direct might be designed to more effectively meet disabled people's needs was a priority. From the findings of the TTR study (2004a), the author (of this thesis) recognised that people with a learning disability have the greatest needs for accessible information in order to travel comfortably and independently. This conclusion provided the first step towards a more specific focus for the thesis.

Further examination of the cross-disciplinary literature highlighted that there is a clear lack of recognition across the transport industry of learning disabilities. One could infer that the lack of focus has been because the groups representing these individuals have a lower profile, which leads to a lack of recognition and awareness. The limited focus may also be due (in part) to the fact that learning disabilities are 'invisible'. As such, these individuals are not denied access to the transportation system due to physical/infrastructural barriers. Hence, the problems experienced are less easy to define and accommodate.

Dyslexia is the most prominent learning disability in the UK – estimated to severely affect 4-6 per cent of the population. This figure could even be as high as 10 per cent (BDA, 2003b). The British Dyslexia Association (2003b)<sup>3</sup> describes Dyslexia as:

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<sup>2</sup> The disabled people involved in this research included: (1) Physically disabled (2) Blind/Partially Sighted (3) Deaf/Hard of Hearing, and (4) Learning Disabilities (TTR, 2004a).

<sup>3</sup> Important note: The page numbers of the direct quotes extracted from the literature and used in this thesis have not been included. Please contact the author if specific information is required.

*'A combination of abilities and difficulties that affect the learning process in one or more of reading, spelling, listening and writing. Accompanying weaknesses may be identified in areas of speed processing, short-term memory, sequencing and organisation, spoken language and motor skills. It is particularly related to mastering and using written language, which may include alphabetic and numeric notations'*

Dyslexia is a specific learning disability. This means that the difficulties are specific to a certain aspect of learning. In the case of dyslexia, the difficulties are specific to aspects of mastering and using written language. For that reason (and because of the other symptoms associated with this disability), it is reasonable to assume that difficulties will be extremely prominent for dyslexic people when faced with the task of undertaking a journey lifecycle. Such problems may be associated with, exacerbated by, or ameliorated by the provision of travel information.

Further examination of the literature confirmed that the barriers to transport facing people with dyslexia have received very limited attention. The thesis addresses this research deficiency by investigating the needs of these individuals from, and frustrations concerning, travel information provision during a journey lifecycle (i.e. 'the series of stages of information need and use that an individual encounters from deciding to plan a journey to arriving at its destination'). A focus group composed of people with a learning disability (including dyslexic people) held by TTR (2004b) as part of Transport Direct's research programme, was used by the author to confirm the proposed topic. The thesis is based upon direct consultation with people who have dyslexia and experts in the relevant fields of study. The research builds upon the existing literature surrounding dyslexia and provides strong evidence for the negative effects of personal travel upon this disability and vice versa, and the reasons behind those effects.

The social model of disability (which is discussed in Chapter 2) implies that all disabled people should be able to successfully integrate into society. This integration includes the transport environment. There is a diverse range of disabled travelling user groups in existence and a need to meet their information needs as far as possible. Yet the specific information needs of dyslexic people are being overlooked. As a result of the challenges information access presents to them, these individuals will either revert back to habitual behaviour or trips will not be undertaken. This fundamentally results in the individual facing limited travel horizons, reduced mobility, immobility, and social exclusion. This clearly highlights a need to further embed the

social model of disability within dyslexia. By changing the fundamental attitudes of the transport industry towards dyslexia and providing more appropriate journey support, the ability of dyslexic people to travel independently would improve, and build their confidence to do so. In turn, this could provide them with individuality, freedom, escape and control, all symbols of mobility (Freund and Martin, 1993).

## **1.2 Research Aims and Objectives**

Ultimately, the aim of the research was to:

*‘Explore and understand the information needs and usability issues individuals with dyslexia encounter during a journey lifecycle; and translate those needs into recommendations for transport policymakers and service providers’*

The following objectives were significant in enabling the above aim to be achieved:

1. To identify the macro and micro problems<sup>4</sup> facing dyslexic people when accessing travel information during a journey lifecycle.
2. To determine whether these problems are a consequence of poor provision of dyslexia-friendly information, the fundamental traits of dyslexia, or both.
3. To consider whether the problems are specific to dyslexia or have a far wider application to non-dyslexics, though perhaps felt more frequently and severely by dyslexic people.
4. To consider what interventions should be implemented by transport policymakers and service providers in order to address the needs of dyslexic people and assist them through the journey lifecycle.

As the research developed, a further aim emerged as important. The focus groups study concluded that the negative experiences of a dyslexic traveller are not only felt physically. The effects are also felt emotionally. Therefore, a further objective of the research became to connect with the emotional experiences of dyslexic travellers. In consequence, a fifth aim was added to those listed above:

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<sup>4</sup> The term ‘macro’ relates to the higher-level fundamental information processing difficulties associated with dyslexic travel. The term ‘micro’ refers to specific aspects of travel information design that emerge as a result of the macro-level difficulties.

5. To capture and convey the emotional and informational setting within which dyslexic travellers find themselves.

### **1.3    Structure of the Thesis**

There are four main parts to this thesis. Part 1 considers the literature review, which provides the foundations for the empirical research. Part 2 discusses the methodology used in order to generate and analyse the empirical data. Part 3 presents the findings of the two empirical studies, the focus groups and travel ethnography study. Finally, Part 4 unifies the different elements of the thesis, presenting a summary and conclusion.

#### **1.3.1    Part 1: Literature Review**

In order to provide a framework within which the thesis could progress and become more contextually-focussed, the review and synthesis of a multidisciplinary literature base was necessary. Although an extensive review of the literature took place, only the concepts most relevant to the thesis are presented. To understand dyslexia, the reader must first understand the discourses of disability. Therefore, Chapter 2 presents an analysis of the literature surrounding this field of study. Chapter 3 subsequently explores the discourses of dyslexia. The literature in Chapters 2 and 3 provided evidence of links between discrimination, social exclusion and accessible transport. Accordingly, Chapter 4 introduces a transport dimension to the thesis, looking specifically at the relevant issues surrounding traveller information. By synthesising the disability and transport literatures, a context for the empirical research developed for this thesis is provided, and the key research area is defined.

#### **1.3.2    Part 2: Methodology**

Following the theoretical and contextual findings established through the literature review, Chapter 5 presents the empirical research strategy adopted in order to fulfil the aims and objectives of the thesis. The main sections present a detailed discussion on the choice of methodologies (focus group research and travel ethnography study). This includes the sampling strategies, method implementation and approach to analysis. Research ethics have been a key consideration within the development and implementation of the methodologies used. Accordingly, this

chapter also addresses the social and ethical concerns surrounding the two empirical research studies.

Following the literature review and methodological discussion, the empirical research findings of this thesis are presented. The primary aim of these chapters is to draw out the greater significance of what is being experienced by (and the relevance of the challenges to) someone with dyslexia. An overview of the contents of these chapters is provided below.

### **1.3.3 Part 3: Empirical Research Findings**

Chapter 6 presents the findings from the first empirical study in this thesis: a series of six focus groups. The experiences of people with dyslexia during the journey lifecycle are presented and discussed along with the specific problems that manifest themselves at each stage.

Chapter 7 (the travel ethnography study) provides an 'emotional texture and depth' to the research, i.e. rich description, by capturing and conveying the setting within which these individuals find themselves. Section 7.2 focuses on the round-trip of a car journey lifecycle, whilst Section 7.3 concentrates on public transport. The discussion focuses primarily on the generic messages/key lessons learned in an attempt to especially draw out what the research is revealing from the ethnographic research method.

### **1.3.4 Part 4: Summary and Conclusion**

Chapter 8 concludes the thesis, introducing discussion of the key findings and methodological challenges corresponding to the overall aims of the thesis. The chapter assesses the contribution of this research to the fields of study, and considers avenues for further research in this area.

# Part 1. Literature Review

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## Chapter 2

### Understanding Disability

#### 2.1 Introduction

As previously mentioned in Chapter 1, to understand dyslexia, the reader must first understand the discourses of disability. Therefore, this chapter presents an analysis of the literature surrounding this field of study, only considering the concepts most relevant to the thesis. The definition of disability and how it is classified are firstly examined. Learning disabilities are discussed in depth because this group of disabilities has the most relevance to this thesis. Next, the chapter explores the two main models of disability that exist (the medical and social models) and how they affect the perception and intervention of those involved. The chapter subsequently discusses disability discrimination, dependent living and social exclusion. These issues are fundamental to exploring how disabled people's lives, including dyslexic people, are shaped by travel information provision. As such, this section provides the centrepiece for connecting the facets of the thesis together.

#### 2.2 Disability

##### 2.2.1 Definitions of Disability

Barnes and Mercer (2003) provide a critique of established definitions and popular discourses of disability. They highlight that society views disabled people in different ways. 'Impairment', and 'disablement' are common terms, however these terms are often used interchangeably. This highlights that discourses on disability are indistinct, which makes it increasingly difficult to apply each with precision and in a mutually exclusive way.

Impairment and disability feed into the medical and social models of disability (discussed in Section 2.3), with *impairment* relating to the medically classified condition, and *disability* denoting the social disadvantage experienced by the impaired (Disabled People's International, 2005). Section 1 of the Disability Discrimination Act 1995 defines disability in a similar way:

*'Someone with a physical or mental "impairment", which has a substantial and long-*

*term adverse effect on his/her ability to carry out normal day-to-day activities'*

(Department for Work and Pensions, 2007)

The above definition pays particular attention to the biomedical/physiological characteristics along with the social-relational issues. The holistic-style blending of disability and impairment is advocated by Barnes and Mercer (2003).

The next section examines how different disabilities are classified within the literature. Two models are discussed (the medical and social models), highlighting the change in approach to classification over the past 30 years.

### 2.2.2 Disability Classifications

A multitude of disabling conditions exist, each with individual and sometimes very subtle differences. This makes categorising them highly problematic. An early attempt to provide a classification system for disability came from Agerholm (1975; cited Carver and Rodda, 1978):

- (1) *Locomotor* - movement, mobility and dexterity.
- (2) *Visual Conditions*.
- (3) *Communication* – hearing, talking, reading and writing.
- (4) *Visceral* – the internal organs.
- (5) *Intellectual* - learning, memory, thinking and reasoning.
- (6) *Emotional and Behavioural*.
- (7) *Invisible* – epilepsy, metabolic and pain disorders.
- (8) *Aversive* - unsightly smell, sight or sound.
- (9) *Senescence* - biological conditions which predispose the individual to die.

Agerholm's classification system focuses primarily upon the medical/functional consequences of disability. It is suggested that, at that time, the medical model of disability was still firmly in place and little was known about the social disadvantages experienced by the impaired. This classification is also considerably outdated. It lacks a social-relational perspective, and therefore fails to correspond to the way disability is perceived today, which has noticeably changed because of research dissemination and emerging legislation.

A more recent classification system has been devised by Transport and Travel

Research, placing disabled people within three categories - (1) physical disabilities<sup>5</sup> (2) sensory disabilities<sup>6</sup>, and (3) learning disabilities (TTR, 2003)<sup>7</sup>. Whilst classifying disabilities is useful (in terms of ease of understanding and practical usefulness), it should be noted that people can have multiple disabilities, and hence may not fall neatly into a specific category as a consequence.

#### 2.2.2.1 Learning Disabilities

Everyone from time to time experiences cognitive<sup>8</sup> difficulties, but for most people these are not problems routinely experienced. Yet there is a proportion of the population for whom these difficulties interfere with their lives on a daily basis, specifically in the areas of learning and information processing. These individuals are referred to as having a learning disability<sup>9</sup>.

The relationship between brain injury and behaviours (particularly spoken language) was explored as early as the 1800s. In the second half of the 1800s research turned to brain abnormalities, reading and language disorders. Research progressed during the 1900s moving into perception, perception-motor and attention and into visual and visual-motor disabilities. By the early 1960's there was sufficient knowledge to claim the existence of learning disabilities (Hallahan and Mock, 2003; cited Swanson, 2003).

Once the concept of learning disabilities became public knowledge, academics became more familiar with the term, propelled by the discovery of tools for identifying and educating such individuals. Since the growth of research in this area, the number of definitions in existence and the number of people diagnosed as learning disabled continued to rise. Over time, legislation, academics, and the disabled person's level of social competence have all played a part in creating definitions which attempt to establish whether the person has a learning disability (Hallahan and Mock, 2003).

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<sup>5</sup> 'Affecting the person's ability to control muscle movement, which can limit mobility and independent movement' (TTR, 2003)

<sup>6</sup> (1) Vision (2) Hearing (TTR, 2003)

<sup>7</sup> Learning disabilities provide a focus for the discussion because this group of disabilities has the most relevance to this thesis.

<sup>8</sup> For the purposes of this thesis, 'cognitive' refers to mental actions and processes.

<sup>9</sup> Examination of the literature surrounding disability (including sources outside TTR, 2003) highlight the use of both the terms 'learning disabilities' and 'learning difficulties'. Similarly to discussions surrounding disability and impairment, these terms are used interchangeably. 'Learning disabilities' appears to be the most commonly used term. Accordingly this will be the term adopted throughout this thesis.

Two main types of learning disability exist:

1. *Non-Specific* - general problems spanning aspects of learning and information processing. Each person's condition can be highly individual and difficulties can range in severity (Johnson and Peer, 2003).
2. *Specific* – a number of specific and related conditions that occur across a continuum of severity. Examples include Dyslexia (difficulties with the written word), Dyspraxia (organisation, motor skills and voluntary movement), Dysphasia (communication), and Autism/Asperger's (social interaction and communication). Again, each condition can be highly individual, ranging from mild to severe (Johnson and Peer, 2003).

The United States Office of Education has also attempted to differentiate between non-specific and specific learning disabilities:

*'The term "specific learning disability" means a disorder in one or more of the psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, speak, read, write, spell, or to do mathematical calculations'*

(Hallahan and Mock, 2003; cited Swanson, 2003)

The above definition does not achieve its objective. It cites the problems experienced, but fails to differentiate between non-specific difficulties and those experienced by specific sub-groups. Consequently, one could suggest that it serves to provide a further definition of learning disabilities in the general sense.

The concepts and classifications associated with disability have led to this field of study being represented and discussed differently within the literature. The next section explores this.

### **2.3 Models of Disability**

Using models to describe disability is useful for the reason that it can aid understanding of its constructs and perspectives. Llewellyn and Hogan (2000) discuss four models of disability in existence:

1. Medical.

2. Social.
3. Systems Analysis.
4. Transactional.

The two most commonly discussed models of disability from the literature are discussed below (the medical and social models). These models provide the most contrasting perspectives on disability and the way that disabled people are defined and subsequently treated.

### 2.3.1 The Medical Model of Disability

The conceptual understanding of disability arose from a medical perspective, which views all disabilities as the result of a physiological impairment arising from disease (Llewellyn and Hogan, 2000). This view perceives disability as something that affects the individual (Wilson, 2002). Consequently, disabled people assume that possession of impairment naturally results in certain negative social consequences such as immobility and inaccessibility. Proponents of the medical model perceive the individual to be alterable, while society is not. Thus emphasis is placed on them having to adapt to society rather than vice versa (Llewellyn and Hogan, 2000).

The suggestions of Wilson (2002) correlate with the earlier opinion of Thomas (1982; cited Barnes *et al*, 1999). The public perception and attitude that has existed towards disabled people over the past 100 years has moved through concern and indifference to hostility. This follows a strong health and welfare approach, condemning disabled people to a life of social exclusion, discrimination and dependence. It fails to look at the causes, how to address the problems experienced and provide support for such individuals. The findings of this thesis highlight that the medical model are persistent within the transport industry.

### 2.3.2 The Social Model of Disability

The 1970s brought extensive protest from disabled people to the medical perspective taken to dealing with their difficulties. The 'disability revolution' created a need for rejection of the medical perspective and the need for a change to perceptions and intervention. Llewellyn and Hogan (2000) point out that the medical theory has not been disproved. It is more a case of additional evidence becoming available on the role of society upon disability and the relationship between them.

A more *social* approach to disability focuses not only on the medical aspects of the condition, but also the barriers imposed by (and the role of) society onto those for who the norms do not apply. Bury (2000; cited Thomas 2004) has the view that although disability (in the main part) is caused by the impairment itself, the role of cultural and contextual causes and the biological causes affecting those causes of a social nature should not be overlooked (Thomas, 2004).

Disabled academics have particularly enabled the social model's application. Finkelstein made one of the most significant contributions to the emergence of a more social approach to understanding and dealing with disability. This was achieved through the creation of UPIAS (Union of the Physically Impaired Against Segregation) and the 1976 Manifesto entitled - 'Fundamental Principles of Disability'. Finkelstein (disabled himself) wanted his manifesto to redefine disability, suggesting that it was society alone disabling disabled people rather than the disability itself. Efforts needed to be redirected towards societal change which allowed disabled people greater control over their own lives and recognising that every person with a disability has the right to respect and a certain standard of living (Wilson, 2004). Finkelstein acknowledged that it is a tragedy to have a disability, but suggests that it is social barriers that prevent disabled people from functioning to the best of their ability (Barnes and Mercer, 2003; Thomas, 2004).

The social approach of Finkelstein's manifesto had an enormous impact on the way in which disability was subsequently perceived and supported by society. It led to legislative action in the form of policies and initiatives which aimed to move society toward the end of discrimination and exclusion and positively impact upon the way disabled people lived their lives. One can suggest that this view has been successfully accepted because it gives due consideration to the functional consequence of the disability as well as the medical classifications. In addition, it recognises that the functional limitations experienced as a result of the disability and the barriers experienced have equal importance to knowledge of the disability itself. Both Wilson (2002) and Thomas (2004) strongly advocate this approach to disability because it promotes justice through equality and inclusion for the disabled and greater empowerment. However, the social model should not be overstated. It is not simply about compensation of weaknesses and intervention via design. It is also importantly about changing the fundamental attitudes of society (Barnes and Mercer, 2003).

### 2.3.3 The Medical vs. Social Model

The early years of the 21<sup>st</sup> century saw a shift from the pathological and functional (i.e. a medical perspective) to a link with social determinants of health and the person's environment (i.e. a social-relational view). As a result, social, behavioural and environmental factors have begun to play a far greater role in helping to define disability than previously (Fox and Kim, 2004). The shared perspective recognises that there *is* a relationship between impairment and society, and disability *is* restricted activity. However, Thomas (2004) points out that there remains a divide between those who see (1) the disabled as oppressed (disability *entirely* socially-imposed – the view held by Finkelstein), (2) those seeing the cause being both impairment and social exclusion with social exclusion leading to oppression - the view held by Shakespeare and Watson (2001), and (3) the view that disability is caused by impairment and social 'disadvantage' rather than 'oppression' (the view held by Williams, 1999 and Bury, 2000).

The lack of a unified view on disability means that discrimination and social exclusion are still felt by disabled people. The next two sections discuss those two issues. To set the scene, available statistics on disability within the UK are presented. This highlights the prevalence of disability and hence the importance of reducing the incidence of discrimination and social exclusion. Access to information is included within the discussion because it forms a central part of this thesis (as discussed in Chapter 1). While the issue of transport is touched upon, a more in-depth discussion on this will take place in Chapter 4.

## **2.4 Disability, Discrimination and Social Exclusion**

### 2.4.1 Disability Statistics

By mid-2006, the UK population was in the region of 60.5 million. There was an estimated 12 million people aged over 60, and 8.5 to 10 million disabled people covered by the Disability Discrimination Act, with a large number having multiple disabilities (Office for National Statistics, 2007). The incidence of disability is set to rise. This is attributable to the fact that a greater number of disabled children are surviving childhood as a result of successful medical innovations. There are also a significant number of people becoming disabled as adults. The possible reasons for this include genetics, acquisition through accident or injury, a poor lifestyle, poor

healthcare provision or access to it). A greater number of adults are also experiencing old age and its accompanying disabilities (for example, dementia and arthritis).

Martin, McCoy and Smith (2003; cited University College Worcester, 2003) suggest that statistics on disability vary between 14 and 17 per cent. At present, the available statistics only account for individuals making use of specialist services and those registered as disabled. In addition, only half of those covered by the DDA consider themselves to be 'disabled' (Sayce, 2003). This highlights that we cannot be certain statistically to what extent the UK is affected by disability. One could argue that this makes it difficult for policymakers and service providers to prioritise and provide support.

#### 2.4.2 Disability Discrimination

Research has long-established the existence of disability discrimination leading to exclusion, dependence and unequal citizenship (Doyle, 2005). The medical model directly contributed to the way disabled people were viewed and treated in relation to citizenship and community living. This created a discriminatory society, one seen as unadaptive and unhelpful towards disabled people (Borsay, 2005).

Through legislation, particularly through the Disability Discrimination Act (discussed in Section 2.5.1.1), the flagrant discrimination against disabled people is decreasing (Barton, 1993; Sayce, 2003). Improved access to employment, goods and public services has led to greater inclusion within society and more independent living (Deal, 2007). However, legislative success should not be determined by the number of cases brought under it, but by the rate of compliance and thus the level of commitment to social responsibility.

Even though a decade has passed since introduction of the DDA, discrimination and the misconceptions pervading society in relation to disabled people still exist, particularly for those with a learning disability or mental illness. A subtle (and less visible) form of prejudice exists, referred to as 'aversive disablism' (Barton, 1993; Sayce, 2003). This term links aversive racism theory with disablism:

*'Discriminatory, oppressive or abusive behaviour arising from the belief that disabled people are inferior to others'*

(Deal, 2007)

Although aversive disablism believe in anti-discrimination and reject crude expression of bigotry, they may still unintentionally view the disabled differently and unequally. These individuals do not see themselves or their actions as prejudiced or discriminatory, for example 'turning a blind eye'. This form of prejudice, although more subtle, still has a negative and discriminatory effect on the person in receipt of their beliefs (Deal, 2007). Metaphorically, aversive disablism is the mortar keeping societal barriers in place. For the situation to change, Deal (2007) maintains that equity must exist in every aspect of a disabled person's life. This means that aversive prejudice must be confronted and dealt with.

#### 2.4.3 Disability and Social Exclusion

The term 'social exclusion' has become widely acknowledged over the past decade. The 'socially excluded' are those administratively excluded by the state or those who have 'fallen through the net of social protection'. Examples include people from ethnic minorities, the unemployed and disabled people (Hills *et al*, 2002).

There are a diverse number of ways in which academics and professionals have defined social exclusion. The Social Exclusion Unit (2002; cited O'Grady, 2004) provides an operational definition, which encompasses published research from the areas of societal living:

*'Social exclusion can happen when people or areas suffer from a combination of problems such as unemployment, poor skills, low incomes, poor housing, high crime environments, bad health and family breakdown'*

Out of all the disadvantaged groups in society, the disabled are the most socially excluded, with choices and opportunities remaining restricted (Howard, 1999; cited O'Grady, 2004). O'Grady (2004) suggests that it was the medical 'disabling' culture that led (and continues to lead) to this. Barnes and Mercer (2003) also believe that the key contributor to the oppression faced by disabled people is the societal restrictions imposed on them. They suggest that social exclusion is presenting disabled people with fewer opportunities and choices as a consequence. In its 2001

White Paper 'Valuing People', the Department of Health highlighted that people with a learning disability are amongst the most socially excluded and vulnerable groups in the UK. Many live life in parallel, feeling socially incoherent (Clarke, 2005).

#### 2.4.4 Disability Discrimination and Social Exclusion

The disabling culture that still exists within society provides disabled people with few benefits in relation to anti-discrimination and social inclusion. A study by the Legal Services Research Commission into the 'justiciable problems' (i.e. problems with potential recourse through the legal system) facing minority groups<sup>10</sup> concluded that disabled people in England and Wales are more likely than other minority groups to face situations relating to discrimination and social exclusion. The findings (along with those provided by the Department of Health) highlight the slow pace with which the Disability Discrimination Act is coming to the fore. This continues to place disabled people in a very vulnerable position.

##### 2.4.4.1 Digital Exclusion and Inequity

Since the start of the digital age there has been a 'digital divide', and not everyone in the community has been able to embrace what the digital age has to offer. Although there have been considerable efforts by the government and professionals to bridge this divide, they have been mainly through technological advancements. The government has failed to fully consider ease of physical access to the technology being developed and the fact that users need certain abilities to make effective use of it (UK Online, 2007). Consequently, millions of people are excluded from using modern technology including the internet. This leads to 'digital exclusion' (UK Online, 2007).

##### 2.4.4.2 Access to Information

Information provided in a certain format may not suit every disabled person because of the vast number of different disabilities which can affect information access, and difficulties can span a wide range of problems. Therefore, it would be very difficult for goods and service providers to provide for each individual's needs and consequently

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<sup>10</sup> The LSRC study involved a periodic survey of legal needs in relation to discrimination and unfair treatment in the areas of housing, finance, crime/violence, mental health and medical negligence.

feelings of discrimination and exclusion are sometimes unavoidable (Barnes and Mercer, 2003). This is particularly the case in relation to people with a learning disability. In order for these individuals to easily access information (particularly information provided via the internet), certain skills are required (Bougie, 1997; cited Brown and Lawton, 2001):

1. *Language processing.*
2. *Information processing.*
3. *Mental skills.*
4. *Motor skills.*
5. *Interrogation and retrieval skills.*
6. *Visual focusing skills.*
7. *Memory.*
8. *Sequencing skills.*

Consequently, a lack of ability in these areas (as is the case for someone with a learning disability) would certainly be a potential barrier to information use.

## **2.5 Reducing the Incidence of Disability Discrimination and Social Exclusion**

### 2.5.1 Legislation: Disability Discrimination – UK and EU Legal and Statutory Duties

The achievement of the disability movement has been to break the link between the biomedical characteristics of disability and the social situation and focus on the real causes of social exclusion, i.e. prejudice and discrimination (Barnes and Mercer, 2003). To quote Bates, Fabian and Davis (2004):

*‘There should be full and fair access to activities, social roles and relationships directly alongside non-disabled citizens’*

The following section provides an overview of the key legislative statutes in existence, which attempt to protect disabled people from discrimination and social exclusion. To discuss each piece of legislation individually would require an in-depth review of its own. This level of detail was deemed unnecessary for the thesis. Accordingly, Appendix 1 provides a chronological overview of key disability-related legislation. As previously mentioned, dyslexia is a specific learning disability. For that

reason, it is important to include the legal protection available to people with a learning disability within the discussion.

### 2.5.1.1 UK Legislation

As the medical model of disability gave way to a more social perspective, statutory duties were slowly extended. This enabled the government to play a more financially active role in the care and support of disabled people. The post-war years brought a growing recognition of disability inequality, discrimination and exclusion. During this period, a number of civil and human rights movements were created. However judiciary support was not available until the late 1950's. By the end of the 1960's, disability-related legislation required the government to provide a range of support services for disabled people. However, at this time, services were allocated on a needs-based system. Consequently, discrimination and social exclusion were still firmly held in place (Borsay, 2005; Gates, 2007).

Between 1970 and 1979, further legislation emerged, coinciding with the joining of the UK with the European Union. Several statutes were also introduced in the early 1980's. However, the use of medical evidence to back up legislative action continued. In an attempt to address this, further legislation was introduced as part of the National Health Service and community care (Borsay, 2005; Gates, 2007).

#### *The Disability Discrimination Act*

The legislation previously introduced continued to lack the power to break down the economic and social barriers faced by disabled people because it failed to provide enough of a 'social outlook' (Clark, 1992). During the first half of the 1990s, the collective strength of disabled people and their desire for greater equality consequently led to discrimination appearing much higher on the political agenda. This not only served to develop the government's understanding on disability discrimination, but it also led to the passing of the Disability Discrimination Act in 1995 (Doyle, 2005).

The Disability Discrimination Act ('the DDA') has made it unlawful to discriminate against disabled people in connection with employment, the provision of facilities, goods and services, and the disposal or management of premises. The DDA is different and substantially stronger than many of the preceding statutes for the

reason that it places important legal duties in respect to many aspects of societal living (Doyle, 2005; Department for Work and Pensions, 2007).

Part 3 of the DDA covers access to, and use of, information services and means of communication. This means that organisations are now under a legal obligation to make their information accessible to disabled people. However, there is a lack of guidance relating to information provided via the internet. This continues to be the case within the Amended DDA. Although Part 3 *does* extend to the internet, it is only referred to as an 'auxiliary' service. This means that whether or not internet inaccessibility constitutes discrimination is not always easy to determine. Legislation is open to a court's interpretation as a consequence. For example, if a disabled person is refused access to the internet because of site design, then this amounts to discrimination. However, if access is denied due to other reasons (such as hardware or software issues) and the person happens to fall within that, then discrimination is *not* taking place (Sloan, 2001).

### *Post-DDA Legislation*

By the end of the 20<sup>th</sup> Century, it was clear that statutory duties were still not being properly policed or enforced. As a result, the Disability Rights Commission was introduced. However, by the turn of the 21<sup>st</sup> Century still only half of disabled people in the UK knew their legal rights and entitlements under the DDA (Sayce, 2003). This led to the passing of an amended version of the DDA (known as the 'Disability Discrimination Bill 2005), a decade since the DDA first came into force. This piece of legislation made crucial changes to the way disability is legally defined and the provisions that fall under the DDA. It ensures that the DDA is fully complied with and those individuals not already covered will now be brought within its scope. Additional legislative protection was introduced in 2006 through the Equalities Act (Deal, 2007). The Prime Minister's Strategy Unit has stated that by 2025, all disabled people will be treated as equal members of society as a result of the legislative measures in place to protect them against discrimination (Doyle, 2005).

### *Legal Protection Available to People with a Learning Disability*

The legal protection available to people with a learning disability has greatly improved since implementation of the the DDA 1995 (Mencap, 2003; Gates, 2007). Through case law, further legislation and more sophisticated legal processes, these

individuals have been able to start to really challenge disability discrimination. In addition, regional policy reviews (as part of the devolution process) have led to key changes to the way services and support is provided for these individuals<sup>11</sup> (Gates, 2007).

Through the DDA and other statutes, a truly inclusive society may be more achievable for everyone, including people with a learning disability. However, considering the continuing need to update or implement new statutes, it is quite clear that legislation alone is not enough to turn this vision into a reality. A fundamental change to the attitudes of society towards disability also needs to be at the heart of the government's strategy (Gates, 2007).

#### 2.5.1.2 European Legislation Relating to Disability Discrimination

Disability discrimination legislation in the UK is complemented and supported by membership of the European Union. An anti-discrimination provision for disabled people is included within Article 13 of the EC Treaty ('the Amsterdam Treaty'):

*'Without prejudice to the other provisions of this Treaty and within the limits of the powers conferred by it upon the Community, the Council may take appropriate action to combat discrimination based on sex, racial or ethnic origin, religion or belief, disability, age or sexual orientation'*

(Vanhala, 2006)

The principles of Article 13 were not legally binding at first. One of the main barriers was that the Treaty did not grant the EU any power. To give the Treaty effect, the Council of Ministers had to approve two directives proposing minimum standards of legal protection. However, these Directives related to racial equality and equal treatment. This highlights that disability was only being provided for *within* other areas. As a consequence, the EU created the European Disability Forum, which plays a crucial role alongside the Directives in place (Vanhala, 2006).

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<sup>11</sup> Regional policy reviews:

- 2000: 'The Same as You' (Scottish Executive)
- 2001: 'Valuing People' (Department of Health); 'Fulfilling the Promises' (National Assembly for Wales)
- 2005: 'Equal Lives' (Department of Health, Social Services and Public Safety, Northern Ireland)

## 2.5.2 Improving Information Accessibility

*'The challenge is to use the information society to strengthen social cohesion and enhance people's ability to participate fully in society and economic life, to make it a tool for the creation of an inclusive society'*

(The European Commission, 1996; cited Sandhu, 1999)

For disabled people, accessible information can be critical to social inclusion and living an independent life. Today we have the power of the Internet, which could be a vital part of life to those who are immobile or unable to communicate in certain ways. To quote Tim Berners-Lee (the inventor of the World Wide Web):

*'The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect'*

(RNIB, 2004b)

Although non-disabled people are just as empowered by the Internet, disabled people can experience a level of empowerment and independence previously unavailable. A study by Knight *et al* (2002) established that over half of the disabled participants saw the Internet as a necessary source of information compared to only 6 per cent of non-disabled people. Immobility and being able to still communicate were the main reasons for this (Deal, 2007).

### 2.5.2.1 Non-Legislative Guidance for Providing More Accessible Information

As previously explained in Section 2.5.1.1, access to information is provided for under Part 3 of the Disability Discrimination Act. Although the DDA is supported by a Code of Practice (which provides operational guidance on legislative compliance), there is a lack of advice on how to *actually* provide accessible information to disabled people. As a result, information accessibility is not properly understood, which means that providers are unable to address the needs of disabled people. Therefore, it is not surprising that disabled people continue to experience difficulty when accessing information. For those reasons, non-legislative guidance on providing accessible information (online and offline) plays a key supporting role to the legal and statutory guidance provided within the DDA Code of Practice. By nature it is only guidance. As such, to what extent an organisation utilises the advice available is closely within their control. Guidelines can either be employed to a minimum standard, or used as

an opportunity to demonstrate best practice and an organisation's commitment to disability provision.

### *Designing Accessible Online Information for Disabled People*

The World Wide Web Consortium (W3C) is a professional organisation working towards making the internet accessible to all users regardless of differences in ability, ethnicity and resource availability. The Web Accessibility Initiative (WAI) is affiliated with the W3C. In 1999, the WAI published the first version of the Web Content Accessibility Guidelines (WCAG). These guidelines have been internationally accepted as the authoritative set of guidelines used for developing accessible websites. All other available guidelines and standards are derived from the WCAG. People with a learning disability in particular need simplicity and ease of access to online information in order to keep cognitive burden to a minimum. For that reason, the WAI point to specific issues that web-based information providers should consider when designing for these individuals (W3C, 1999). The specifics associated with the WCAG are explained more fully in Appendix 2.

#### 2.5.2.2 Challenging Digital Exclusion and Inequity

With approximately 90 per cent of public services available online, there is clearly a need to target hard-to-reach groups currently excluded from using the internet. This includes disabled people. The 'Myguide' initiative is one solution (developed by the Department for Education and Skills). The primary aim of myguide is to provide individuals currently excluded with an easy way of gaining access to the internet. It is hoped that using the service will give them the confidence to revisit the internet due to the positive experiences gained.

Findings of the pilot study<sup>12</sup> highlight that myguide has made a positive contribution towards digital equity and inclusion. Individuals have developed new ways of

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<sup>12</sup> The 'myguide' pilot study involved the following groups:

- Disabled (24%);
- Female (60%);
- Non-white (26%).
- Social classes C2DE (57%);
- Not in work, either unemployed or retired (65%);
- Aged over 55 (55%);
- No formal qualifications (38%);
- No learning or training undertaken for past 3 years (54%).

communicating, and there is a common feeling of a true sense of achievement. Greater social and economic opportunities have also become available. New relationships have been created and individuals have a new highly valued sense of independence (UK Online, 2007)<sup>13</sup>. This means that digital inclusion *can* lead to social inclusion.

## **2.6 Summary and Conclusion**

As previously explained in Chapter 1, the synthesis and review of a multidisciplinary literature base was necessary in order to provide a framework within which the thesis could become more focussed. To understand dyslexia and explore travel information provision for dyslexic people, the reader must first understand the discourses of disability. Therefore, this chapter presented an analysis of the literature surrounding this field of study, only considering the concepts most relevant to the thesis. Disability discrimination, dependent living and social exclusion are fundamental to exploring how disabled people's lives, including dyslexic people, are shaped by travel information provision. As such, considerable emphasis has been placed on these issues within this chapter in order to connect the facets of the thesis together.

Society's attitude towards disabled people *is* improving, and the multiple needs of a heterogeneous population *are* gradually being recognised. However, it is being coerced by legislative and statutory obligations emphasising a more social approach to disability. Despite improvements, disabled people are still facing discrimination because of the broader medical-based ethos of society's institutions (Borsay, 2005). A society with continued misconceptions about disability, can greatly affect the lives of disabled people. It can affect the perception that they have of themselves and the role they perceive themselves (and are expected to have) within society.

Extending the civil, political and social rights of disabled people will be crucial in continuing to challenge disability discrimination. However, legislation alone is not enough to influence change. Proactive collaboration between society's political, educational, cultural and welfare institutions is also necessary. A persistent multistranded strategy is needed, which addresses the way discrimination manifests itself within society and promotes the benefits of social inclusion to the *whole* of society:

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<sup>13</sup> As a consequence of its success, Myguide received official governmental approval in 2007 (UK Online, 2007)

*'Initiatives to reduce discrimination should make use of the iron fist of law within the velvet glove of persuasion'*

(Sayce, 2003)

Society needs to fully understand why disability rights are important and how to be responsive to the needs of *all* disabled groups. At the heart of this (and a driving force for successful and effective change) is collaboration with (and ensuring the support of) disabled people.

## **Chapter 3**

### **Understanding Dyslexia**

#### **3.1 Introduction**

This chapter explores the discourses of dyslexia. Similarly to the previous chapter, only the concepts considered most relevant to the thesis are examined. The following paragraphs outline the content of this chapter, making particular reference to its theoretical and contextual importance.

An understanding of the origins and evolution of dyslexia is a necessary starting point to understanding its cognitive causes. Accordingly, the chapter firstly explores the historical background to dyslexia and provides some key definitions from the literature. The medical and social models of disability reappear within this chapter because they are a key element of the literature informing the thesis, and connect the different facets of the thesis together - models of disability are fundamental to explaining society's perception of dyslexia and how dyslexic people encounter the social world, including the transport environment.

To fully understand dyslexia and its effects upon travel information need and use, the reader must understand its cognitive causes. Therefore, the leading theory supporting the primary causes and origins of dyslexia is presented (the phonological theory), along with research which substantiates this. However, before the phonological hypothesis is discussed, the general theory of phonology is explained to highlight the relationship between this theory and the constructs of dyslexia.

Dyslexia is an 'invisible' disability. As such, there is a need to make it feel more 'visible' to the reader by explaining the principal symptoms associated with this disability. The definition provided by the British Dyslexia Association (2003b) has been 'unpacked' to form the basis of the discussion, along with a brief explanation of the cognitive styles of non-dyslexic people in order to draw out the differences between dyslexics and non-dyslexics. All of the symptoms discussed will manifest themselves at some stage during a journey lifecycle because of their impact upon information need and use (this will become clear in Chapters 6 and 7). Although this is the case, one particular group of symptoms has particular relevance to transport and travel information need and use (wayfinding, orientation and spatial awareness).

Accordingly, these will be discussed in Chapter 4.

Dyslexia can have severe psychological and emotional effects that stem from the physical difficulties. Therefore these effects are explored in this chapter. The age, gender and language differences associated with dyslexia are also discussed. This is for the reason that these aspects could have potential significance for empirical research, in terms of the methodological approach taken and data analysis. Additionally, in an attempt to further embed the social model of disability within dyslexia, the abilities of dyslexia people are highlighted.

Finally, the chapter discusses disability discrimination and social exclusion in relation to dyslexic people, with particular reference made to information access and use. Disability discrimination and social exclusion are fundamental to exploring how the lives of these individuals are shaped by travel information provision, and how the situation can be improved.

### **3.2 Historical Background**

Dyslexia is not a recent discovery. The inability to read and the skill deficits associated with decoding written language were recognised as early as the early nineteenth century (Duane, 2001). Snowling and Stackhouse (1996) and Duane (2001) discuss an early case of this condition by Dr Pringle-Morgan in 1894. The report was of a young boy who, despite average intelligence, could not recognise or understand written words. Hinshelwood also came across cases of word-blindness:

*'In spite of his laborious and persistent training, he can only, with difficulty, spell out words of one syllable. The schoolmaster who taught him says that he would be the smartest lad in the school if the instruction was entirely oral'*

(Snowling and Stackhouse, 1996)

This captures the issue that has intrigued scientists ever since: the difficulties that otherwise intelligent people experience when reading and processing the written word (Shaywitz, 1996). As more cases were reported, two types of word-blindness were identified: (1) the inability to read or write, and (2) the ability to write but not read. For many years, the leading opinion was that the reading difficulties highlighted in these cases were caused by visual processing difficulties alone. It was not until 1937 that the influence of language was recognised by Samuel Orton (Shaywitz,

1996; Snowling and Stackhouse, 1996). Hermann subsequently identified phonics as significant to word-blindness (Hoyles, 2007).

As more cases of this condition were being investigated, a dislike for the term 'word-blindness' was outwardly expressed. Research findings were indicating that participants did not possess complete word-blindness. As a consequence, the term 'dyslexia' was deemed more suitable for the reason that it depicts a *difficulty* with words rather than a complete blindness to them. The term 'dyslexia' has its origins from Greece, meaning difficulty with ('dys') words ('lexia') (Wiertelak, 2003a).

In the 1960's, educationalists began to take notice of the effects that dyslexia was having on academic ability. This coincided with the emergence of a more social approach to disability (discussed in Chapter 2). The label of dyslexia, despite its medical roots, started to be seen as 'socially-applicable'. Psychologists began to collaborate with the educational experts. The psychologists explained that the brain in the individual showing symptoms of dyslexia was complete but not storing information in the same way as those not experiencing difficulties. Neurologists found that information was being stored in a different part of the brain leading to it being processed differently and incorrectly. As a result, new ways of teaching were developed. However, the number of teachers showing an interest was still limited at this point. Consequently, the new methods were only used by the small number of teachers who supported the findings and expressed an interest in putting in the additional effort required to make learning easier for these individuals. The majority still seemed reluctant to accept the social-relational constructs of dyslexia, and the prevailing models of dyslexia continued to focus on effective ways of addressing the medical facets of the condition. As a result, educational establishments could only prescribe a narrow band of acceptable learning, which did not accommodate the diversity of student characteristics. Until the epistemology of the sceptical educationalists changed, there was little hope of effective support for dyslexic people.

Today, a continuing shift towards the social model of disability has brought positive attitudinal change towards dyslexia. A large number of professionals outside of education are now accepting the constructs of dyslexia. This has allowed dyslexic people to really identify with the culture of dyslexia and, in doing so, start to empower themselves (Riddick, 2002; cited Wearmouth, 2002). However, the model of dyslexia is still influenced by the medical model of disability. This means that how social factors transform dyslexia from impairment into a disability is still not considered

sufficiently in order to allow dyslexic people to really challenge society. In order for this to happen, the social model of disability must play a key role in future policy and practice in respect to dyslexia (Riddick, 2002; cited Wearmouth, 2002).

### **3.3 Defining Dyslexia**

#### **3.3.1 Key Definitions**

The concept of dyslexia has been evolving for more than a century. Even though there are similarities between the definitions, a comprehensible single definition still escapes us (Solan, 1993). One can conclude that dyslexia does not lend itself to having a single universally accepted definition. It is not a single, uniform condition where each individual suffers from the same difficulties to the same severity. Miles (1995) concludes that no single definition would be able to satisfy all needs. If the juxtaposition of key words from a variety of sources were combined, a complex and misleading definition may be produced. A highly multidisciplinary definition would result. Consequently Miles (1995) suggests an interdisciplinary approach should be taken, where different facets of dyslexia are discussed depending on the context and discipline defining it.

One of the earliest definitions of 'dyslexia' originates from the late 1960s:

*'A disorder in children who, despite conventional classroom experience, fail to attain the language skills of reading, writing and spelling commensurate with their intellectual abilities'*

(World Federation of Neurology, 1968; cited Johnson and Peer, 2003)

If we look beyond the surface of this definition, it is clear that it involves the principle of causality (the relationship between cause and effect). This definition embraces a social perspective, acknowledging the fact that some dyslexics may have grown up in a pedagogically or socially-impoverished environment or have less than normal mental capacity/cerebral functioning which leads to the condition (Miles, 1995; Tonnessen, 1997).

The definition of dyslexia provided by the British Psychological Society (1999; cited Johnson and Peer, 2003) suggests that:

*'Dyslexia is evident when accurate and fluent word reading and/or spelling develops incompletely or with great difficulty'*

This definition is driven by cognitive theory, focussing on literary learning at word level. It implies that the problem is severe and persistent despite appropriate learning opportunities. However, Johnson and Peer (2003) believe that by presenting the statement 'dyslexia is evident when...' implies that the British Psychological Society has restricted itself to the symptoms that can be explained via phonological deficiencies. They argue that phonological deficiencies are connected to a number of symptoms outside of dyslexia. However, the question arises whether or not phonology explains *all* of them and are they confined to dyslexic people. For this reason, the definition has been criticised by the British Dyslexia Association because it can be applied to anyone exhibiting reading and/or spelling difficulties. As a consequence, the British Dyslexia Association (2003b) developed a more in-depth and comprehensive definition:

*'A combination of abilities and difficulties that affect the learning process in one or more of reading, spelling, listening and writing. Accompanying weaknesses may be identified in areas of speed processing, short-term memory, sequencing and organisation, spoken language and motor skills. It is particularly related to mastering and using written language, which may include alphabetic and numeric notations'*

This is an accurate definition of dyslexia. It concentrates on the specific signs and symptoms of the disability, avoiding cognitive theory. It is also expansive, in that it mentions other areas of physical functioning that may be affected. Accordingly, one could suggest that it is a description rather than simply a definition (Johnson and Peer, 2003).

The above definition identifies dyslexia as affecting the interpretation and use of written language, which enables experts to distinguish between dyslexia and other reading and writing difficulties. However each definition takes a different perspective based on the context within which this disability is being discussed and the discipline attempting to define it. Some definitions take a predominantly symptomatic approach, i.e. medical. Others take a causal perspective, touching upon the important social and medical factors. The latter could be considered to be more practically applicable in relation to diagnosis and intervention.

Now that the concept of dyslexia has been explored and defined, the main theories available that provide a causal explanation for the condition are examined. A discussion on the credibility of these theories is provided, along with research attempting to determine the primary cause.

### **3.4 Leading Theories Supporting the Causes and Origins of Dyslexia**

A number of leading experts have proposed causal theories which they suggest lead to individuals suffering from (and consequently being diagnosed with) dyslexia. The main theory (the phonological theory) is discussed below. A number of other theories supporting the causes and origins of dyslexia have been investigated and consequently supported by academics and practitioners (these are explained in Appendix 4):

1. Rapid auditory processing.
2. Visual processing.
3. Cerebellar/Automaticity.
4. Magnocellular.

#### 3.4.1 Phonological Theory

Phonology is a skill underlying the analysis of both spoken and written language. It is defined as:

*'The system of contrasting relationships among the fundamental speech sounds of a language'*

(The Oxford English Dictionary, 2004)

The language system comprises of a hierarchical sequence of components devoted to an aspect of language. The lower level comprises of the phonological components dedicated to processing the unique elements of sound that comprise language. The upper levels consist of semantics (the meaning of a word), syntax (the arrangement of words and phrases to create well-formed sentences), and discourse (written or spoken communication) (Oxford English Dictionary, 2004)

The 'phoneme' (the distinct unit of sound that distinguishes one word from another) is a fundamental component of the English linguistic system. Before words can be

identified, understood and stored in memory, the phonological component of the brain takes the word and dismantles it into phonetic units. For example 'cat' firstly becomes 'c-a-t'.

Learning to read in an alphabetic-style language such as English requires an appreciation of the correspondences between letters and sounds. To become flexible readers, young children not only need to learn how to read whole words by sight, they also need to learn how the letters in the printed words map on to the sounds of the spoken words. This requires phonological awareness (Hulme and Snowling, 1992; cited Snowling and Stackhouse, 1996). The phonological system should be fully formed by the time the child comes to learn to read. The status of children's phonological representations determines the ease with which they learn to read. As the phonological system develops, these links become refined. This brings improvements in the cognitive skills which underlie reading development, such as access to the spoken forms of words and verbal short-term memory (Snowling and Stackhouse, 1996).

Manis (1996) explains how the normal reading system operates, making particular reference to two parallel routes for assigning sound and meaning to sequences of letters:

1. *The sub-lexical route* (also known as the phonical route) uses knowledge of correspondences between the orthographic (the conventional correct spelling system of a language and how letters combine to represent sounds and form words) and phonological units from the alphabetic writing system to generate phonological representations. In other words, it associates each letter with its regular sound value. This procedure produces correct output for regular words.
2. *The lexical route* (also known as the sight vocabulary route) uses the orthographic representation of a word to retrieve an associated phonological representation stored in the mental lexicon. The lexical procedure associates the visual words as a whole with its meaning and pronunciation.

In the 1990s, neuroscientists were able to utilise technological developments (particularly Magnetic Resonance Imaging) to obtain more extensive knowledge about brain function. They identified three areas of the left side of the brain that play key roles in reading (a diagram of the brain can be found in Appendix 3):

1. The left inferior frontal gyrus (the 'phoneme-producer')
2. The left parieto-temporal area (the 'word-analyser')
3. The left occipito-temporal area (the 'automatic-detector')

It was discovered that all of these areas work simultaneously. Beginner readers rely most heavily on the phoneme-producer and word-analyser. These areas allow them to analyse words more thoroughly, pull them apart into their constituent syllables and phonemes, and link the letters to their sounds. As the reader becomes more skilled, the automatic-detector becomes active and begins to dominate, which builds a permanent catalogue in the brain which enables the reader to recognise familiar words on sight (Gorman, 2003).

#### 3.4.2 The Phonological Theory of Dyslexia

A coherent model of dyslexia has emerged over the past three decades based on phonological weakness (Shaywitz, 1996). This is defined by Vellutino (1987; cited Miles, 1993) as:

*'The inability to represent and access the sound of a word in order to help remember the word'*

A large number of academics and professionals agree that a core phonological deficit is the main descriptor and identifier of dyslexia (Lyon, 1995; Thomson, 2000; Ramus, 2003). Other proponents of the phonological theory include Miles (1993), Snowling (2000; cited Ramus, 2003) and Evans (2001). The brain imaging studies conducted in the 1990s provide further evidence that the fundamental problem with dyslexia lies in the brain's inability to process phonemes (Murphy, 2003).

If the individual is dyslexic, a lower-level phonological processing deficit impairs word coding, which subsequently prevents word identification. This blocks access to higher order linguistic processes which allow the reader to gain meaning from text. Therefore, the language processes involved in comprehension and meaning cannot be used because they can only be accessed after a word has been identified. Shaywitz (1996) also suggests that the lower level phonological components are impaired even when the higher level components are intact. For example, the person may be able to tell you about a word's meaning or correct usage, but they would not

be able to recognise the word on a page because they cannot easily decode and identify written words.

The classic developmental dyslexic fails to make the transition to the normal alphabetic phase of reading and literacy development. For most people, reading is an automatic unconscious skill once learned, concentration and decoding of words occurring naturally (Frith, 1985; cited Snowling and Stackhouse, 1996). For dyslexics, this is not the case. Gorman (2003) points to brain scans concluding that there are anomalies in the brain which prevent dyslexics from easily gaining access to the word analyser and automatic detector - left-sided areas of the brain. Consequently, a deficit exists on the left side of a dyslexic's brain. The clusters of difficulties which make up dyslexia are information processing difficulties arising from left-brain analytical-type deficits resulting from phonological weaknesses. This theory provides the reason why right-brain skills are stronger in dyslexic people and thus more relied upon (BDA, 2003b).

The above problems exist within the 'dual-route' model of reading - the lexical and sub-lexical routes discussed earlier. Manis (1996) suggests that dyslexia results from a failure to acquire a fully functioning lexical or sub lexical mechanism. Marshall (1973) believes that dyslexics may even have problems with both routes.

### 3.4.3 Theory Credibility

There is a substantial body of evidence supporting the phonological theory of dyslexia. However, a major weakness with this theory is its inability to explain the occurrence of sensory and motor disorders. Snowling (2000; cited Ramus, 2003) suggests that it dismisses sensory and motor disorders as not part of the core features of dyslexia. Ramus (2003) considers the co-occurrence of sensory and motor disorders with a phonological deficit, but dismisses the former as playing a causal role in the aetiology of reading impairment. Fawcett and Nicolson (2001; cited Ramus, 2003) support the idea of distinct cerebellar and magnocellular origins and causes of dyslexia. However, they also recognise that the cerebellar theory fails to account for sensory disorders. The magnocellular theory seems to be a realistic construct in light of its ability to account for all the observable signs of dyslexia (Ramus, 2003). In an attempt to close the case on these different theories, Frith and Ramus (2003; cited Murphy, 2003) undertook a multiple case study. The research involved a number of tests on hearing, vision, balance, motor coordination,

intelligence and phoneme awareness. The results revealed that all of the subjects suffered from a phonological deficit, 63 per cent had an auditory deficit, 25 per cent a motor deficit and 13 per cent a visual magnocellular deficit. These results conclusively support the phonological theory of dyslexia, while acknowledging the presence of additional sensory and motor disorders in some individuals.

### **3.5 The Principal Difficulties Associated with Dyslexia**

As previously mentioned, dyslexia is a learning disability relating specifically to processing the written word (hence the reason why it is defined as a specific learning disability). It refers to difficulty with words spelt, read, pronounced, written, and association of meaning between words (Pollock and Waller, 1997). As a consequence, the principal difficulties associated with this disability centre around literacy and numeracy.

The definition of dyslexia provided by the British Dyslexia Association (see Section 3.3.1) is an accurate and comprehensive description of the disability. For that reason, it will be 'unpacked' in the next section and used to structure a discussion surrounding the difficulties associated with this disability. Although this definition forms the basis for the discussion, the views of other key academics are also included. While some theoretical explanation is necessary, this section focuses predominantly upon the physical effects, i.e. the symptoms (the physiological causes have already been explained in depth within the previous section on phonology).

#### **3.5.1 Learning**

Learning is a complex process. It is also an active process, which utilises both the left and right hemispheres of the brain. Firstly 'declarative knowledge' (facts about the world put into words) is acquired. Following this, an 'associative' stage occurs where connections are made between various elements of a task and 'procedural knowledge' develops. Task procedures are stored in memory and knowledge structures become modified and extended as we learn more, enabling us to integrate more of the new knowledge. As we learn and become more experienced, knowledge about the skill is stored more effectively and logically in the brain rather than as a random set of actions. The final stage is where the skill becomes more automated and rapid, with initial declarative knowledge disappearing (Preece, 1994).

Dyslexics experience difficulties which directly impact upon their ability to become competent learners. Rather than being slow learners, in essence dyslexics possess *alternative* learning styles and use alternative strategies during the learning and knowledge acquisition process. A dyslexic's right brain skills lead to highly developed visual skills, which are utilised as an aid to learning. They use intuitive thought rather than rational/analytical explanation, using the relationship between meaning and association of ideas to fix memory. They also prefer a more practical approach to learning for the reason that the skills associated with the left side of the brain are weak (Corrigan, 2001).

### 3.5.2 Reading

Reading is not an automatic unconscious skill for dyslexic people. A phonological deficit prevents them accessing the word analyser and automatic detector parts of the left hemisphere of the brain (Frith, 1985; cited Snowling and Stackhouse, 1996). These individuals are unable to abstract letter-sound correspondences from their experience with printed words and therefore fail to develop phonological reading strategies. This means that dyslexics rely heavily on sight vocabulary in reading. In doing so, they make a large number of visual errors (Snowling, 1980, 1981; cited Snowling and Stackhouse, 1996). Below is an example of how different dyslexic people may see the word 'cat':

CAT TAC TAC CVL  
CAT TAC TAC CVL  
CAL TAC TAC CVL  
ACT TCA TCA VCL  
ACT TCA ACT TCA  
ACT TCA ACT TCA  
ATC CTA VTC CTA  
CTA ATC CTA VTC  
ATC CTA VTC CTA  
VTC CTA ATC CTA

It is also regularly reported that dyslexics tend to read slower than non-dyslexics. This is particularly the case if they have to read and remember large quantities of information. Memory deficiencies exacerbate this issue, causing them to forget what they have read before they reach the end of the text (Miles, 1993). Memory is discussed later in this section.

### 3.5.3 Spelling

Learning to spell involves the integration of several skills such as phonological representations, grammatical and semantic knowledge. There is also the formulation of analogies with words in visual memory and the knowledge of orthographic rules and conventions. These skills are primarily mediated by two processes. One is phonological where spelling is based upon the application of grapheme-phoneme correspondence rules. The other is based upon a visual process where lexical analogies are facilitated through direct lexical access (Barry, no date; cited Brown and Ellis, 1994).

In languages with alphabets such as English, there are two ways in which we might spell a word. We might (a) retrieve its spelling from a lexical store, retrieving spellings of known words from a learned repository (for example, writing the word 'symbol'), or (b) construct spellings by applying a form of sub-word sound-to-spelling conversion using an assembled spelling route (for example, symbol is written as 'simbol') (Brown and Ellis, 1994).

The relationship between the sounds and spellings of English words are notoriously inconsistent. There are homophones, where each of two or more words have the same pronunciation but different meanings, origins or spelling (for example, rain and reign), pseudohomophonic nonwords, where the sound is identical to the word (for example, rane), words containing inconsistently pronounced segments (for example, cove, love and move), and many forms of irregular words ranging from the typically divergent (for example, head) to total exceptions (for example, yacht and colonel). Such irregularity compromises the efficiency of non-lexical pronunciations and the possible implementation of an assembled spelling route, and consequently leads to incorrect spellings (Barry, no date; cited Brown and Ellis, 1994).

Spelling poses one of the greatest problems for dyslexic people (referred to as 'dysgraphia'). This is because these individuals do not possess the skills which allow them to spell correctly or easily correct spelling errors:

- Recall of words, i.e. an accurate mental image;
- Auditory discrimination, i.e. accurate awareness of letter-sounds, syllable-sounds and word-sounds;

- Kinaesthetic skills, i.e. a feel for the patterning of the word through the movement of the hand while writing or typing it (Pollock and Waller, 1997).

Dyslexic children display poorer understanding and use of phonological information in their spelling than normally-achieving children who also make spelling errors. Dyslexics also rely on visual memory skills and orthographic conventions rather than more rudimentary phonological skills (Brown and Ellis, 1994). Snowling (no date; cited Brown and Ellis, 1994) explains that dyslexic children fail to make a successful transition to a stage using alphabetic processing because of phonological deficits (spelling-to-sound and sound-to-spelling translation procedures). Unlike non-dyslexic people, dyslexics are unable to implement phonological spelling strategies. Performance is affected by word frequency, word length and the stress pattern of the word. This inability to segment and translate graphemes to phonemes and vice versa represents a bottleneck in spelling development. Dyslexics are blocked at the initial stage where whole words are processed as a whole unit and are thus unable to progress to the alphabetic phase of spelling development (Nicolson and Fawcett, no date; cited Brown and Ellis, 1994).

Miles (1993) discusses the types of spelling difficulties demonstrated in people with dyslexia. He found errors such as 'asist' instead of 'assist', wellfair/welfare, liquied/liquid and aviod/avoid. Pollock and Waller (1997) substantiate these findings.

#### 3.5.4 Writing Skills

Writing is composed of combinations of discrete symbols that stand in a socially agreed upon relation to language. Children learn about writing not by acquiring letters one after another but by firstly becoming sensitive to the features of written language (Temple, 1988).

Corrigan (2001) explains that a number of dyslexics experience a problem with writing coherently. This is primarily due to a phonological deficit. Someone with dyslexia is unable to firstly break the word into correct speech sounds before it can be written (Temple, 1988). Furthermore, if a dyslexic has to write things down at speed or under pressure, they may not be able to cope with the complexity or volume of the information that they have to process. This leads to poor presentation, spelling errors or the use of simplified vocabulary. Beaton (2004) also attributes poor

handwriting to deficits in fine motor skill and coordination (motor deficits are discussed later in this section).

### 3.5.5 Speech

From a very early age, children are trying to make sense of the communication around them. As they mature (cognitively and physically), they start to build a system of rules through a process of trial and error (more unspoken assumptions than strict 'rules') which enables them to construct sentences. As the child ages, they amend and add to their own rules, enabling them to produce more sophisticated sentences (Temple, 1988).

Snowling (1981), Brady, Shankweiler and Mann (1983; all cited in Snowling and Stackhouse, 1996) all report speech production difficulties in dyslexic people (referred to as 'verbal dyslexia'). Poor phonological awareness and/or weak phonological representations in memory are the primary cause of this difficulty (Hales, 1994; cited Miles, 2004; Beaton, 2004). The first information received about the speech sounds contained within a word is through hearing and perception of the word. Difficulties with speech output may reflect impairment at the earlier input or encoding stage of establishing phonological representations. If input processing problems exist, then inaccurate phonological representations will have knock-on effects on speech (Snowling and Stackhouse, 1996).

Speech difficulties can affect a dyslexic individual in a number of areas of literacy development. They may experience delayed speech, misuse of words and comprehension of text, word-finding difficulties and immature syntax development. The speech errors associated with dyslexia in adults are more evident at word rather than sound level. This means that they can produce the correct speech sounds in isolation, but have difficulty sequencing them correctly into words. The difficulty lies at the level of programming speech output (Snowling, 1987; Stackhouse, 1990; cited Snowling and Stackhouse, 1996; Townend, 1999). Examples of speech errors demonstrated in these individuals include 'Menelie' instead of 'Melanie'. There may also be confusion over similar-sounding words such as 'melon' and 'lemon' (Snowling and Stackhouse, 1996).

### 3.5.6 Listening

Listening is one of the main ways in which we take in information. Even though the availability of visual information is continuing to rise as a consequence of the digital age, it is listening and spoken language that remains the foundation of our ability to communicate with others (Rost, 1994).

To say that information is conveyed from the speaker to the listener is highly simplistic. The speaker *does* signal the content, however the images that are created are coming from the mind of the listener. The listener starts the process by building up from the most concrete units of the input (phonological units). By combining individual sounds and groups of sounds, a person is able to understand words which then let him/her comprehend sentences, ideas and relationships between them (Rost, 1994).

Hearing forms the basis of language perception and perception forms the basis for listening. When sounds reach the inner ear, they excite the auditory nerve and are then passed on to the auditory cortex of the brain. Here, sounds are quickly categorised as either speech or non-speech. If they are identified as the former, phonological decoding commences. We start by discriminating between sounds or by putting them into a category identified from within the language system, i.e. phonemes and syllables (Rost, 1994).

Rost (1994) also explains that words are recognised auditorily using three simultaneous processes:

1. Finding a probable word.
2. Estimating the meaning of the words (or 'semantics').
3. Finding the correct reference for the word within the language in which we have heard it.

People without dyslexia are easily able to achieve these processes. However, dyslexic people with impaired hearing and/or auditory skills will find them difficult.

Ear dominance also plays a major role in a person's ability to understand information relayed orally. The best scenario for a human being is to be right-ear dominant. This is for the reason that sounds heard with the right ear travel straight to the major

language centre located in the left hemisphere of the brain where they are interpreted and acted upon if appropriate. However, left-ear dominance means that sounds travel to a sub-language centre in the right hemisphere before they are transferred to the left side for interpretation. This means that the whole listening and interpretation process takes much longer, which affects the hearing of instructions, spelling, sequencing and understanding. Left hemisphere deficits and right hemisphere capabilities observed in dyslexic people causes them to be predominantly left-ear dominant. This is one of the primary reasons why listening and interpretation is a much longer and complex process for these individuals (Pollock, 2004).

### 3.5.7 Speech and Listening: 'Feeling Foreign'

Pollock and Waller (1997) and Townend (1999) describe the speech and listening difficulties experienced by dyslexics through the analogy of being in a foreign country. The reason behind the use of this analogy is the fact that a dyslexic person will experience this feeling whenever they are trying to communicate with others, particularly if the recipient is non-dyslexic. Firstly, the 'visitor' (in this instance, someone with dyslexia) has to work out the vocabulary needed to construct the sentences that they need. Next, they have to communicate this to the 'native' (someone without dyslexia), who subsequently answers in their own language. As a consequence, the visitor will struggle to understand complete sentences, missing out words not understood and guessing a lot from the context. This means that they start to question what the native has said and its meaning. The odd word may be recognisable, but the meaning in its entirety will have been forgotten. All these issues will lead to incorrect or inefficient communication between the visitor and native.

### 3.5.8 Numeracy

Research on dyslexia tends to focus on literacy. However, a dyslexic's grasp of numeracy can be affected for similar reasons. This is commonly known as 'dyscalculia'. Holding figures in the mind's eye is one of the main areas of difficulty because of visual processing weaknesses. Johnson and Peer (2003) list a number of other numerical weaknesses observed in dyslexics, these include:

- Number recognition (particularly similarly-looking numbers): numbers can be distorted, rotated, inverted or misplaced;
- Understanding numerical concepts and relationships;

- Mathematical skills such as calculations.

Miles (1993) points out that weakness in the area of digit span is extremely common within dyslexic people. A large number of dyslexic people display weaknesses in processing both visually and aurally-presented digits. He concludes that visual difficulties are experienced because such digits can be presented either simultaneously or in succession.

Being able to correctly process numbers is an important skill that we need to use on a daily basis. For example knowing the date, how much something costs, and understanding time conventions and the passage of time (Pollock, 2004). Therefore, one could suggest that poor numerical skills will present dyslexic people with a major barrier to inclusive participation in society.

### 3.5.9 Short-Term Memory

Short-term memory is a temporary store for information. The information stored will later be forgotten or transferred to the long-term memory store if it is important or used repetitively. If the information is used instead of simply remembering it, then 'working memory' is involved (Johnson and Peer, 2003).

Poor short-term and working memory are difficulties commonly experienced by dyslexic people (Miles, 1993; Johnson and Peer, 2003). The inability to form a visual image of words is known as having a poor 'visual memory' and the inability to hold a sequence of words or numbers is referred to as poor 'auditory memory'. Dyslexics experience difficulty with both types. Remembering this type of information is difficult because these individuals are trying to deal with the mechanics of the information processing task whilst trying to retain the information (Pollock, 2004). Dyslexic people will often find themselves having to return to the beginning of a long passage of text or within a long succession of digits if they become lost. They can often remember what appears at the start of a sentence, but would forget what they have just seen (Miles, 1993).

Corrigan (2001) also explored the practical difficulties associated with short-term memory in dyslexic individuals:

- *Note-taking*: People with dyslexia find it difficult holding large chunks of continuous auditory information long enough in order to process it into a written format. They may be unable to coordinate a listening task along with choosing key words and recording them in an abbreviated format. Spelling and handwriting difficulties further complicate this problem because they interfere with thought processes and make further demands on short-term memory. Copying at speed may also be problematic because it can involve a degree of memory skill.
- *Reading speed and comprehension*: reading involves a degree of visual perception and memory. Dyslexic people tend to read more slowly than non-dyslexics because they tend to rely on phonetic analysis rather than on sight vocabulary. Corrigan (2001) points out that this can cause a great strain on short-term memory. Dyslexic people may have to re-read paragraphs in order to assimilate meaning. They may also lose their place or have problems skimming or interpreting text.
- *Sequencing and organisation*: dyslexics may hear, read, write or remember words out of sequence. Incorrect word associations may magnify these difficulties.
- *Numeracy*: Rote/working memory problems may cause difficulties with remembering simple number facts. Someone with dyslexia may get lost in the middle of calculations or when following patterns of numbers due to sequencing or directional difficulties. The individual may also have difficulty with retaining small sums of numbers while processing calculations and may reverse, omit, miscopy numbers or decimal points.

### 3.5.10 Sequencing and Organisation

Sequencing is defined as:

*‘Doing or putting things in the correct order’*

(Pollock and Waller, 1997)

Our lives are dominated by sequencing and organisation. Once we have learned how to undertake a task or action in a particular sequence, we will carry it out without thinking about it. If we are stressed or tired, we may fail to do this correctly or as efficiently as normal. Getting organised may be affected or we may forget something.

Pollock and Waller (1997) point out that it is easy to assume that everyone has an in-built awareness of the basic concepts of sequencing and organisation. Yet, this is not the case for dyslexic people. Links between separate members of series will not be as easily formed and remembering word-sound patterns or visualising words in the correct order is problematic. These difficulties are caused by weaknesses in short-term memory, auditory and visual sequencing, visual recall and verbal labelling.

The main areas of literacy where sequencing problems have been identified are in the domains of reading, writing and spelling, for example the inability to get letters or words in the correct order. Johnson and Peer (2003) list some of the most commonly reported difficulties:

- Taking notes, writing or copying sequences of words correctly;
- Creating schedules and following them in the correct sequence;
- Structuring or organising written work so that it is coherent and understandable;
- Carrying out tasks logically so that they are undertaken efficiently.

A particular problem with correctly sequencing numbers has been identified by Miles (1993) and Pollock (2004). This has massive implications for daily functioning. For example, it can cause a person to be late for an appointment, get the date, day or time incorrect, or miss the appointment completely.

### 3.5.11 Motor Skills and Coordination

Sophisticated reflexes are needed for control over balance and voluntary movement. Motor development and coordination occurs from head to toe, and from the trunk outwards. By the age of seven we are fully integrated with both sides of the brain and body working together. This is not necessarily the case for someone with dyslexia (Pollock, 2004). Many dyslexics experience problems with motor skills and coordination, for example eye-hand or eye-foot coordination. When we become more expert at a skill, we put the learned sub-skills together to form one fluid automatically-performed task, using both hemispheres of the brain. This leaves us spare capacity for the other cognitive processes required for task accomplishment. Dyslexics are unable to progress to expert status in light of phonological weaknesses and

cerebellar deficits associated with the left side of the brain. Phonological skills, memory, speed, balance and cerebellar tasks can all be affected (Miles, 2004).

### 3.5.12. The Psychological and Emotional Effects of Dyslexia

Non-dyslexic people expect dyslexics to function and succeed in ways that are classified by a 'non-dyslexic world', which is often inappropriate. This leads to dyslexics making mistakes and the exacerbation of both their physical and psychological state. Unlike physical impairments, cognitive disabilities such as dyslexia are invisible. Therefore only the physical effects can be seen rather than the cause. However, the physical manifestations can lead to severe psychological and emotional effects. This subsequently further exacerbates the physical effects.

A number of negative psychological emotions are felt by dyslexic people as a result of the practical difficulties that they face. The main emotions to emerge from the literature are stress and anxiety, frustration, nervousness, a lack of confidence and self esteem. Naylor (1990; cited Maughan, 1995) also mentions feelings of inferiority and insecurity. Johnson and Peer (2003) produced an exhaustive list of emotional problems that they have observed. These include:

- Anger;
- Confusion;
- Depression;
- Embarrassment;
- Fear of exposure and ridicule;
- Fear of failure;
- Worry about others' perception and subsequent judgement of them because of their disability.

One of the worst aspects of being dyslexic is the vicious circle that stress can cause. A cyclical cause and effect relationship exists between dyslexia and stress. Refusal to attempt tasks or withdrawal can follow, which can lead to feeling excluded, discriminated against or dependent upon others (Hampshire, 2004; cited Miles, 2004).

### 3.5.13 The Individual Nature of Dyslexia and the Spectrum of Difficulties

Dyslexia is a highly individual disability (Pollock and Waller, 1997; Evans, 2001; Johnson and Peer, 2003). Although each symptom associated with dyslexia will manifest itself similarly between individuals, no two dyslexic people will have the same set of symptoms or levels of severity attached to each symptom. Furthermore, symptoms can sometimes disappear or change with the transition from childhood to adulthood (this is discussed below). This perspective to dyslexia is one more in line with the social model of disability.

### 3.5.14 The Transition of Childhood to Adulthood

The transition from childhood to adulthood is an important issue in relation to dyslexia. Some of the symptoms that are present at one point in a dyslexic's life may not necessarily be present in another. As the person matures, they often overcome many of the classic problems. This is simply through experience and the development of coping strategies (Brachacki *et al*, 1995). It is also not uncommon for particular problems to be compensated for over time due to learning. This is similar to someone who is born blind or becomes blind and develops coping strategies for the difficulties that they face (Bruck, 1990a, 1990b; cited in Snowling and Stackhouse, 1996).

Townend & Turner (2000) point out that a reading problem tends to be the key difficulty during the school years. Yet, most dyslexic adults turn out to be competent readers. The existence of reading difficulties in adults are not ruled out, but spelling and writing problems are more persistent. Dyslexic adults continue to experience difficulties with verbal naming, general language processing, phonological awareness, decoding words and short term memory tasks. There is also the possibility that the individual's difficulties will become more complex and diverse with age. One can suggest that there are many reasons for this. A more interactive role played by the individual within society means that they are often trying to accomplish more complex tasks and a greater number simultaneously or in succession.

## **3.6 Language and Cultural Differences**

*'Dyslexia is a critical issue worldwide. It is no respecter of race or ethnicity'*  
(Hoyles, 2007)

Examination of the literature highlights that dyslexia occurs worldwide regardless of language, race and culture, affecting approximately 8 per cent of the world's population (European Dyslexic Association, 2007). Until recently, a large proportion of research has been conducted solely with English-speaking participants. However, there is now an increasing interest in other languages. Data collected from other European countries also using alphabetic-style languages have identified a dyslexic sub-group within the general population (Beaton, 2004; Miles, 1993).

Beaton (2004) explains that there are subtle differences between languages which influences phonological sensitivity and thus incidence and severity of dyslexia. Learning to read exists in a vacuum and the impact of a phonological deficit will exist within the context of the person's overall language ability and experience. Differences in the organisation of neural mechanisms involved in reading were not found to be a determining factor. Yet word length, letter-sound relationships, the frequency of complex syllable onsets, different phonological input and the orthographic nature of the script in which the language is written can all be influential. This is one of the primary reasons why more errors are made by English sufferers in light of language complexities (Beaton, 2004).

Dyslexia does not only affect those who speak letter or alphabetic-type languages. It also affects those individuals whose language is based on symbols rather than letters. Chinese people with dyslexia have similar reading difficulties to dyslexics from the West; however difficulties have been traced to different parts of the left hemisphere of the brain (Miles, 1993; Beaton, 2004).

### **3.7 Gender Differences and the Incidence of Dyslexia**

Gender differences within the incidence of dyslexia have been regarded as another indication of a constitutional basis for the condition (Beaton, 2004; Miles, 2004). A ratio of 3 or 4 males to 1 female have been cited by Beaton (2004) and Miles (2004). Beaton (2004) points to several models which attempt to explain the gender differences within dyslexia:

- The expression of a relevant gene modified according to gender;
- A greater incidence of dyslexic males than females born to dyslexic mothers;
- Greater phenotypic variance in oral reading performance amongst males;

- Difference in referral rates – a greater number of son referrals by mothers;
- Perception of males in the classroom as disruptive or in need of extra help;
- IQ – a study undertaken in Colorado concluded that as selection for severity of word reading deficits becomes more severe, the mean IQ of the sample tends to decrease and this includes predominantly more males.

The above list highlights the fact that, although a gender difference clearly exists, to date there does not seem to be one reason behind it. Each possible cause for the gender imbalance has credibility, but opponents will provide an alternative view based on their own research findings and experiences.

There is however conclusive evidence that dyslexia is inheritable. There is an approximately 50 per cent probability of a boy being dyslexic if his father is dyslexic and 40 per cent if the mother has the disability. There is also a lower probability of girls having dyslexia than boys. What is inherited is not a reading disability *per se*, but aspects of language processing difficulties. Studies suggest there is heritability of phonological aspects of reading and that phonological awareness shares heritable variance with this (Olson, Forsberg, & Wise 1994; cited Turner and Rack, 2004).

### **3.8 Dyslexia: A Combination of Abilities and Difficulties**

In addition to the difficulties faced by someone with dyslexia, certain skills form part of their cognitive make-up. Dyslexic people are able to compensate for their left-brain weaknesses by utilising skills associated with the right side of the brain, particularly creativity, intuitiveness and visual-spatial thought. Right-brain skills are evident from birth (i.e. nature) and also develop as the person matures (i.e. through nurture). Albert Einstein and Leonardo Da Vinci both had dyslexia, as did Hans Christian Andersen and Pablo Picasso. Their difficulties existed alongside surprising abilities (Corrigan, 2001; Hoyles, 2007). In light of that, definitions of dyslexia should not simply concentrate on the notion of defectiveness and what someone with dyslexia is unable to do. What they *can* do because of a different cognitive style should also be considered (Corrigan, 2001). This is a key issue developed in the thesis. A positive (social) view such as this could in turn have favourable consequences for someone with dyslexia in terms of how they feel about themselves, and how they are perceived and subsequently treated by others, intentionally or unintentionally.

Next, this chapter examines the ways in which society discriminates against and excludes dyslexic people from society, and the ways in which these issues are being dealt with. Similarly to the approach taken in Chapter 2, access to information is discussed because it has particular pertinence for dyslexic people and is fundamental to exploring dyslexia and travel information provision.

### **3.9 Dyslexia, Discrimination and Social Exclusion**

Compared to the total number of people in the UK (estimated at 60.5 million in 2007)<sup>14</sup>, the incidence of dyslexia is quite substantial. From the available statistics, dyslexia is one of the most prevalent learning disabilities in the UK, affecting between 4 and 6 per cent of the population, and 8 per cent of the world population (BDA, 2003b). It is possible that this figure could be as high as 10 per cent because the available statistics only include those individuals using voluntary organisations or specialist services. Furthermore, some individuals have yet to be ‘officially’ diagnosed by a professional. One could conclude that a more accurate estimate will not be available until there is increased awareness and acceptance of this disability within society. This would lead to a proliferation in official diagnosis, which could then be reflected in the statistics.

Dyslexia is now a recognised disability by law. As such, dyslexic people are covered by disability statute (providing the individual is defined as ‘disabled’ within the definition of the law). However, dyslexia is not recognised as such by society as a whole. Negative stereotypes and misconceptions still exist, which leads to dyslexic people continuing to be treated inequitably in many aspects of their lives. Hence, discrimination and social inclusion barriers remain in place (Johnson and Peer, 2003). This is in line with the medical model of disability. There continues to be a mismatch between the signs and symptoms of dyslexia that society *does* see and awareness of what *really* constitutes dyslexia. Furthermore, being a cognitive disability, the problems of dyslexic people are less easy to define and accommodate than those experienced by people with more ‘visual’ disabilities. Such poor awareness will undoubtedly lead to a lack of knowledge of how to support the needs of dyslexic people, and an inclination to do so. The increased proliferation of the social model of disability within dyslexia will be slow to occur as a consequence.

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<sup>14</sup> Office for National Statistics (2007)

### 3.9.1 Access to Information for Dyslexic People

If an individual has the means to access information, but is unable to do so because of their disability, then the information is rendered inaccessible (Lyons *et al*, 2001). This could either be as a consequence of the medium used or the way that the information is presented. The individual will undoubtedly feel discriminated against as a result. Dyslexic people are often excluded from using certain services because the information provided is not dyslexic-friendly. Even though the DDA requires information providers to accommodate dyslexic people, there is a clear lack of supporting guidance aimed at educating providers on how to *actually* provide dyslexic-friendly information. Therefore it is unsurprising that dyslexic people feel unsupported in relation to information access.

A number of the difficulties experienced by dyslexic people will have an impact upon their ability to access and use information (Rainger, 2003). Visual processing difficulties will lead to slow visual object recognition and problems with visual concentration. This means that a dyslexic information user can be affected by both interface aesthetics and visual readability of the content. Specifically related to the Web, short term and working memory difficulties will have a huge impact on the accessibility of the information architecture. There is the likelihood that the user will become lost in the hypertext structure. This may occur particularly if they are returning to a higher level within the navigational structure as a result of reverse sequencing problems. Rainger (2003) also points to the issue of site navigability. As a consequence, errors are likely to be made before the information is located, or sometimes the information is not found at all.

### **3.10 Eliminating Discrimination: Creating Greater Social Inclusion and Independent Living for Dyslexic People**

This section provides an overview of the legislation and available guidance in place which attempts to protect dyslexic people from discrimination and social exclusion. Similarly to other groups of disabled people, dyslexic people should have the same choices and opportunities as the non-disabled. They should be able to be independently mobile within the built environment and feel a full and inclusive citizen in the society within which they live.

### 3.10.1 Legislation

Dyslexia is a recognised disability. It was first recognised as a special need by Parliament in the Chronically Sick and Disabled Persons Act 1970 (BDA, 2003b). It is also supported in the World Health Organisation's International Classification of Diseases. It is also referred to many times in the Code of Practice on Disability Discrimination (Moody, 2001).

Often, dyslexic people can reduce the effects of their disability if they are able to do things *their* way using coping mechanisms. However, if that is not possible or coping strategies cease to work, then the effects are 'disabling'. As discussed in Chapter 2, the Disability Discrimination Act has imposed an obligation on organisations to provide equity for disabled people. However, case law identified by Moody (2001)<sup>15</sup> highlights that not all dyslexics can be classed as disabled under the Act. This is as a consequence of the definition of disability provided by the DDA, and the spectrum of severity associated with dyslexia. Accordingly, not every dyslexic person will receive the same level of legislative protection, sometimes even as a result of coping strategies that they have developed in order to make life easier (Riddick, 2001). With the gap that still exists between visible disabilities and those of a cognitive nature, it is questionable whether or not the same treatment would be assigned to a person in a wheelchair who develops enough arm strength to use ramp facilities, or a blind person who copes with reading by learning how to use Braille. The BDA (2003b) believe that when assessing the effects of dyslexia, the law must take into account the fact that a person's ability to manage the effects may break down so that the effects may still occur.

### 3.10.2 Making Information Dyslexic-Friendly

The fundamental difficulties associated with dyslexia naturally lend themselves to clear specific operational-level guidelines for the provision of dyslexic-friendly information. However, legislation (particularly the DDA) does not provide clear guidance for this. Accordingly, it is provided via separate standards and guidelines. The main guidelines to come from such consultations can be classified under the following headings:

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<sup>15</sup> Bolton Metropolitan Borough Council; Profile Microfilming (Kent) Ltd; Thorne House Services for Autism; Kurt Geiger Ltd; A.E Proctor Ltd.

1. Presentation of Information;
2. Page Design;
3. Font Style and Size;
4. Paper Type and Colour Contrast;
5. Language.

The available guidance on the above areas is substantial. For the purpose of this thesis, only an overview is provided. This can be found in Appendix 5.

Being separate guidelines, they do not have to be implemented by law. Accordingly, they are often overlooked, and a 'design-for-all' approach taken to information provision. Providers are (in the main) interested in minimal compliance with the DDA and providing for as many different types of disabled groups as possible simultaneously. However, dyslexic-friendly information means that it is also 'user-friendly'. If information providers were aware of this, then they may consider demonstrating a greater commitment to designing for dyslexic people.

### 3.10.3 Online Information Provision

As previously mentioned, short term/working memory difficulties, along with sequencing and navigational problems, will have a huge impact on a dyslexic's ability to use the web. There is the likelihood that the individual will become lost in the hypertext structure, and may be unable to find the information they need. This is particularly the case when returning from a higher level within the site's navigational structure (Rainger, 2003). The literature does provide guidance on supporting the needs of dyslexic users of the internet and providing dyslexic-friendly web-based information. This can be found in Appendix 5.

Although the Web Content Accessibility Guidelines have been considered in relation to people with a learning disability, they have not been examined to see how users with a specific learning disability such as dyslexia can be provided for. Having said that, the cognitive approach taken to the WCAG means that some of the existing guidelines *do* have relevance to dyslexia (see Appendix 2). For example:

- Guidelines emphasising the perceptual and structural attributes of website documents;
- Reducing working memory load;

- Good navigational structure;
- Text readability;
- Content organisation;
- Providing multisensory support.

Refinement of the WCAG is required in order to make the guidelines more closely relevant to dyslexic people. Dyslexia is now a well-defined disability. Therefore, it is important that the guidelines acknowledge that, rather than being applicable to a number of different learning disabilities. However, it is arguable that it may not be practical to produce guidelines for each specific learning disability. There are a number of learning disabilities in existence, each having subtle differences between *and* within them (Brown, 2002).

### **3.11 Summary and Conclusion**

In order to explore and understand the needs of dyslexic people and their frustrations concerning travel information, the reader must first understand the discourses of dyslexia. Accordingly, this chapter examined the literature that surrounds this field of study. In so doing, it has presented a theoretical grounding for the research.

This chapter has presented a number of possible theories that experts suggest lead to individuals suffering from dyslexia. A phonological deficit emerged as the most likely cause. Accordingly, this came through strongly when discussing the principal difficulties associated with this disability. A number of the difficulties faced by dyslexic people emerged as particularly pertinent to travel information provision.

The understanding of dyslexia and the way in which it is defined is firmly embedded within the medical model of disability, focusing primarily upon the difficulties faced by dyslexic people. A positive change to society's perception of dyslexia is being prevented as a consequence, which means that dyslexic people are continuing to experience discrimination, inequity and social exclusion. If society is only presented with the negative facets of dyslexia, then it will undoubtedly be viewed and treated in a similar way. The very people attempting to change society's view of dyslexia are preventing this from happening because of the way in which they continue to conceptualise it. A social approach which challenges the innate medically-dominant assumptions towards dyslexia is necessary in order change the way in which

dyslexic people are perceived and subsequently treated. To uncover the issues at the forefront of discrimination and social exclusion for dyslexic people and how to address them will require a combination of legislative review and closer collaboration between academics, professional, government, and most importantly dyslexic people.

The empirical studies undertaken as part of this thesis (presented in Chapters 6 and 7) build upon this literature review. They provide empirical evidence for the negative effects of personal travel upon dyslexia and vice versa, and the reasons behind those effects. In order to reach that point, the next chapter presents an examination of the literature surrounding the contextual setting informing the basis of this thesis: travel and traveller information.

## **Chapter 4**

### **Transport Provision and Disability**

#### **4.1 Introduction**

The preceding two chapters explored the discourses of disability and dyslexia. This provided a framework within which the thesis could progress and become more focussed. Chapter 4 now introduces a transport dimension to the thesis by exploring the issue of transport and travel information provision for disabled people. By synthesising the disability and transport literatures, a context for the empirical research developed for this thesis is therefore provided. As explained in Chapters 2 and 3, dyslexia is a learning disability. Therefore, a discussion on how transport and travel information provision affects people with a learning disability provides a focus within this chapter.

Any attempt to examine the issues surrounding transport provision for disabled people must include accessibility. This is due to its potential impact upon the transportation needs of these individuals and their requirements of our transport systems (Transportation Research Group, 2001). Chapters 2 and 3 provided evidence of the links between disability discrimination and social exclusion. Accessible transport plays an important role in access to the built environment. Therefore, a link exists between accessible transport provision, discrimination and social exclusion. This chapter examines the evidence which supports this relationship.

The chapter then turns to examine the barriers to travel faced by disabled people. The role of travel information provision is explored, along with the different media used to deliver it, including web-based travel information. Transport Direct forms the basis of the discussion on web-based travel information because of its link with this thesis (explained in Chapter 1). Once the barriers facing disabled travellers are explained and how they make use (or not) of travel information, the chapter turns to look at the legislative protection available to disabled travellers and how transport providers are tackling the access challenges facing disabled people.

The final section of this chapter looks at dyslexia. In so doing, the key research area informing this thesis is defined. This section clearly highlights what potentially makes

dyslexic people and their travel experiences different to non-dyslexic travellers, thus providing further justification for this thesis.

## **4.2 Travel and Disability**

### 4.2.1 Accessibility

Gray *et al* (2001; cited Brake and Nelson, 2007) define accessibility as:

*'The ease with which an individual can access services and facilities that he or she needs or desires'*

In line with disability discrimination legislation, the definition of accessibility provided by the Oxford English Dictionary (2004) includes *'the right to use something or enter a place'*. This suggests that equality has been taken into account when defining the term.

Within the context of transport, accessibility is defined in the following ways:

1. *Physical accessibility*: the ease with which people can board and alight from vehicles, interchange between vehicles and move around terminals or interchanges (CIT, 1998).
2. *Information accessibility*: developments in Information and Communications Technology (ICT) are changing the nature of accessibility. Physical accessibility and mobility are being complemented by accessibility in virtual space (Transportation Research Group, 2001).

Communicating, imparting and exchanging travel information is a vital part of mobility for disabled people. The ease with which these individuals can physically use the transport network is influenced by the ease with which they can access, understand and subsequently use travel information. If the individual is unable to access the information that they need in order to ensure that the physicality's of the journey are possible, then the efforts made to improve their physical mobility become relatively unimportant. There will be low expectations and confidence in the ability to travel via certain modes as a consequence. In addition, if travel information is inaccessible, the individual will be unaware of the alternative travel choices available which may enable them to travel in a way which better suits their needs. Until this information is

available in a way in which it can be easily accessed, the choices of a disabled traveller will be more limited and behaviour will remain focussed on familiar routes or modes, which may not necessarily provide them with the most optimal choices.

#### 4.2.2 Discrimination and Social Exclusion

Everyone in society should have the means and opportunity to use something or enter a place, and should be able to do so easily. The standards and regulations introduced by the Disability Discrimination Act ensure that disabled people are no exception.

Transport policymakers and providers in the UK have a legislative duty under the DDA to take reasonable steps in order to prevent disability discrimination. Although improvements are being made to the transportation system, provisions are still not commonplace (Smith *et al*, 2006). Accessibility is key to achieving greater social justice and social inclusion (Gray *et al*, 2001; cited Brake and Nelson, 2007). Therefore, if transport accessibility is an issue, disabled people will continue to face discrimination and there will be fewer opportunities available to them for social inclusion.

##### 4.2.2.1 Public Transport Accessibility

Mobility is an important feature of social inclusion. Disabled people who are unable to drive because of their disability are going to be dependent upon the public transport system in order to stay mobile and part of society, or will be confined to a much more localised existence. However at present, public transportation (and the travel information provided) are not designed to suit *all* disabled people and a 'design-for-all' strategy is evident (where well-understood disabilities with a higher incidence are catered for in the hope that minority disabled groups will also benefit from the support provided).

'Design-for-all' does *not* design for all disabled people. Therefore, it is unsurprising that a proportion of disabled people continue to experience restricted opportunities and dependence upon others (Campion, 2003; cited Smith *et al*, 2006). However, the fact that each disability is highly individual means that the task of designing a public transport environment which is acceptable to every disabled group is quite complex. As a result, public transport will always be inaccessible to certain disabled people in

some way (Barnes and Mercer, 2003).

An inaccessible public transport system places considerable value on the car by disabled people for maintaining independent mobility and accessing opportunities within society. Even though less disabled adults have access to a car than non-disabled adults, disabled people without a car make fewer trips than disabled people with access to a car. Without a car, disabled people feel that they would not be able to leave the house as often, and some would not be mobile at all (Smith *et al*, 2006; Scottish Executive, 2006). Factors in the preference of disabled people for car travel are predominantly associated with the physically disabled - cars obviate the need to wait for transportation or walk as far. In addition, physical adjustments can be more easily made to a car in order to ensure that the vehicle better suits their needs.

### **4.3 The Barriers to Travel Facing Disabled People**

#### 4.3.1 The Barriers to Public Transport

Several studies explore the particular sources of difficulty to disabled people using public transport as their primary mode of travel (Metz, 2003; Smith *et al*, 2006). The issues identified range from physical access barriers (such as step height) to issues associated with access to travel information (such as timetable presentation). Of course, poor accessibility is also applicable to people without a disability. However, the existence of a disability will undoubtedly mean that these problems are felt more intensely and frequently. This will have a profound effect upon the journey experiences of disabled people (Scottish Executive, 2006).

#### 4.3.2 The Barriers to Car Travel

Car travel presents disabled people with fewer barriers to access and mobility than public transport. Compared to 61 per cent experiencing difficulties with public transport, only 13 per cent experience difficulties with car journeys (Scottish Executive, 2006). Despite that, car travel could still be made easier for disabled people.

Although the problems experienced by disabled drivers are predominantly physical (such as disabled parking provisions), access to information is also a considerable issue (Lucas, 2001; Barrett *et al*, 2003; cited Smith *et al*, 2006). The media most

frequently cited by disabled people as difficult to access include road maps, road signs and web-generated journey directions.

As a consequence of the access barriers to car travel, disabled people have to adjust their travel behaviour to reduce risk exposure. For example, choosing a different route, or not even attempting the journey at all. One can assume that as a result, disabled people are making fewer and shorter journeys than non-disabled drivers, usually in the daylight, choosing local familiar routes only. Independence is also going to be affected by accessibility.

#### 4.3.3 Barriers to Travel for People with a Learning Disability

In 2001, Mencap carried out a major consultation with people with a learning disability in order to create a national strategy for access to the arts. Participants explained that the design of the UK transport system and travel information provision is restricting their mobility and hence access to the arts. This study also relates strongly to inequity and social exclusion. These individuals are likely to avoid a place where they are treated less favourably, which adversely affects the choices and opportunities available to them (Mencap, 2004).

##### 4.3.3.1 The Barriers to Public Transport

The social model of disability (and the legislation arising from it) has had a direct impact upon public transport provision for disabled people. Although considerable effort has gone into improving access for the physically disabled and people with a sensory disability, much remains to be done for people with a learning disability. Policymakers and public transport service providers need to realise that these individuals have needs just as great as other disabled people, even more so in fact. The mobility of people with a learning disability is not only affected by the physical environment, but also the information provided within it. As a result, these individuals are particularly susceptible to dependent or reduced mobility, and immobility (Gates, 2007).

Meadows (1992; cited Lavery, 1998a) highlights a number of barriers to travel via public transport for people with a learning disability. These barriers are directly related to the cognitive nature of this group of disabilities:

### 1. Personal Factors

- Communication (e.g. understanding signs, recognising the correct vehicle);
- Vulnerability (e.g. getting lost);
- Unreliability of transport;
- Inability to react to unforeseen situations (e.g. a route change);
- Lack of confidence and anxiety.

### 2. Environmental Factors

- Poor attitude/lack of awareness of transport staff and other travellers;
- Unruly passengers (particularly school children and youths);
- Inadequate availability of travel training services.

### 3. Trip Factors

- Unexpected diversions;
- Inadequate information;
- Lack of proximity between the stop and destination;
- Inexperienced staff.

There is a definite interrelationship between these issues:

1. The person's ability to communicate is greatly affected if travel information is inadequate or inaccessible.
2. Their inability to react to change can create negative emotions.
3. The attitude/behaviour/experience of others can negatively affect the individual's psychological state.
4. Inadequate travel training services creates an inability to address all of the above issues.

Carpenter (1994) highlights similar issues:

#### 1. Vehicle Accessibility

- Boarding the correct vehicle;

- Coping with a noisy or crowded environment while simultaneously trying to access information;
- Coping with an unexpected or emergency situation;
- Understanding announcements;
- Knowing when to alight the vehicle.

## 2. Station Access

- Navigating the station, i.e. entrances, routes to vehicles, paths from other transport modes;
- Understanding signs and graphic displays;
- Identifying the correct route;
- Locating facilities;
- Understanding public announcement systems;
- Accessing ticket machines and information points;
- Correctly using gates and turnstiles;
- Navigating the station to exit.

## 3. Emergency Situations

The learning disabled rely on stable, predictable environments for navigating public transport systems. An emergency situation requires greater cognitive skills than normal in order to cope and react appropriately. These skills are not readily available to a person with a learning disability. These individuals will have to work much harder under emergency circumstances. In addition, the negative emotions felt can lead to incorrect or inefficient decision-making (Carpenter, 1994).

Carpenter (1994) provides an indicative list of circumstances that could be classed as an emergency to a traveller with a learning disability. This includes:

- Power failure;
- Vehicle, route or timetable change;
- Crowded conditions.

To a person *without* a learning disability, the above situations would probably not be classed as a true 'emergency'. Yet, having focussed considerable mental resources

on the planned journey, an unexpected change can cause a person with a learning disability to become unsure how to proceed, and have the confidence to do so. This causes the individual to feel a sense of emergency, reacting similarly to how a person without a learning disability would in a real emergency. An ethnographic approach to empirical research provides one of the most effective ways of capturing and conveying the reactions of an individual to emergency situations. This is because the distinctive features of ethnography revolve around the notion of understanding how people interpret their worlds and the reasoning behind their behaviour (ethnography is discussed in Chapter 5).

Even though the above section highlights that research attention has been given to learning disabilities, the transportation needs of these individuals are not being properly addressed. People with a learning disability still see the UK public transport system as confusing and daunting, deterring many of them from using it because the obstacles are impossible to overcome. In addition, the choices of these individuals are often restricted to certain locations at certain times (TTR, 2002; 2004a). This indicates an importance for policymakers and providers to acknowledge learning disabilities within transport systems and the ways in which their problems can be resolved. Independent mobility is an extremely worthwhile goal for *all* individuals to strive for. Yet, there is a lack of appreciation of the benefits that this can bring to people with a learning disability (TTR, 2002; 2004a).

### *Prominent Barriers to Travel by Public Transport*

The literature highlights three prominent barriers to travel by public transport for people with a learning disability:

1. Inaccessible travel information.
2. A lack of staff knowledge and sensitivity.
3. A lack of available travel training services.

Each of these issues is discussed below. One can suggest that these are prominent issues for people with a learning disability due to the cognitive nature of this group of disabilities. These issues are also interrelated: if information cannot be easily accessed or travel training is not available or has proved unsuccessful, the individual is likely to ask a member of staff for assistance. They may be subsequently received or dealt with insensitively because the member of staff lacks the knowledge or

experience in order to help them, or the inclination to do so.

### *Inaccessible Public Transport Information*

The literature highlights that access to public transport information is one of the biggest problems facing people with a learning disability. To make the right decisions, these individuals in particular need the right information at the right time, and in the right format. These elements are often missing, and information is too difficult to process. This means that the individual will experience difficulty, which will have a negative impact upon their travel horizons.

### *A Lack of Staff Knowledge and Sensitivity*

The majority of us have at least one experience of a member of staff who is unable to provide us with the assistance that we need. These experiences can range from a lack of knowledge to giving the impression of having 'got out of the wrong side of bed'. This can not only test our journey skills, but also leaves us anxious and uncomfortable, particularly if the situation or environment is unfamiliar. The negativity that these situations can cause will influence self esteem, our mobility and possibly future travel behaviour.

Imagine the above situation happening to someone with a learning disability. They are not easily able to communicate their needs and are often unable to understand or remember the information relayed back to them. If the situation is exacerbated by the anxiety felt at the hands of physical or verbal mis-treatment, then this can lead to the heightening of physical symptoms. Evidently, ground-level transport staff do not understand what having a learning disability means or the needs of such passengers. This clearly creates negative perceptions of public transport amongst this group of disabilities and hence inhibits use of this mode of travel (Mencap, 2003; Scottish Executive, 2006).

### *A Lack of Available Travel Training Services*

To use a public transport system effectively, an individual must be able to execute and complete several stages. They must be able to:

1. Get to (and correctly locate) the local stop/station for departure.
2. Identify the correct route for their destination and departure time.
3. Buy a ticket.
4. Locate and embark the correct vehicle in good time.
5. Identify their destination stop and alight correctly.
6. Exit and find their destination (i.e. complete the end leg of the journey).
7. They will also need to learn appropriate skills so that they can utilise this knowledge for the return and subsequent journeys.

One of the reasons people with a learning disability face barriers undertaking one or more of these tasks (and the fact that few travel independently) is because of a lack of available 'travel training services'. Although persistent cognitive weaknesses will mean that travel training cannot compensate for *all* of the problems experienced, it can provide these individuals with the skills and information which will enable them to learn and more easily undertake the aspects that *can* be recompensed (Carpenter, 1994).

#### 4.3.3.2 Barriers to Car Travel

The symptoms and associated limitations of people with a learning disability have a number of implications for the driving task. Although research in this area is limited, Telscan<sup>16</sup> (1999) identify the barriers to car travel facing these individuals:

1. The multi-tasking nature of the driving task.
2. Correctly estimating the speeds of surrounding traffic.
3. Correctly estimating time and distance.
4. Reacting in good time to sudden hazards or unexpected situations.
5. Easily navigating through an unknown area.
6. Correct and efficient use of information requiring spatial awareness, orientation and navigational skills.
7. Finding a parking space.
8. Undertaking the parking manoeuvre.
9. Relocating the car.

Although the above suggestions provide a useful indication of the issues facing

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<sup>16</sup> The Telscan Consortium works alongside developers of intelligent transport systems to ensure that the needs of elderly and disabled travellers are considered.

drivers with a learning disability, it fails to make any inferences or substantiate them with references to the literature on the causes and effects. The above elements of the driving task all contain a cognitive element and require the driver to utilise one or more cognitive processes in order to correctly perform them. However, the cognitive processing weaknesses exhibited in people with a learning disability are slower and more limited than people without a learning disability. Hence, the symptoms associated with these limitations will have a direct and negative effect upon the driving task. As a result, driving will not be unconscious and automatic, as is the case for people without a learning disability. Cognitive limitations also lead to less mental capacity for correctly processing what is going on and an ability to correctly act upon the situation. Confusion may occur and exacerbate the existing cognitive difficulties.

The chapter now focuses upon travel information, how it is delivered (via traveller information systems), and the role of information within the journey lifecycle. The reasons for the particular focus on travel information have been explained in Chapter 1.

#### **4.4 Travel Information and Traveller Information Systems**

Travel information provision can take the form of low-tech paper-based information (e.g. maps and timetables), telephone services (e.g. customer helplines), word of mouth (e.g. radio or television), and web-based services (e.g. Transport Direct). Traveller information systems collect, process, store and disseminate travel information. These systems are also used to support decision-making, coordination, control and analysis of the information provided<sup>17</sup>.

There is a long history behind the provision of travel information within the UK. Up until 30 years ago, the responsibility for this provision rested entirely with service providers. They produced signs, printed maps, timetables, information leaflets and ran their own telephone enquiry services. However, in the last 30 years, the government has taken an increasing responsibility for travel information as part of its social and legislative responsibilities (Lyons *et al*, 2003).

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<sup>17</sup> This definition of a 'traveller information system' has been adapted by the author using the generic definition for an information system produced by Laudon & Laudon (2007)

#### 4.4.1 The Role of Travel Information

Travel information can serve a number of important roles for the traveller. It can (1) make the individual aware of the travel options available to them, (2) empower the individual to make more fully informed travel choices, and (3) assist the individual in being able to successfully undertake and complete a journey. If the travel information available to the individual is incomplete, inaccurate or inaccessible, they are forced to make sub-optimal or more constrained journey choices, either in terms of route or mode (Lyons, 2006). If travellers are more easily able to embrace the information available to them, they will be more aware of the different options open to them, which could lead to a change in travel behaviour, either in terms of route or mode choice.

#### 4.4.2 Travel Information: Types

A three-way categorisation for travel information service provision exists:

- *'Unimodal Traveller Information' (UTI)* - informs the individual about one mode of transport only (for example travel by train, bus, ferry, plane, or car);
- *'Multimodal Traveller Information' (MTI)* – coordinates and provides the individual with information on more than mode. An MTI service consists of a number of UTI services stored together within a portal providing a single point of access;
- *'Integrated Multimodal Information' (IMMI)* – integrates and provides access to information on multiple modes of transport within one system. IMMI reduces the effort again for the individual, past that which can occur through the use of MTI through integration. An IMMI service requires access to the substantial number of local and regional travel information databases across modes is required, along with the ability to efficiently interrogate and manage them effectively (Haydock, 2007).

The increasing size and complexity of the UK transport system is creating a greater need for IMMI services. The transport system is now managed by collaboration between the public and private sector and the road network has increased by a quarter in the last 40 years. Furthermore, different needs and levels of mobility exist compared to a decade ago. For example, business and leisure opportunities have

made long distance unfamiliar journeys increasingly popular, which often means that journeys will be multimodal (Lyons, 2006).

#### 4.4.3 Delivering Travel Information in the Digital Age: Web-Based Travel Information ('Transport Direct')

The Internet has become an established and accepted method of communicating travel information. Travel information provided via this medium is readily available; it is up-to-date, efficient and easily accessible. This of course depends upon the characteristics/background of the individual and the design of the website itself (Frag and Lyons, 2008).

Although multimodal journeys have become increasing popular (and often necessary), the information which allows the public to link up each stage of the journey is not easily available. This leads to these types of journeys being undertaken using familiar routes and modes (particularly the car). In order to improve the situation, the Government (as part of its Ten Year Plan for Transport) has implemented an integrated web-based multimodal travel information service ('Transport Direct'). By exploiting the capabilities of the internet, this service is able to provide the public with a 'one-stop shop' - not only can individuals compare multimodal travel options across public and private modes, but a ticketing service is also available. Screen shots of Transport Direct at the time of the focus groups study can be found in Appendix 14.

At present, there is a low level of inclination to seek alternative mode choice information. Most individuals act habitually, using their normal route or mode, which may not be the most effective option. Implementing an integrated multimodal travel information service such as Transport Direct has the potential to positively change people's attitudes towards different modes by providing them with comparative information for alternative mode choice options (Lyons, 2006; Haydock, 2007).

The overall success of Transport Direct will be marked upon the extent to which it is being used by the public, how it informs their travel choices and how that subsequently affects their travel behaviour (Lyons, 2006). However, this is providing that the service has 'usability', i.e. that provision is useful (where the content meets the needs of the users) and 'usable' (where the users are able to gain access to the information easily and efficiently). If the service does not possess these attributes, it

will continue to play a minor role in a world dominated by unimodal travel information services (Haydock, 2007). In order to support the development of Transport Direct, the Department for Transport has a research programme in place and has engaged both internal and external usability expertise.

#### 4.4.4 Disabled People and Access to Travel Information

The principles of anti-discrimination require travel information services to be accessible to everyone. Yet a study by Tripscope (2004)<sup>18</sup> found that over half of disabled people are unable to independently access these services because they do not effectively meet their needs; over half of users are non-disabled using services on behalf of a disabled counterpart. Clearly, travel information providers are not fully complying with their obligations under the Disability Discrimination Act.

The findings of a study exploring the attitudes and aspirations of disabled people regarding travel information highlight an inverse relationship between independent travel and obtaining the right information pre-trip<sup>19</sup>. This is particularly the case for travel by public transport. Whilst disabled people's experience of public transport is that it is often inaccessible, difficulties in obtaining pre-trip information about the physicality's of travel tend to add to their problems. The research concluded that transport operators and information providers should comply with guidelines relating to the accessibility of information provision (such as WCAG). Providers should also strive to provide information on items considered by disabled people to be essential, subject to this being achievable at reasonable cost (TTR, 2004a).

This chapter has so far examined the transportation barriers facing disabled people, and the feelings that are created as a result. It has also looked at how disabled people make use (or not) of travel information services based upon accessibility. The chapter now turns to explain how the government is tackling the access barriers to transport facing disabled people.

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<sup>18</sup> This research involved a study into the ways in which disabled people obtain travel information and advice on travelling to, from, within, and across London (Tripscope, 2004).

<sup>19</sup> The disabled people involved in this research: (1) Physically disabled (2) Blind/Partially Sighted (3) Deaf/Hard of Hearing, and (4) Learning Disabilities (TTR, 2004a).

## **4.5 Improving Accessibility for Disabled People**

### 4.5.1 Improving Public Transport Accessibility for Disabled People

For people without access to a car, public transport is important for securing the ready access to the people and places necessary in order to maintain quality of life (Metz, 2003). Improvements (during the past decade in particular) have made the public transport sector much more responsive to the needs of disabled people. The UK is (as are other countries) continually and periodically producing new and updated strategies in an attempt to tackle current governmental concerns. For example, 'Demand Responsive Transport' and proposals in order to provide greater support for multimodal travel have emerged in recent years. These are discussed below.

#### 4.5.1.1 Demand Responsive Transport

People living in rural/suburban areas are particularly susceptible to urban inaccessibility. Conventional public transport services (particularly bus services) have fixed routes and times that have to be adhered to. This can lead to torturous routes, low frequencies and thus poorly used services; particularly by groups of society who already find travelling difficult. Disabled people are a prime example.

In response, a more flexible form of transport has become available. 'Demand Responsive Transport' (also known as 'Flexible Transport Services') can play a key role in making urban areas more accessible. These services can serve dispersed mobility needs and provide local mobility, as well as providing connections to conventional urban transport services, thus promoting urban/interurban travel. It is also suggested that Demand Responsive Transport could help to break down barriers to social inclusion - improved mobility allows socially-excluded groups to participate more fully in their communities and reduces barriers to equality with other citizens (Mageean and Nelson, 2003; Brake, Mulley, Nelson and Wright, 2007a).

Taxis are one of the simplest forms of Demand Responsive Transport. However, technological developments (particularly satellite tracking, on-screen information and routing software) have made it possible to create more cost-effective public transport alternatives (MTRU, 2008). For example:

- INTERMODE (Department for Transport, 2002);
- SOLUTIONS (Solutions, 2007);
- MASCARA (Cork City Council, 2007);
- Community transport initiatives (Cambridgeshire Rural Transport Partnership, 2005).

#### 4.5.1.2 Support for Multimodal Journeys

Disabled people have considerable needs for support and reassurance particularly where journeys are multimodal. For this type of journey to be possible, a disabled person must be confident that all of the links in the journey chain are accessible and manageable. It takes only the prospect of one difficult link for someone with a disability to abandon the journey altogether or lose an element of independence (Metz, 2003).

Human-based support mechanisms would allow disabled people to more comfortably make multimodal journeys. Salveson (2001; cited Smith *et al*, 2006) recommends developing a network of 'travel buddies', and Campion (2003) suggests the increased presence of ground-level transport staff and telephone operators. The provision of a dedicated disability coordinator would also be valuable, particularly if the individual employed was able to support access across different public transport services.

#### 4.5.1.3 Improving Accessibility for People with a Learning Disability

Ease of access to the public transport system means facilitation and support that is sufficient to enable individuals to easily understand and use:

- Transit vehicles;
- Routes and networks;
- Paths of travel, e.g. entrances, exits;
- Primary functions, e.g. platforms;
- Amenities, e.g. ticket machines, telephones;
- Emergency facilities, e.g. exits and emergency procedures (Carpenter, 1994).

The following aspects of design ensure that people with a learning disability are supported during the above activities:

- Use of simple text, graphics and colour coding;
- Clear display of stop and vehicle details;
- Times available in a 12-hour format;
- Clear audio information;
- ‘Talking Signs’;
- Low-technology solutions such as help desks;
- Staff training;
- Ground-level staff;
- Travel training;
- Awareness of and access to Smart Cards.

Transport operators would argue that these are already in place. However, privatisation of the transport network and regional control of transport provision means that they are not commonplace and improvements are slow to materialise.

#### 4.5.2 Assisting Road Travel

A review of the literature surrounding disabled drivers highlighted a number of ways in which they are being physically supported in their quest to stay mobile. There is seating and lifting equipment available, infrared controls and automatic gear changing. Community vehicles and mobility scooters are also available to those who are unable to drive.

Understanding (and hence making use of) traditional forms of highways information (such as written directions and road maps) can also be a challenge to disabled people during a car journey lifecycle. This can affect the mobility, safety and comfort of the driver. Technological developments provide one solution to this (for example satellite navigation systems and mobile map-based itineraries such as ‘MAPPED’). However, the usefulness and usability of these systems depends upon the way in which they are designed, both in relation to the needs of disabled drivers and ease-of-use within context.

#### 4.5.3 Providing Accessible Web-based Travel Information

The level of detail that web-based travel information services are capable of providing can transform a journey option into a real possibility for disabled people.

However, in order to achieve this, information providers have to ensure that disabled people can derive maximum benefit from its services, i.e. the information has to be useful, useable *and* accessible. A study investigating the travel information requirements of disabled people<sup>20</sup> highlights some of the most common suggestions for a disabled-friendly web-based travel information service:

- Text-to-speech and speech-to-text facilities;
- Screen-reader friendly (i.e. alternative text descriptions);
- Screen-magnifier friendly;
- Appropriate use of graphics;
- Pages should not require a horizontal scrollbar where possible;
- A consistent and appropriate use of font, typefaces and colour contrasts;
- User control of presentation settings (TTR, 2004).

In relation to information content, the TTR (2004) study recommends that a web-based travel information service should provide the following information for disabled people (or links to it):

- Information on the accessibility of the transport that will be provided (such as contact details, information on fares, details for impaired access, onboard facilities, and planned engineering works which may cause the journey to change);
- Maps of stations highlighting access for people with reduced mobility;
- Door-to-door travel guides;
- Travelling in and around the end-leg locality;
- Taxi and private hire information from or to stations;
- Live travel news available via mobile technologies - this allows them to make decisions and changes as much in advance of the journey as possible (TTR, 2004).

Transport Direct has implemented a number of the above suggestions. At present, it conforms to Part 3 of the DDA by means of the WCAG (Level A 1.0, and where possible Level AA). However, it is suggested that conformance to Level AA of the

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<sup>20</sup> Several groups of disabled people were involved in the TTR 2004 study:

1. Physical/dexterity impairments.
2. Sensory - blind/partially sighted and deaf/hard of hearing.
3. Learning disabilities (general learning disabilities rather than specific categories)

WCAG is necessary in order to influence the mobility of disabled people.

As previously mentioned, the accessibility barriers to transport facing dyslexic people does not exist in any depth, hence the reason why this thesis is possible. This is substantiated by Brachacki *et al* (1995) and TTR (2004b). The following section examines the literature that *does* exist on this subject, which provides an effective point of departure for the empirical research (Stewart and Kamis, 1984; cited Blaikie, 2000).

## **4.6 Dyslexia and Transport Provision**

The problems experienced by dyslexic people spill over into many aspects of their lives (Johnson and Peer, 2003). Travelling is a prime example. The inherent cognitive processing difficulties of these individuals, combined with a time-constrained and stressful context provide the primary causal factors. Although dyslexia is a learning disability, experiences *specific* to dyslexia exist. This causes dyslexic people to experience difficulties, which people without dyslexia may not experience.

The fundamental difficulties associated with dyslexia were discussed in Chapter 3. However it was explained in Section 3.1 that there is a cluster of difficulties which has a considerable relevance to dyslexic people undertaking a journey lifecycle - orientation, spatial awareness and wayfinding. These difficulties are now discussed.

### 4.6.1 Orientation, Spatial Awareness and Wayfinding

The concepts of orientation and spatial awareness are relatively similar. They both refer to positioning and placement of an object in relation to the person themselves or other objects (Pollock and Waller, 1997). 'Wayfinding' can be defined as:

*'How people find their way in the physical world, what they need to find it, how they communicate directional information, and how people's verbal and visual abilities influence wayfinding'*

Raubal (1997; cited Campbell and Lyons, 2008)

All travellers in an unfamiliar setting can experience orientation and wayfinding difficulties. Complex layouts, simultaneous travelling and comprehension of

directions are some of the aspects of orientation and wayfinding that create challenges (Campbell and Lyons, 2008). Yet in light of the cognitive nature of dyslexia, the above issues are likely to be more routinely and severely experienced by dyslexic people. Orientation and wayfinding require more sophisticated decision execution and information processing skills in order to reach the destination, skills which originate from the left hemisphere of the brain. Dyslexic people are less likely to possess these skills and consequently need to utilise their right-brain skills in order to compensate for left-brain weaknesses.

Having difficulty finding a destination may not immediately be perceived to be of great importance or highly stressful (Campbell and Lyons, 2008). However, someone with dyslexia will be almost certain that something is going to go wrong. There is anxiety and the constant fear that they will not be able to deal with the situation easily and independently. Passini *et al*, (2000) points out that a person's psychological and mental state can determine the person's cognitive ability to face and solve wayfinding problems. Hence, for a dyslexic, stress is likely to exacerbate orientation and wayfinding difficulties.

Similarly to the other symptoms of dyslexia (discussed in Chapter 3), the difficulties that dyslexic people experience with orientation and wayfinding exist along a spectrum. Someone with dyslexia can feel totally lost and unable to relate themselves to other objects. At the other end of the scale, they possess a language-based difficulty with connective terms (a word that can be used to describe the relative position of one object to another with a relationship between the objects – left/right, north/south, east/west). Problems tend to originate more frequently from the latter case (Miles, 1993; Pollock and Waller, 1997). Miles (1993) suggests that the wrong responses are a consequence originating from verbal labelling and naming weaknesses. He found that single commands can be dealt with correctly, yet having to distinguish one from the other (such as left and right) is when the weaknesses are exposed. Problems such as this will make orientation and wayfinding extremely difficult - a person firstly has to be spatially aware and orientate themselves correctly before wayfinding can occur.

#### 4.6.2 The Barriers to Travel by Public Transport facing Dyslexic People

The Trace Research and Development Centre (2003) suggest that dyslexic people will potentially experience problems with one or more of the following aspects of a

journey by public transport:

1. Accessing and understanding information pre-trip.
2. Ascertaining the destination.
3. Accessing technology en-route such as self-service ticket machines.
4. Reading ticket information.
5. Accessing and understanding information at the station, i.e. audio and visual information.
6. Finding the correct stop/platform number.
7. Boarding the correct vehicle.
8. Finding a pre-booked seat.
9. Knowing when to alight.
10. Wayfinding through the interchange.
11. Finding the station exit.
12. Wayfinding through the end-leg of the journey.

The above difficulties arise primarily because of the nature of dyslexia, exacerbated by the fact that at present public transport information is not provided in a dyslexic-friendly format. As a consequence, the information provided is not able to assist them and travel by car will often be favoured. Although this conclusion is drawn, the driving task is still stressful and challenging for dyslexic people. For that reason, the following section discusses travel by car.

#### 4.6.3 The Barriers to Car Travel facing Dyslexic People

For a non-dyslexic, the driving task *per se* is unconscious and automatic once learned. Through the learning process, the individual has obtained sufficient knowledge of the Highway Code and how to manoeuvre the car efficiently. He/she also improves with practice. However, that is not necessarily the case for someone with dyslexia. The difficulties are more intractable because of the slower processing abilities associated with the disability (Kirkby, 1995).

During a car journey, the driver needs to run through the sequence of events that they are about to face, make appropriate predictions, and act upon them. The most important aspects of the traffic scene need to be quickly assessed, and the aspects which are of no immediate threat have to be filtered out. Dyslexic people do not possess the same cognitive processing abilities as non-dyslexics, and as such their

driving abilities are likely to be greatly impaired (Kirkby, 1995). A quantitative study discussed by the BBC (2005) concludes that dyslexic drivers can take up to 30 per cent longer to react than non-dyslexic drivers.

A story in a regional newspaper highlights the real dangers dyslexic drivers face because of information processing difficulties. A severely dyslexic man misread a road sign and collided with another car (South Wales Echo, 2007a). If one was to look at this story through the medical model of disability, the story implies that dyslexic people should not be allowed to drive. However, this is not the case. Someone with a more social perspective would see that the citation is designed to highlight the severity of the situation dyslexic drivers can face, and hence the urgency associated with addressing and supporting their needs.

The issues discussed above stem from the poor interchange of information between the left and right hemispheres of the brain. Driving is a skill which involves the use of the left *and* right hemispheres. For example, moving through the traffic is about control, sequencing, perceiving changes in the environment, analysing the situation and responding rapidly and correctly. These are left hemisphere skills. Tasks involving car control are 'spatial parallel processing' tasks, which are dealt with by the right side of the brain. Pushing the clutch down before changing gear is a situation where the individual has to use both hemispheres of the brain (Kirkby, 1995).

#### 4.6.3.1 Difficulties with Road Signs

Upon seeing a road sign, the driver has to understand the information and subsequently act upon it in good time. The meaning of road signs are learned at first by situated instruction, with further knowledge and learning occurring via written sources such as the Highway Code (Brachacki *et al*, 1995).

The findings of a study undertaken by Brachacki *et al* (1995) highlights a deficit for knowledge and recall of traffic signs amongst dyslexic people<sup>21</sup>. Whereas for the non-dyslexic participants there was a correlation between traffic sign recognition and driving experience, no such correlation was found for the people with dyslexia. The preferred conclusion was that the performance of the adults with dyslexia was less automatic than that of the non-dyslexics, with a greater cognitive load and

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<sup>21</sup> The study tested ten adults with dyslexia on their ability to recognise and recall traffic sign knowledge.

information processing deficits leading to less spare capacity for recalling and correctly processing road signs. This leads to an apparent deficit in implicit learning, accounting for the slower acquisition of traffic sign knowledge (Brachacki *et al*, 1995).

#### 4.6.4 Barriers to Travel Information

Similarly to other travellers, dyslexic people feel that it is crucial to have access to travel information both pre-trip and en-route in order to help manage stress and anxiety. However, research suggests that based upon the specific needs of dyslexic people, information is either unavailable, of little use, or difficult to access. As a consequence, these individuals are unable to consider alternative journey options. Hence, they will stick with familiar routes and modes and exhibit a reluctance to explore alternative options and journeys because the alternatives are perceived to be too difficult (TTR, 2004b)<sup>22</sup>.

##### 4.6.4.1 Barriers to Web-based Traveller Information

For dyslexic people, web-based travel information services can be incredibly overwhelming and complicated because websites are not dyslexic-friendly and do not support the cognitive makeup of dyslexic people. Consequently, users routinely become stressed and frustrated, and some are even unable to complete the task without assistance. If assistance is unavailable, the task may be abandoned completely (TTR, 2004b).

#### 4.6.5 The Need to Create a Dyslexic-Friendly Transport Environment

Access to information at any time en-route is important if travellers are to have complete awareness, understanding, safety and security (Kenyon, 2001; cited Lyons *et al*, 2001). In order for dyslexic people to achieve this, they need the support of specific dyslexic-friendly travel information. Otherwise, independent movement is made increasingly difficult or even impossible. Where an interchange is required (particularly if a modal change is involved), the need for information increases further. The individual must be satisfied with the feasibility and reliability of each connection.

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<sup>22</sup> The research study forming the basis of this discussion involved one focus group of people with a learning disability. A number of the participants were dyslexic, and recruited at the request of the author of this thesis in order to confirm the proposed topic. The issues uncovered in the study were not discussed in a comparable level of depth to this thesis (TTR, 2004b)

Even though dyslexic people develop coping strategies for certain circumstances, when circumstances change or there is a lot of pressure, then coping strategies cease to help. Information becomes even more crucial in order to help overcome (as far as possible) the problems encountered and continue with the journey.

Providing the dyslexic person falls within the requirements necessary under UK and EU disability legislation, he/she does have legal protection against discrimination. However, it is clear that dyslexia has still not been embraced by the transport sector. This is having serious consequences for dyslexic people in their plight to stay independent, mobile and part of the society within which they live. If adaptations are made to travel information to make it more 'dyslexic- friendly', this would allow dyslexic people to function more easily, without having to rely so heavily upon coping strategies, or upon other people. Furthermore, the anxiety that accompanies them because they are trying to function in a non-dyslexic environment would be more manageable.

#### **4.7 Summary and Conclusion**

Chapters 2 and 3 explored the discourses of disability and dyslexia. This provided a framework within which the thesis could progress and become more contextually-focussed. Chapter 4 has introduced a transport dimension to the thesis by exploring disability and transport provision in the UK, including the potential issues surrounding travel for dyslexic people. By synthesising the disability and transport literatures, a context for the empirical research developed for this thesis has been provided.

A key theme running through this chapter has been the relationship between accessible travel information and mobility-related exclusion, particularly where people with a learning disability are concerned. These individuals in particular need easy access to information that will reassure them that the physicality's of the journey will be possible. In other words, the need for accessible travel information precedes the need for physical accessibility for people with a learning disability. Although the number of travel information services and their sophistication has significantly increased in the past decade, exploitation seems to have led to information inaccessibility for people with a learning disability. This has a substantial impact upon propensity to access the physical transport system. The consequent isolation and loneliness that is experienced as a result of mobility-related exclusion can lead to depression and an exacerbation of physical symptoms. This can lead to self-

exclusion. Although dyslexia is a *specific* learning disability, it is suggested that dyslexic people will face similar challenges.

Travel information plays an important role in not only creating access barriers to transport for people with a learning disability, it can also counteract them. Well-designed traveller information can do much to reduce the stress that these individuals experience during a journey lifecycle, and thus enhance their journey experiences. More comfortable use of the transport network also fosters increased confidence, both in the individual's own abilities to travel and in the transport services themselves. However, proliferation of the social model of dyslexia within the transport sector only becomes a real possibility if research findings are widely disseminated and better collaboration occurs between public and private service providers.

Now that the disability and transport literatures have been synthesised, the thesis can now present the empirical research developed for this thesis. The following chapter will examine the research methodologies used in order to generate and analyse the empirical data.

# Part 2. Methodology

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## **Chapter 5**

### **Methodology**

#### **5.1 Introduction**

This chapter presents the empirical research strategy adopted in order to fulfil the aims and objectives of the thesis. The chapter progresses through four principal sections followed by a summary and conclusion. It begins by discussing the research approach. Subsequent sections present a detailed discussion on the choice of methodologies - a series of focus groups and a travel ethnography study. This includes the sampling strategies, method implementation and approach to analysis. Two separate sections have been devoted to presenting these methods. By discussing each method separately, the reasons why such methods are considered complimentary can be more clearly identified (Corbetta, 2003). The chapter closes with a discussion on research ethics. Although this forms the final section, social and ethical concerns have been a key consideration throughout the development and implementation of the methodologies used.

#### **5.2 Research Approach**

##### 5.2.1 Research Approach

Research raises an important question concerning whether the approach to data generation should be quantitative, qualitative or a combination of both. When choosing the approach to this research, a number of key issues were considered:

1. Effectively achieving the aims and objectives of the research.
2. The production of valid and authentic findings.
3. Making a contribution to the theoretical understanding of dyslexia within the context of transport.
4. Suitability to the nature of the target population being studied.

A purely qualitative approach was strongly compatible with the above aims and objectives. Although a quantitative-based survey would have highlighted the prevalence of the problem, the findings would be of little use to the transport sector in learning about the attitudes and aspirations of dyslexic people in depth. In addition,

survey-based research with dyslexic people is challenging because of the nature of dyslexia. Even if dyslexia itself was not a problem, a quantitative survey remained inappropriate. A qualitative approach allowed the researcher to gather and represent human phenomena with words and the meanings attached by participants to events and their lives (Schutt, 2006). Valuable subjective elements were captured and consequently so were the perceptions, attitudes and motivations of the participants (Edmunds, 1999; Gray, 2004).

## 5.2.2 Methodologies

The intention from the outset involved two stages of data generation using different but complimentary (interconnected) methods. The first stage would form a core element to the overall thesis and provide a basis for further research, with the aim of the second stage to build upon and validate the findings from stage one. Using a two-stage approach would also allow the researcher to develop a deeper understanding of the topic being studied.

The following two sections present a detailed discussion on the choice of methodologies (a series of focus groups and a travel ethnography study). This includes the sampling strategies, method implementation and approach to analysis.

## **5.3 Stage One - The Focus Groups Study**

### 5.3.1 The Focus Group Approach

The final section of Chapter 4 highlights that research into the experiences of dyslexic travellers is limited. Accordingly, an exploratory insight was an essential part of this thesis:

*'A journey of a thousand miles must begin with a single step'*

(Lao-tzu, no date; cited Fetterman, 1998)

A focus group typically brings together a group of individuals for a face-to-face discussion on a topic of interest. Hence, they are an effective way of gathering the views of a number of people simultaneously. Participants provide a flow of input and interaction related to a particular topic, bringing their opinions and perspectives to the surface, with the opportunity to diversify onto other related topics if appropriate

(Edmunds, 1999). For those reasons, it is suggested that focus groups are an ideal method to use with those who have disabilities that affect aspects of literacy and where the condition is inhibited by stress (such as dyslexia). From a social perspective, people with a learning disability respond well to focus groups because this method allows them to be involved in research as active contributors (Aldridge, 2007). Focus groups offer a way of placing these individuals in a situation where they can listen and respond to the comments and opinions of similar individuals (TTR, 2004a).

Krueger & Casey (2000) explain that a focus group is a special type of group discussion because they possess the following specific characteristics:

- A clear purpose;
- Participants with specific characteristics related to the topic.

For some time, academics have been apprehensive about using focus groups because of the difficulties associated with data contamination due to group dynamics. However, with the success observed from within the market research environment during the 1980's, academics re-examined its potential. While focus groups are less formal than methods such as structured interviews, they nonetheless provide an important source of information for the academic researcher (Edmunds, 1999).

Although a valuable research method, the literature points to some concerns regarding data validity and generalisability of the findings of focus group research. Edmunds (1999) explains that the results of focus groups are not quantifiable and involve modest sample sizes to ensure that in-depth discussions develop. This means that the findings are not necessarily representative of the entire population from which the participants are recruited.

### 5.3.2 Undertaking Focus Group Research with Dyslexic People: Expert Support

In social research, people with a learning disability are often excluded from conventional research studies for the reason that the researcher does not understand how to adapt research methods to allow such participants to be effectively included. Their experiences go unutilised as a consequence (Aldridge, 2007). Trying to conform to recognized principles of qualitative research methods do not work well where respondents' different cognitive and verbal skills cannot be accommodated:

*'Textbook methods of social research discriminate against people with a learning disability. Methods that rely on reading or writing may effectively exclude them from the role of respondent or informant in ways that mirror their exclusion from wider society. Wittingly or unwittingly, the use of these methods also helps to reinforce the medical model of learning disabilities as individual deficits'*

(Aldridge, 2007)

In considering the conclusions of Aldridge (2007), a meeting was held with a dyslexic expert prior to commencement of the empirical research (Professor Timothy Miles, Bangor Dyslexia Unit, University of Bangor). This would help to ensure that the researcher approached the study with a greater degree of knowledge on how to conduct research with dyslexic people, and that the methods chosen were appropriate.

The meeting between the researcher and expert was held at a location chosen by the latter to ensure maximum comfort - in addition to being an expert in dyslexia, Professor Miles is dyslexic. An informal and collaborative discussion ensued, with the expert providing the benefit of his knowledge and expertise where necessary. The expert was able to provide an insight into the difficulties likely to be faced by the researcher and how these problems could be accommodated. It was also possible to develop the researcher's understanding on dyslexia itself. The expert confirmed that a series of focus groups and a travel ethnography study would almost certainly be the most appropriate methods to use in order to achieve the research aims and objectives. Professor Miles expressed considerable interest in the research and wished to have continued involvement as it progressed. Consequently he was involved in the review of all research outputs to emerge. The findings of the focus groups study have also been published in his most recent book examining the day-to-day experiences of a musician with dyslexia<sup>23</sup>.

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<sup>23</sup> Miles, 2008. *Music and Dyslexia: A Positive Approach*. Chichester: John Wiley and Sons Ltd.

### 5.3.3 Designing the Focus Group Study

#### 5.3.3.1 Proposed Focus Group Profiles

One of the first tasks associated with recruitment is identifying the proposed profile of the focus groups. The proposed focus groups profile is discussed below and presented in Appendices 8 and 9.

It is advisable to conduct multiple focus groups. Multiple groups ensure greater data reliability, better representation of the target population, and allow comparisons to be made between and across groups. The number of groups largely depends upon the breadth of the topic and data saturation. Between four and six are recommended. Due to the fact that the focus groups would provide a core element to the thesis, it was decided that a series of six groups would be necessary in order to generate the depth of knowledge required. The locations of the focus groups would be based upon the dyslexic support groups agreeing to participate.

In terms of group size, each group must be small enough for everyone to have the opportunity to share insights, but large enough to provide diversity of perceptions and a large pool of total ideas. Groups involved between six and ten individuals. Groups with over ten participants tend to be somewhat unwieldy. Groups tend to fragment, interaction among the participants is less effective, and discussions can be hard to control (Edmunds, 1999; Krueger & Casey, 2000).

Next, the configuration of the groups had to be considered. It is noticeable that non-dyslexic control groups were not used within this research, in what is a case study rather than a comparative study as a consequence. Although this approach has obvious advantages, the author felt that the published research discussed within Chapters 2-4 serves to provide a non-dyslexic perspective to travel information provision. Although this research concludes that the challenges faced by dyslexic travellers and the needs of these individuals are unique because of their cognitive makeup, this needs to be verified by incorporating non-dyslexic people into further research.

Recruiting on the basis of dyslexic severity (mild, moderate and severe) would yield a much richer set of findings than simply recruiting on the characteristic of dyslexia alone. However, the literature highlights that the level of dyslexic severity can vary on

an individual basis, and between traits. Therefore, it would have proved extremely difficult to recruit on that basis. Recruiting based upon official diagnosis of dyslexia (received from a professional) was considered sufficient for this study.

It could not be assumed initially that the overriding personal characteristic that matters in relation to (the problems) using travel information is dyslexia alone. Accordingly, the participants had to be heterogeneous in terms of the other characteristics that they possess. Each group involved dyslexic adults aged between 18 and 60. Children were not included for the principal reason that they do not operate independently within the context being studied. A further reason for the absence of children from the proposed recruitment profile stems from the literature. It was highlighted in Chapter 3 that the cognitive makeup of dyslexic children is quite different to that of dyslexic adults (Brachacki et al, 1995; Snowling and Stackhouse, 1996; Townend and Turner 2000). Adults aged between 60 and 75 were initially considered due to the potential problems experienced by these individuals and their specific information needs and frustrations. However the aging process itself brings a number of problems. Therefore, it was decided not to include such participants at this time at this time. It may also have been difficult to recruit older participants because 'official' diagnosis of dyslexia is a fairly recent phenomenon. As a consequence, there may have been a low level of acceptance/official recognition of the condition within the over 60s population. It should be noted that the potential associated with including people below the age of 18 who travel/have the potential to travel independently and people aged between 60 and 75 has been recognised, and has not been ruled out as part of further research.

The participants would have to be convinced to share their opinions and experiences with other people on a subject which is considered quite sensitive to disabled people. This level of overtness requires trust, effort and courage, and a permissive non-judgemental environment. Focus groups have to promote self-disclosure because this does not come easily to the disabled, particularly people with dyslexia. It has been suggested by the British Dyslexia Association that dyslexics feel more comfortable talking freely and openly on personal issues with people of the same gender. As a consequence of that, single gender groups were incorporated into the participant specification. Single gender focus groups also yield different information (but neither better nor worse) to mixed gender groups because of the different travelling experiences and information needs that can exist between genders. Mixed gender groups were also included to ensure that the group dynamics and conflict that

is often observed within mixed groups would not be omitted or dismissed. The gender differences in dyslexic adults were highlighted in Chapter 3. However, the fact that there is a lower probability of a girl being born with dyslexia (Olson, Forsberg and Wise, 1994; cited Turner and Rack, 2004) did not impact upon recruitment.

In relation to travel behaviour, the journeys being discussed were unfamiliar in nature. Familiar journeys tend not to be problematic. Accordingly, they were not included in the discussion unless participants expressed a desire to do so. Groups were split into discussions related to private (at least half drive beyond 50 miles in one unfamiliar trip ten times per year) and public modes of transport (all use the bus or train at least once a week. At least half travel beyond 50 miles in one unfamiliar trip at least ten times a year. At least half do not have a car). It was deemed unnecessary to hold focus groups for each public transport mode. Accordingly, a multiple-category focus group design was implemented with specific modes examined if discussions arose.

Participants selected for focus groups are generally more socially active and visible. Consequently, this means that key members of the population of interest may be missed. Although the main aim of the research was to better understand the needs and usability issues of dyslexic travellers, currently immobile dyslexics should not be ruled out. Less socially active dyslexics such as those who do not travel because of their disability and accessibility issues have just as valuable experiences to share as socially active dyslexics. Involving these individuals would provide them with the opportunity to share their experiences. By offering them a transport service to and from the focus group, the very issue that would have prevented their attendance is being taken care of (Schutt, 2006). However, as can be seen from the focus groups profile (appendix 13) all of the participants were currently mobile dyslexics.

#### 5.3.3.2 Recruitment Method

It was considered unlikely that there would be apathy towards this subject because of the opportunities available to support change. Yet, the British Dyslexia Association suggested to the researcher that recruitment would be challenging. Dyslexic people shy away from research participation because of the difficulties experienced receiving information and responding to it, and the fear of 'stepping outside of the dyslexia circle'. Self confidence and esteem amongst these individuals is also quite low (this was pointed out in Chapter 3). Furthermore, having to actually face up to

their problems may be a concern. For those reasons, an external recruitment agent was used to recruit participants to the specification provided.

A financial incentive was offered to each participant in order to provide an additional stimulus to participation. A financial reimbursement in exchange for an individual's time also protects (as far as possible) commitment to attend the focus group and highlights the importance of their contributions (Krueger & Casey, 2000).

#### 5.3.3.3 Sampling Strategy

On the majority of occasions, studying an entire research population is unnecessary and impossible. *Samples* are used as an alternative. A sample is defined as:

*'A selection of elements from a target population with all the relevant features of the population included in the sample in similar proportions'*

(Blaikie, 2000)

An important distinction that should be made is whether sampling should be based on probability or non-probability. The qualitative nature of the research and the specific variables required meant that a probability selection method would not be appropriate. Probability selections are completely random and nothing but chance determines which elements are included in the sample (Schutt, 2006). Non-probability sampling was more appropriate for the reason that the focus groups were part of an exploratory study and the research aims called for an intensive investigation of a small population with specific characteristics (Schutt, 2006).

Sampling within this research emerged as a lengthy process, involving a number of strategies. Initially, a purposive method was employed. Through purposive sampling, each sample element is selected for a purpose, usually because of the unique position of the sample chosen (Schutt, 2006). Using a list of regional dyslexic support groups (compiled by the researcher), the recruitment agent selected a sample based upon suitability to the variables contained within the proposed recruitment profile.

The recruitment agent made initial contact with the dyslexic support groups via telephone and email, providing them with details of the research. This information was provided in a dyslexic-friendly format in order to demonstrate to the recipients that the researcher had their needs in mind from the outset (see Appendix 10).

However, even after a number of weeks and several attempts, recruitment according to the original profile was proving challenging. A number of possible factors contributing to the challenges were considered, including the nature of the participants, how the project was promoted by the recruitment agency, and the personal approach taken by the recruiter. Consequently, the recruitment profile had to be modified in order to allow for a greater chance of successful recruitment. The recruitment profile would now be based upon:

1. Official diagnosis of dyslexia.
2. Mixed gender groups.
3. Adults aged between 18 and 60.
4. Participants must currently/have the potential to travel independently and regularly by car or public transport for unfamiliar journeys (either local or long distance) and have experiences (positive and/or negative) that can be discussed in depth.

A new form of sampling was also introduced - 'availability sampling'. Participants are selected for availability sampling because they are available. Hence, this sampling method is also known as 'convenience sampling' (Schutt, 2006). The availability sample was selected from the support groups who chose to respond to the recruitment drive. However, recruitment was still not yielding the desired results. At this point it was clear that the issues lay with the participants and their disability. This was confirmed in a retrospective meeting with the recruitment agent. 'Snowball sampling' was subsequently employed, using the existing support groups already recruited as a starting point. As the recruitment process continued, the number of participants increased, hence the snowball analogy (Corbetta, 2003).

Focus groups are ideally composed of people who do not know each other. This is so that the information disclosed is neither inhibited nor influenced (Krueger & Casey, 2000). However, when snowball sampling is employed, it is difficult bringing people together who are not already known to each other. It was clear through this research that dyslexic people feel much more comfortable and at ease when the other people within the group are familiar to them. Therefore, snowball sampling proved successful in this research.

Once the sample had been identified, the recruitment agent screened the participants (see Appendix 11). Next, lists of the participants' names and screening results were

generated and sent to the researcher. The recruiter had managed to recruit a total of 52 people to the six focus groups, all of which had received official diagnosis of dyslexia. Appendix 13 presents the actual profile of the focus groups. The difference between the proposed profile (Appendices 8 and 9) and the actual profile is evident where travel behaviour is concerned. Instead of recruiting mode-specific groups for unfamiliar journeys of greater than 50 miles ten times per year, all six of the focus groups discussed local and long distance unfamiliar journeys, with experiences concerning public and/or private modes discussed within the same session. Although a less-specific variable was achieved than contained within the proposed profile, the journey characteristics recruited were still considered 'fit for the purpose'.

Prior to the focus group, each participant received an information sheet from the researcher in order to provide them with all of the details that they would need to attend (see Appendix 12). Contact was made by the recruiter a few days beforehand as a reminder of attendance. This often occurs within social research, but was even more important within this research due to the nature of the participants.

While the recruitment activity was taking place, the researcher concentrated on planning for the focus group meetings. This predominantly involved designing the materials required in order to conduct the focus groups and organising the equipment that would be required for data collection. This process is discussed below.

#### 5.3.3.4 Planning for the Focus Groups Meetings

Focus groups discussions can stem from one of two methods:

1. A formal list of questions to be presented sequentially to the participants - a 'structured' approach.
2. The generation of a list of topics forming the basis for the discussion - a 'semi-structured' approach.

To ensure that the participants were not restricted in any way by what they could discuss, the researcher decided to develop a topic guide rather than a formal list of questions. A topic guide more easily encourages reflection and exploration, leaving room for leads to be picked up as they arise (Krueger & Casey, 2000). The topic guide had to ensure that the correct data was generated. Accordingly, it was decided to structure it around the factors hypothesised to be important to the research, i.e.

living day-to-day with dyslexia and experiences during the journey lifecycle. Appendix 14 presents the topic guide used.

The topics proposed for discussion were arranged into a logical flowing sequence. The beginning of the focus groups would be fairly general in relation to dyslexia. It was hoped that this would assist in making the participants feel more comfortable talking about themselves and their experiences. In addition, this would serve to uncover the dyslexic characteristics of the participants in readiness for the discussion on transport provision. This would also highlight to the participants the fact they are not alone and share similar symptoms and experiences to others in the group. The focus would become more specific to the research itself as the discussion progressed. Participants may not be very well informed on the nature of travel information or the type of information that the researcher required. Accordingly, it was necessary to provide some introductory background material to generate interest and reflection. Due to the origins of the PhD (discussed in Chapter 1), information and visuals of 'Transport Direct' were incorporated into the discussion on the pre trip stage of a journey in order to provide constructive feedback to the Department for Transport.

#### *Data Collection Techniques*

The data collection techniques chosen were largely determined by the sensitivity of what was being observed and resource availability. The researcher decided to use a combination of techniques in order to ensure as much as possible of the discussion was captured. Although easy to administer, video would have proved quite obtrusive particularly with participants of this nature. In addition, a visual record was not a necessity. Audio-taping provided an alternative (yet still an appropriate and valuable) way of capturing the discussions. This method left the researcher free to concentrate on interacting with the participants. It also gave her the opportunity to reflect upon what was transpiring, and encourage thinking about the connections between the issues that arose (David and Sutton, 2004).

#### 5.3.4 The Focus Group Meetings

The participants of the focus groups were initially greeted by the recruiter, who dealt with gaining their informed consent (see Appendix 15) and the distribution of incentives. Once all of the participants were accounted for, the recruiter introduced

the participants to the researcher, the latter now taking on the role of focus group moderator.

The moderator has an important role to play in the focus group. They are not in a position of power, yet still have to encourage both positive and negative comments to emerge. They also have to be careful not to make judgements or leading comments. Their role is to ask questions, listen, keep the conversation on track and make sure everyone has a chance to share their experiences. Emphasis has to be placed on understanding feelings, comments, and thought processes of the participants as they discuss the issues with empathy and positive regard (Krueger & Casey, 2000). In addition, the moderator's persona has an influence over effective conduct of the group. The moderator has to avoid construction of the 'other' through their dress, attitude and demeanour (Barbour, 1999). Those issues were particularly important within this research because of the nature of the participants, their initial reluctance to participate, and the experiences that they were sharing.

The participants entered the room, a little apprehensive, but open to the experience. The first few minutes were crucial. In this brief time, the participants were welcomed and provided with an overview of the research. The tone also had to be set for the discussion. Being too formal could stifle interaction, and too much informality could jeopardise control (Krueger & Casey, 2000).

During the opening introduction, information on the participants was gathered in order to determine which people would be the most dominant, shy or verbose, and control the group accordingly. The primary aim of the focus group is to elicit the opinions and experiences of all the participants where possible. A moderator can expect 40% of the participants to be eager and open to sharing insights; 40% are more introspective and willing to talk if the situation presents itself; the remaining 20% are apprehensive about the experiences and rarely share (Krueger & Casey, 2000). It became clear that there were a number of dominant and shy characters. Therefore, all of the participants were encouraged to speak early on before the discussion became more focussed. In retrospect, all of the participants made a significant contribution to the discussions. This topic has obvious importance to these individuals.

During the introduction, it was also important to learn the names of the participants, vocal tones and accents. This meant that participants could be matched with their

individual dyslexic characteristics. Learning their names would also create a much more comfortable and friendly environment for everyone.

Following the introduction, participants were asked to discuss the problems that they experience on a daily basis, and what it means to have dyslexia. Next, the participants were taken through a discussion on the journey lifecycle, beginning with a discussion regarding the use (and usefulness) of travel information pre-trip. Participants were asked about their experiences in relation to pre-trip planning and the information sources used at this stage of the journey lifecycle (the definition of a journey lifecycle was clearly defined). They were asked to comment on their perceptions of these and other sources used in terms of usefulness and usability; this included barriers to access and use. At this point, participants were introduced to Transport Direct in order to assess the potential demand from this user group for this service. The participants were given time to discuss the visuals provided amongst themselves before intervention occurred<sup>24</sup>. Once pre-trip planning had been explored in sufficient depth, the perception of different transport modes provided the next topic for discussion. By examining modal experiences and modal choice, the perceived constraints on travel behaviour would be uncovered, and the barriers to modal change. The participants seemed to treat each topic as a group task, exploring it together.

Following each focus group, the researcher made contact with the participants and support group representatives using the details that they had provided during screening. As previously mentioned the second stage of research would build upon and validate the findings from the focus groups. Thanking the participants for attending the focus groups and maintaining contact would allow a good relationship to develop between the researcher and the researched, and increase the possibility of continued involvement.

### 5.3.5 Data Analysis

*'The collection of qualitative data is often straightforward. However, the sheer volume of data produced often creates a complex analysis procedure'*

(Robson, 2002)

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<sup>24</sup> The screen shots provided were those available at the time of the focus groups study (September 2004).

A number of approaches are available in order to qualitatively analyse focus group discussions. The classic approaches discussed by Robson (2002) provided the basis for analysis:

- Identifying and refining important concepts (also known as 'data organisation');
- Gradually elaborating a set of generalisations for the entire sample (also known as 'data interpretation');
- Linking generalisations to the formalised body of knowledge on disability, dyslexia and travel information provision.

Although data analysis software provides an organised single location storage system for all stored material, the researcher decided to adopt the 'long table approach'. This is where the researcher uses a long table, paper and scissors to organise the transcripts into key themes, patterns and relationships that emerge. This technique allows the researcher to easily and effectively identify themes and categorise the results without having to learn how to use complex analysis software (Krueger & Casey, 2000).

Within the data, the researcher looked for commonalities, patterns and interrelationships, along with comparisons, contrasting results and dissenting opinion, both within and across the groups (also known as 'horizontal analysis'). Back-references were often made to the literature and pertinent quotations of the participants in order to enhance the authenticity of the findings<sup>25</sup>. This allowed the researcher to move from simple descriptions to a more in-depth explanation of outcomes and possible relationships (Schutt, 2006). Certain data characteristics were examined during analysis:

- Similarities and differences between the responses of the online participants and focus groups;
- Possible gender similarities/differences;
- Mode/travel behaviour;
- Dyslexic traits and severity.

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<sup>25</sup> Participants were referred to by name (as stated on the consent form), gender, the percentage of positive responses to the BDA Dyslexia Checklist, and the main difficulties experienced in relation to dyslexia. Appendix 18 presents a list of the participants whose quotes have been used within Chapters 6 and/or 7.

When deciding upon how to present the findings, two different approaches were considered:

1. *Thematic approach*: organising and discussing the findings around major themes that emerged from analysis.
2. *Journey Lifecycle approach*: organising the findings around each stage of the journey lifecycle, and broken down further into mode. The main themes to emerge are subsequently discussed within this framework.

Due to the fact that the topic guide and focus group discussions centred on each stage of the journey lifecycle, it was both appropriate and natural for the findings to be presented in a similar way. This would also allow the reader to better experience and follow through the lifecycle from a dyslexic perspective (as far as is possible if the reader is non-dyslexic).

#### 5.3.6 Online Discussion Fora

Even though the focus groups provided considerable insight into the journey experiences and travel behaviour of dyslexic people, accessing a wider view by adding to the existing research sample served to further substantiate the findings:

*'A series of actions should be considered for research findings to have strength in credibility'*  
(Gray, 2004)

The widespread use of personal computers for internet access has created new possibilities for research. This medium creates a platform for individuals not directly involved in the research to freely discuss their needs and concerns with others. It also provides the researcher with an effective way of collecting additional data and verifying existing findings. For those reasons, the researcher decided to collect additional data via online discussion fora, running concurrently with the focus groups. The chosen websites<sup>26</sup> were monitored by the researcher for a period of time prior to the study in order to ensure that they were frequently and widely used by dyslexic people.

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<sup>26</sup> Appropriate forums were identified through the Adult Dyslexia Organisation, the 'Dyslexia Adults Link'<sup>26</sup> and 'JISCmail'

A discussion thread was created on each forum, providing users with details about the research and the information being sought, similar information to that provided to the focus group participants<sup>27</sup>. The forums were checked on a daily basis for new comments and threads. It was evident from the responses that these individuals could use these sites to discuss their experiences. This is in spite of the fact that the literature highlights that dyslexic people experience great difficulty accessing and using web-based services because they are not dyslexic-friendly (Rainger, 2003). The very fact that the participants were using this medium meant that they were comfortable communicating through these websites. A number of possible reasons could have accounted for this (the actual reason was not uncovered during the research):

1. The online communication medium has become familiar to these individuals through repeated use and experience.
2. The person's dyslexia is not severe enough to impose on their ability to communicate using this medium.
3. The forums are dyslexic-specific. Hence, considerable emphasis is placed upon making the design of the interface and the information provided dyslexic-friendly.
4. Entering into a discussion is easier via a computer because of the assistive technologies available to dyslexic people using this medium and this task is consequently easier than providing hand-written responses.
5. Electronic communication means that individuals who find physical interaction difficult or impossible are still able to voice their opinions and share their experiences, whilst remaining in a safe and comfortable environment.

A total of 25 dyslexic people responded during the two-week time frame (each person was required to confirm with the researcher that they have received official diagnosis of dyslexia). Some of the entries comprised of brief comments put together about a number of different journey experiences, whilst other participants provided more detailed accounts of one memorable experience. Some of the responses were aimed at the researcher, while others were directed at the other participants for further comment. The findings feature within the analysis and reporting of the focus

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<sup>27</sup> The opinions of the online respondents towards Transport Direct were not obtained.

groups findings in Chapter 6<sup>28</sup>. While the sample was not large enough to allow wider generalisations to be made (and was limited to those with the ability to access the internet), this method proved an effective method of data collection for the purpose, and illuminative in terms of the data collected.

### 5.3.7 Stakeholder Workshop

The conclusion of the focus groups study provided an opportunity for a gathering of stakeholders to be convened in the form of a workshop. The aim of the workshop was to present, discuss and verify the findings, delivered to the stakeholders via a presentation and accompanying report. The stakeholders involved in the workshop included key members of the Transport Direct development team and selected representatives from the focus groups and dyslexic support groups. The invitation to attend was also extended to external professionals who would be able to provide the researcher with valuable feedback. This included transport experts and user-interface designers. The views of stakeholders unable to attend the workshop were also sought. These individuals were considered to be in a position to provide valuable input into the research. This included the expert involved prior to the focus groups (Professor Miles).

It was initially thought that the different stakeholder groups should be kept separate. This would reduce the likelihood of conflict arising as a result of the quite different perspectives and needs of each group of people. However, instigating interaction between different groups via a single multi-stakeholder workshop is advantageous because conflict can be more easily explored, understood and reconciled within one workshop.

Upon review of the findings, the stakeholders felt that the researcher had produced a balanced and accurate account of the situation at present. The findings were considered not only beneficial to the transport industry, but also to the field of dyslexia. The fact that the findings were presented in a dyslexic-friendly format proved a useful aid to information processing for the dyslexic stakeholders. It also highlighted how information should be provided to dyslexic people and the fact that simple modifications to information design can not only be useful to dyslexics but to a

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<sup>28</sup> Within the results, the online participants are referred to by their online user name and gender. The participants whose quotes are used within Chapter 6 are listed within Appendix 18.

wider-reaching non-dyslexic audience. The fact that the findings have now been reviewed by policy makers, transport providers, dyslexic experts and dyslexic people themselves provides 'tactical validity', i.e. validating findings through credible feedback (Lamnek, 1988; Becker, 1989; both cited Sarantakos, 1993).

The workshop was also designed to elicit discussion on a further stage of empirical research and the opinions of the stakeholders as to the best way forward. The next stage of the research would need to collect data in order to compliment and build upon the findings from the core focus groups study. Prior to the workshop, the researcher had considered the possibility (and feasibility) of a number of research methods. Survey-based research was considered, as were one-to-one in-depth semi-structured interviews. Undertaking an ethnographic study was also deliberated. The potential for each method was presented to the stakeholders, along with the strengths and weaknesses associated with each technique.

The stakeholders and researcher agreed that travel ethnography would be the most suitable and appropriate method to adopt. Depth and texture continues to have priority over generalising to a wider number of dyslexic people. Taking an ethnographic approach was considered to be more effective than interviewing out-of-context for the following reasons:

- Ethnography provides a means to examine in-situ the co-existence of dyslexia and transport provision;
- Ethnography allows the researcher to experience actual journey problems as they occur - 'being shown and not just told' (Laurier & Philo, 2003);
- Actually observing a real-life journey lifecycle with a dyslexic traveller would allow the researcher to capture and convey the emotional setting that these individuals find themselves in;
- Ethnography allows the researcher to study the phenomena within a natural context, thus enabling him/her to determine whether or not the findings are 'ecologically valid' (Lamnek, 1988; Becker, 1989; cited Sarantakos, 1993; Saunders, 2003).

The chapter now turns to a discussion on the planning and implementation of this method.

## **5.4    Stage Two – Travel Ethnography**

### 5.4.1 Ethnography

The focus groups study concluded that the negative experiences of a dyslexic traveller are not only felt physically; the effects are also felt emotionally. Thus, a key objective of the research became to connect with the emotional experiences of dyslexic travellers. In consequence, a fifth research objective emerged as important:

*‘To capture and convey the emotional and informational setting within which dyslexic travellers find themselves’*

In order to effectively achieve this type of objective, the researcher needed to understand the problems as they are experienced within context, by observing dyslexic people. This necessitated an ethnographic approach:

*There is an increasing interest in methods which present human, lived experiences in research that can ‘restore [the] emotional content of human experience’*

(Aldridge, 2007)

Ethnography involves the study of people in naturally occurring settings by methods of data collection which capture their social meanings and activities. The researcher attempts to participate fully in the activities of the research subjects and share the experiences of the participants. The distinctive features of ethnography revolve around an emphasis on understanding the particular cultural worlds in which people live. Part of a culture is described in order to understand better how the culture works as a whole (Fetterman, 1998; Laurier and Philo, 2003).

The boundaries surrounding the term ethnography are unclear. Some academics refer to it as a method, while others refer to it as a school of thought. For the purpose of this thesis, the term has been interpreted as referring to a set of qualitative methods of inquiry using participant observation as the primary research method (Hammersley & Atkinson, 1995; Somekh & Lewin, 2005). Participant observation combines participation in the lives of the subjects being studied, with the maintenance of a professional distance that allows accurate observation and recording of data (Fetterman, 1998). However, the researcher is still able to become

immersed in the activities of the people under study, thereby learning to understand the reasoning behind their attitudes and behaviour (Hammersley & Atkinson, 1995).

#### 5.4.2 Adopting Ethnography within Transport Research: 'Travel Ethnography'

Up until a few years ago, ethnography was largely absent from transport research. This was particularly the case involving locations that are themselves on-the-move (such as buses and trains) as opposed to locations which travellers pass through (i.e. stops and stations). 'Travel ethnography' allows the researcher to more easily conduct research within the former context, simulating in various ways the many and interdependent forms of intermittent movement of people, images, information and objects (Bærenholdt, 2004; cited Watts and Urry, 2008).

Bærenholdt (2004; cited Watts & Urry, 2008) discusses the various approaches to travel ethnography available to the researcher. The following methods have been utilised within this research:

- *'Mobile ethnography'/'co-present immersion'* - travelling with the people under investigation as a form of sustained engagement within their worldview;
- *The 'observation' of people's movement and behaviour using shadowing and 'in-situ' probing and questioning.* Audio and/or visual techniques are used to capture (as far as possible) the participant's behaviour, verbal communication and problem solving strategies, along with their thoughts, mannerisms, body language and facial expressions. This is combined with the researcher's own theoretical knowledge of the field being studied.

#### 5.4.3 Preparing for the Travel Ethnography Study

##### 5.4.3.1 Sampling and Recruitment

The travel ethnography study intended to expand and deepen the existing research findings. For that reason, it would be quite important to recruit participants from the focus groups study. Recruiting those already involved in the research also meant that there was less of a distance between the researcher and the researched, important for this type of study. The researcher was able to capitalise upon the empathy and rapport built up during focus group engagement, with a trusting relationship between

the researcher and the researched already in place (Fetterman, 1998; Laurier & Philo, 2003).

Access is an enduring and almost defining problem in ethnography (Hammersley & Atkinson, 1995), particularly in the fields of travel and mobile ethnography (Laurier and Philo, 2003; Watts and Urry, 2008). Recruitment for this research exhibited similarities to the methods adopted by Laurier and Philo (2003)<sup>29</sup>, beginning with an informal approach made to a person in the field who could grant access to potential participants, also known as a 'gatekeeper' (Schutt, 2006). The Director of the Adult Dyslexia Organisation (Donald) had been a willing aid at each stage of the research so far, and demonstrated a depth of interest in the study. Being dyslexic himself, Donald also possessed sensitivity to the cause. With his help, the good relationship already in place between the researcher and researched was maintained and potential participants were identified. Recruitment predominantly utilised a form of 'judgemental sampling', i.e. relying on judgement to select appropriate members of the population under study (Fetterman, 1998), such as identifying typical cases and/or 'critical cases', i.e. individuals rich in information pertaining to the research objectives (Schutt, 2006).

Similarly to the findings of Laurier and Philo (2003), potential participants were uncomfortable with the idea of being observed. However, after numerous attempts at making contact with potential participants, four people provided their consent to participate in six journeys, with one participant consenting to three different journeys (this is explained in Section 5.4.3.2 below). Hammersley & Atkinson (1995) explain that it is quite usual for ethnographers to only study a small number of people, particularly if generalisation is not the primary concern and the study is of intrinsic interest. The size of the sample will vary depending upon the objectives of the research and recruitment issues. The study by Laurier and Philo (2003) involved just six participants, with Watts and Urry (2008) conducting an ethnography study of twelve timetabled bus and train journeys. The fact that the participants of this study were dyslexic created additional challenges to those of normal ethnographic standards, which adversely affected the number of participants recruited. What should be emphasised is that, similarly to Laurier's study, the researcher involved in this research was not starting afresh with the participants and fieldwork was in fact spread over a period of several months.

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<sup>29</sup> The study involved Laurier shadowing six car-based workers on six journeys, collecting data using a small camcorder and dicta-phone (Laurier and Philo, 2003)

The participants who took part possessed varying characteristics in terms of age, gender and occupation. There were both white UK nationals and participants from ethnic minorities (UK-born nationals within English as their first language). All had different travel experiences to draw upon, in terms of journey type, mode and frequency. Screening information obtained prior to the focus groups highlighted that all of the participants had dyslexia to quite a severe degree. Although this meant that the experiences of less-severe dyslexics would not be captured, the difficulties emerging would highlight the seriousness of the issues being experienced and the importance that should be placed upon addressing them (Appendix 16 presents the characteristics of the participants).

#### 5.4.3.2 Journey Characteristics

It was initially hoped that the researcher would be able to accompany each participant on an unfamiliar long distance journey that they were already planning to undertake. However, no potential journeys of this nature could be identified. Consequently the researcher designed a journey schedule (see Appendix 17). This meant that the travel ethnography study was as much an experiment as ethnography.

When deciding upon the characteristics of each journey, the researcher took several factors into consideration. The first issue involved the choice of origin and destination. All of the journeys commenced from the participant's home or place of work. Unfamiliar journeys tend to originate from one of these points. However, the local familiar leg of the journey (from the point of origin to London Paddington train station) was not accompanied for the reason that the focus group research did not highlight any major issues with this stage of a journey. In addition, the researcher was aware of the limitations of the participants in terms of how much they could offer and endure (both physically and emotionally) before stress would have a negative impact upon them and consequently the data collected. The presence of an observer and the effect this would have on the participants would be a strong intervention into their usual routine. Accordingly, observation had to be kept to a minimum.

The same unfamiliar destination was chosen for all of the journeys involving the same mode (excluding the pilot study). This allowed the similarities and differences between each individual to be more easily observed and accounted for. However,

different times and days of the week were chosen to observe behaviour when operating in different flows of 'traffic' (the definition of 'traffic flows' used within this thesis encompasses both highway traffic and public transport passenger traffic). The experiences as part of a round trip were captured because this type of journey had not formed part of the focus groups study. The researcher also wanted to be able to compare and contrast a dyslexic's experiences between and across modes. Therefore, it was decided that one of the participants would be accompanied on two journeys - one journey by car, and one by public transport.

Due to the fact that the travel ethnography study involved research on-the move, a pilot journey was undertaken. The pilot involved a car journey because this type of journey is more complex to capture (Laurier & Philo, 2003). The chosen journey was different to the actual journeys in order to ensure that the rest of the journeys remained completely unfamiliar to the participant concerned.

Similarly to Laurier and Philo (2003), six journeys were undertaken, which allows a valuable exploration of the participant's journey experiences. The participants were provided with a journey schedule a week prior to travel, which enabled them to plan for the journey as appropriate using methods of their choice. Transport Direct was suggested to the participants as an additional/alternative pre-trip planning medium to those normally used.

#### 5.4.3.3 Data Collection

Observation is an obtrusive technique. Consequently, there was a concern that the participants would feel more anxious than normal simply by being observed, and hence make more mistakes than they would if travelling unobserved. Although this may also be the case with non-dyslexics, it was more likely to occur with dyslexic people because of the nature of the disability and the affect that stress has upon it within context. Therefore, the methods chosen to collect the data ensured that the participants felt comfortable, whilst still providing the researcher with rich information on their travel practices and experiences.

Neither mode was simple to observe. Simultaneous activities were taking place, and it was difficult to ensure that all the relevant points were noted. Furthermore, being non-dyslexic, the researcher had to find an effective way of recording the participant's experiences without influencing their behaviour. Field notes, computer,

tape recorder, digital camera and video are all tools of travel ethnography. They are extensions of the human instrument, aiding memory, capacity and vision. These are all useful devices to facilitating the ethnographic 'mission', capturing rich detail and flavour of the ethnographic experience:

*'Proper equipment can make the ethnographer's sojourn in an alien culture more pleasant, safe, productive, and rewarding'*

(Fetterman, 1998)

Due to the nature of ethnography and the people taking part, the researcher felt it important to allow the participants to make a contribution to the decisions made on the choice of data collection methods. The relative merits of each method were firstly explained, along with the drawbacks and appropriateness.

Although audiovisual evidence proves an invaluable tool for data interpretation and analysis (Aldridge, 2007), video equipment was not a favoured method by the participants travelling by public transport. It was perceived to be too distracting and conspicuous when used within this context. The participants did not want to draw additional attention to themselves because of the effect this has upon them emotionally and practically. Accordingly, field notes and digital photography were chosen. This method proved quite easy to perform, inconspicuous and not too distracting. Although not every word and nuance could be recorded, the researcher made copious notes during each journey along with descriptive evidence of the experiences and some early interpretations of them.

There has been a growing interest in (and use of) photographic methods in qualitative research in order to extend our understanding of lived experience. Photographic evidence aids the memory of the researcher during analysis, and 'brings experiences to life'. They are an extension of the human eye and provide precise records of material reality, providing they do not distort reality (Aldridge, 2007; Fetterman, 1998).

For the car journeys, the researcher emphasized to the participants that video would be the most effective way of capturing both audiovisual and contextual information. Although a tape recorder would capture the verbatim, this method used in isolation would not have captured the key documentary visual evidence of car journey practices. In addition, taking photographs of key points would have been quite a task

to achieve whilst travelling at speed. Travel ethnographers only have seconds to capture a person's actions and the reasons behind it and video provides the observer with the ability to 'stop time'. In addition, for the purposes of analysis, one of the main advantages of video evidence is that it can be watched over and over, and each time a new layer of meaning may become clear (Fetterman, 1998).

#### 5.4.4 Journey Experiences

Prior to the start of each journey, the researcher conducted a short briefing session to discuss the expectations of the participant and how the journey would proceed. This briefing session also aimed to put the participant at ease with the task ahead. The researcher refrained from asking the participant about their pre-trip planning experiences until the trunk stage of the journey in order to provide the researcher with time to gather as much information as possible.

For the journeys by public transport, the researcher accompanied each participant as they purchased their tickets, walking with them, and sitting next near them as they made the journey. For the journeys by car, the researcher was located in the back seat of the car in order to reduce reactivity, albeit still a little apprehensive at the task ahead. This also enabled a '180° view' of events to be captured, along with non-verbal aspects of the context. Each participant was instructed to proceed as normal, whilst providing a commentary as they progressed, engaging with the researcher, and reflecting upon their experiences.

Once the unfamiliar stage of the journey was complete, the researcher and participant engaged in an informal debriefing session. These discussions enabled both the researcher and participant to clarify and expand upon some of the issues that had occurred whilst still fresh in their memory. The local familiar leg of the return journey was discussed via a follow-up telephone conversation with each participant. This gave them the opportunity to discuss any problems that had arisen at this stage of the journey, if at all. Where additional visual evidence was required in order to effectively support the findings, the researcher undertook similar journeys after the ethnography study was complete.

Through the travel ethnographies, the researcher gained a rich insight into the journey experiences of dyslexic people. However, being non-dyslexic, the researcher could only go some way in understanding the problems experienced and the

emotions felt. In an attempt to more closely empathise with the participant and really sense their experiences, the researcher ensured that the participants communicated overtly as much as possible. Probing was used if the participant was not openly following this protocol. Externalising thoughts is quite unnatural and people often forget to do this.

#### 5.4.5 Post-Ethnography Workshop

After the ethnography study was complete, the researcher conducted a workshop with all of the participants simultaneously. A walkthrough of the findings took place in order to refresh the participants' memories of the experiences documented and allow each person the opportunity to further elaborate on their experiences if necessary.

Although a significant gap existed between the first journey and the workshop, this method was still valuable. Repeating the journeys was considered as an alternative to the workshop. However, issues associated with memory may have made this task difficult. In addition, the journey would no longer be unfamiliar and the problems that originally manifested themselves may no longer exist as a result. This would have made it difficult to determine the true cluster of problems experienced by someone with dyslexia during an unfamiliar journey lifecycle. For those reasons, providing written accounts and video evidence to recap events would be just as effective in verifying the findings. Reflections upon the findings provided by the participants proved invaluable in adding to the interpretations already made by the researcher. The participants felt that by requesting their continued involvement, they experienced a real sense of ownership of the research.

#### 5.4.6 Data Analysis

*'Analysis in ethnography is as much a test of the ethnographer as it is a test of the data. The researcher is faced with a mass of ideas which have to be examined until discernable thoughts and behaviours become identifiable'*

(Hammersley & Atkinson, 1995)

Data analysis in ethnography requires the researcher to navigate their way through a forest of data, and make the choice between (1) taking a logical path, or (2) taking a path that entices the reader, deciding which data is valid and identifying interesting and genuine patterns of behaviour (Fetterman, 1998). In ethnography, data analysis

is not a distinct stage. It is a process which starts to take shape during data collection. This is essential if the research is not to face an analytical impasse in the final stages, i.e. a situation where analysis cannot progress any further (Hammersley and Atkinson, 1995).

The main issue facing the ethnographer is representing reality as concisely and completely as possible (Fetterman, 1998; Goldbart & Hustler, 2005; cited Somekh & Lewin, 2005). Through the travel ethnography study, the reader has to be left under no illusion that personal travel for dyslexic people is affected by travel information provision. In order to achieve this, the findings had to illuminate the phenomenon as lived experience, i.e. bring the setting alive (Schutt, 2006). Although it is not generally the case that the results of the pilot study are included within data analysis, the researcher felt that the pilot journey provided comparably useful insights into the emotional setting of dyslexic travel and were consequently included within the findings. The 'first person passive' was used to describe and explain the observations made during the journeys. Although writing in the third person is customary within academic writing, the use of the first person is very effective when used to describe and explain the findings of ethnographic research (Laurier and Philo, 2003).

Ethnographies are usually written in the 'ethnographic present'. This means that the culture stands still through time. Within this research, the best the researcher could achieve was to describe the culture as accurately as possible up to the point of 'contextual departure'. This means that the ethnographic present is true to the ethnographer's image of the culture at the time of the study (Fetterman, 1998).

In order to enhance theoretical understanding, data analysis usually involves combining and relating the findings to a formalised body of knowledge. However, this approach had already been taken during the focus groups study. Hence, the reader would already be in a position to make such connections. Repetition would not have furthered the research other than through reaffirmation of the connections between travel experiences and dyslexia. In order to further enhance the existing findings and body of knowledge, analysis of the travel ethnography data had to focus upon the issues emerging in depth, and to capture and convey the real emotions felt within context.

The next section of this chapter closely examines the subject of research ethics. As pointed out in Section 5.1, although this forms the final section, ethical concerns have

remained a key consideration during the development and implementation of the methodologies used.

## **5.5 Research Ethics**

*'It is a fundamental principle that researchers adopt a continuing personal commitment to act ethically and to encourage ethical behaviour in those with whom they collaborate'*

(Cardiff School of Management, 2006)

The ethics of research concerns the appropriateness of the researcher's behaviour in relation to the research subjects and those who are affected by it. Research brings to the forefront a number of ethical predicaments and complications. Robson (2002) lists some of the questionable practices related to ethics in social research:

1. Involving people without their knowledge or consent.
2. Coercing people to participate.
3. Withholding information from the participants about the true nature of the research.
4. Deceiving the participants.
5. Inducing participants to commit acts negatively impacting upon their self-esteem.
6. Exposing participants to physical or mental stress.
7. Invading peoples' privacy.
8. Not treating participants fairly, or with consideration, or with respect.
9. Withholding benefits and remuneration from participants.

The extent to which these issues are relevant varies with the research being undertaken. The potential issues that might be raised need to be determined when the preparatory groundwork for the research is being undertaken. The following sections examine the ethical principles that required attention within this research.

### **5.5.1 Informed Consent**

Research has to be conducted openly without deceit (Cardiff School of Management, 2006). However, the key to ethical involvement is not just obtaining the consent of participants, but gaining their 'informed consent' (Gray, 2004). In order for the

participants to make an informed decision on their involvement, they had to be in possession of as much information as possible about the research, provided in a comprehensible dyslexic-friendly way.

Informed consent can be obtained verbally, but a written statement is more common. A two-stage process was involved in both stages of research. Verbal consent was firstly obtained, offering the participant the opportunity to discuss the study with the researcher. Written consent was obtained prior to data collection (see Appendix 15).

This research involved a lengthy data-gathering period. This meant that it was necessary to regard informed consent not as obtained once and for the entire duration of the research, but subject to re-negotiation over time, with the participants free to withdraw if appropriate (Cardiff School of Management, 2006).

Gaining the informed consent of every person who may be affected by the data collection activities (i.e. the police, transport operators and the general public) was unnecessary. These individuals were not being observed and overtly obtrusive data collection methods were not being utilised in public spaces. The researcher wore a form of identification, and an explanation of the research was available in the event of enquiries.

#### 5.5.2 Addressing the Potential for Risk or Harm

As part of ethical responsibility, the researcher has to consider the issue of harm and whether the research could potentially put the participants at risk. Researchers should make every effort to foresee all possible risks and proactively deal with them. The physical, social and psychological health and well-being of those involved in the research has to be protected (Robson, 2002; Gray, 2004). It is not possible to avoid every theoretical possibility of harm, but direct harm has to be avoided where possible. In ethical terms, this means that research should produce benefit with the absence of negative long-lasting effects:

*'Take only pictures leave only footprints'*

(The National Speleological Society, no date; cited Fetterman, 1998)

In order to address this, the participants were provided with full details of the research so that they were fully aware of what it entailed. It would also be important

to reassure the participants that they would not be placed under emotional stress over and above what they would *normally* experience under similar circumstances. During both stages of the research, if any of the participants showed signs of physical or emotional distress over and above what they would normally experience as a result of the research itself, the study would have been stopped. During the travel ethnographies in particular, the researcher had an ethical responsibility towards the participants. However, researcher intervention depended upon an assessment of the purpose of the ethnography study, the level of danger, and the psychological state of the participant.

#### 5.5.2.1 Safeguarding the Safety of the Researcher

It is not only important to safeguard the health and safety of the participants. The researcher working in the field also has to be kept safe and well. The following issues were considered within this research:

- *Physical risk* - exposure to the risks associated with research-on-the-move involving dyslexic people. In order to ensure that risk exposure was not over and above what was considered 'reasonable', the researcher assessed the risks associated with each journey prior to travelling, and again as the journey progressed. A further issue arose in relation to being in a one-to-one situation with the participants. In light of this, a 'buddy system' was put in place. The researcher ensured that another person knew of her movements and a plan in place if concerns as to her whereabouts emerged.
- *Psychological risk* – exposure to physical risk may cause psychological anxiety. If emotional distress was experienced upon observing the negative experiences of dyslexic travellers or the situation being placed in, the researcher would have re-evaluated her psychological state.

#### 5.5.3 Research involving Vulnerable/Minority Groups

There are particular ethical issues associated with working with particular groups of society. Certain social groups are considered to be 'sensitive' and special care has to be taken when dealing with them (Gray, 2004). This includes people that are vulnerable by virtue of age, social status or powerlessness (for example, children, the elderly and disabled people). The main issue of concern is whether the participants can freely give their informed consent (Robson, 2002). Although the participants

within this research are considered a vulnerable minority group, all of them were able to freely provide informed consent. In the event of difficulties arising, support group representatives were available to assist.

#### 5.5.4 Integrity

Integrity has a clear role within research ethics. With particular relevance is the issue of participant exploitation. It has been claimed that research often exploits those studied in order to generate valid and authentic findings. However, the issue arises as to what exactly constitutes exploitation. The concept implies a comparison between what is given and received, and what is contributed to the research, by each side (Hammersley and Atkinson, 1995).

Whether or not exploitation has taken place, is a matter of judgement and subjective opinion. On the one hand, it could be seen that the travel ethnographies were exploitative, putting the participants in an uncomfortable position which caused them stress and heightened symptoms of dyslexia. However, ethnography provided the best way for the researcher to observe behaviour that was context-reliant and convey the real experiences of dyslexic people. This necessitated placing the participants within context, where they would undoubtedly feel uncomfortable, and a questionable approach for such reasons. After considerable thought and discussion between key stakeholders (including the participants), the 'ethical course' still necessitated the use of travel ethnography in order to meet the aims and objectives of the research. Furthermore, using this method was not considered exploitative.

#### 5.5.5 Confidentiality

Researching with integrity relates strongly to the principle of confidentiality (Robson, 2002). Researchers are required to probe beyond the façade of normal human interaction. Such descriptions can jeopardise individuals if the information is revealed in an inappropriate way. In communicating findings, the anonymity of the participants has to be respected and their personal interests protected. Participants should not suffer any harm by being identified by the research findings.

Assuring confidentiality proved crucial in gaining the trust and disclosure of the participants on their personal experiences. Although they were provided with the opportunity to be assigned a pseudonym, this does not guarantee complete

confidentiality and anonymity. Individuals in the setting studied may still be able to identify those being described (Robson, 2002). Accordingly, any information that could potentially uncover the identity of the participants was anonymised as far as possible without compromising the results.

Ensuring confidentiality also has legal implications for the researcher. Compliance with the Data Protection Act is a necessary legal obligation. Particular care has to be exercised in relation to the protection of personal data, appropriate to the amount of harm that would be inflicted if the data was disclosed or misused (Robson, 2002). Within this research, the informed consent agreement stated that all of the data relating to the participants would be kept secure, confidential and anonymised.

#### 5.5.6 Ethics in Data Analysis

The process of data analysis (particularly when qualitative data is concerned) still involves the issue of ethics. The analyst has to keep at the forefront how the findings will be used and how the participants will react to them. This has to be reflected in the way that the findings are communicated. Schutt (2006) suggests several specific ethical issues that are important for the researcher to consider during the data analysis process. The ways in which they have been adopted in this research are explained below.

- *Privacy, confidentiality, and anonymity.* This issue has already been discussed within the context of data collection, but it is also a concern within data analysis. Participants were asked to review the findings via the workshops before they were released in order to gauge the extent to which they feel that their privacy has been protected;
- *Integrity and Quality.* Real-world research has real consequences. The researcher had an ethical responsibility to everyone involved in the research to produce authentic and valid conclusions.

### **5.6 Summary and Conclusion**

This chapter has presented the empirical research strategy adopted in order to fulfil the aims and objectives of this thesis. The chapter began by discussing the research approach taken. Next, the research methodologies adopted and associated methodological issues were examined. The discussion validated the researcher's

claim that a quantitative methodological approach was unsuitable, and no single qualitative methodology alone was suitable. By comparing the aims and objectives of the research with the methods available, a series of focus groups and a travel ethnography study provided a complimentary and effective approach. When taken together, these methods provided a richer, more complete view of life from a dyslexic perspective than either could have offered alone. Travel ethnography in particular allowed the researcher to capture and convey the richness that dyslexics attribute to the phenomena being studied, and the real emotions experienced as a consequence of dyslexia and a lack of appropriate support.

Planning for and implementing the chosen research methods with dyslexic people was a challenging task. The psychological and emotional effects of dyslexia provided one of the main methodological barriers. It is well-known that dyslexic people shy away from research participation. Discussing their problems places them under a considerable strain cognitively, exacerbated by low self-confidence and esteem. The travel ethnography study in particular meant that these individuals would have to confront their problems and operate within the very context that causes them distress. This was of great concern to the potential participants, and caused a reluctance to participate. Accordingly, recruitment had to be handled with care and sensitivity. It took considerable time and effort on the part of the researcher to ensure that a strong and trusting relationship was firmly in place. To this end, this thesis has provided a useful contribution towards undertaking transport research with dyslexic people, and how future studies can absorb and deal with similar issues if they arise.

Although this thesis uses relatively modest sample sizes, the sample's were 'fit for purpose'. This study aims not to establish facts that can be statistically verified, but to advance theoretical and contextual understanding. This type of understanding requires qualitative empirical findings that demonstrate depth and texture, which is most effectively achieved using modest sample sizes (Corbetta, 2003).

This chapter closed by exploring some of the key ethical considerations necessary as part of this thesis. Ethics assumes great importance within social research. This research involved *real* people, and thus required the researcher to consider the legal and ethical implications of the research and set procedures in place in order to protect the well-being of the participants. The fact that qualitative methods dominated the research approach led to a range of ethical considerations to emerge.

Now that the empirical research strategy has been discussed, the thesis now turns to present the empirical research findings. Chapter 6 considers the findings of the focus groups research. Chapter 7 presents the findings from the travel ethnography study.

## **Part 3. Empirical Findings:**

### **A Focus Groups Study and Travel Ethnography**

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## **Chapter 6**

### **The Focus Groups Study**

#### **6.1 Introduction**

Now that the thesis has become contextually and methodologically-focussed, this chapter presents the findings from the core stage of empirical research: a series of six focus groups and three online discussion fora. The chapter explores in considerable depth the attitudes and aspirations of dyslexic people regarding travel information provision during an unfamiliar journey lifecycle. By doing so, the following objectives are achieved (previously listed in Chapter 1):

1. To identify the macro and micro problems facing dyslexic people when accessing travel information during a journey lifecycle.
2. To determine whether these problems are a consequence of poor provision of dyslexia-friendly information, the fundamental traits of dyslexia, or both.
3. To consider whether the problems are specific to dyslexia or have a far wider application to non-dyslexics, though perhaps felt more frequently and severely by dyslexic people.
4. To consider what interventions should be implemented by transport policymakers and service providers in order to address the needs of dyslexic people and assist them through the journey lifecycle.

The chapter begins with a discussion of the impact of dyslexia upon daily life, and what it means to have dyslexia. Next, the general attitudes of the participants towards travelling are presented. This is followed by an in-depth discussion of the dyslexic-specific problems that manifest themselves at each stage of an unfamiliar journey lifecycle (pre-trip, the trunk leg and end leg). Structuring the chapter around the stages of the journey lifecycle allows the reader to gain a depth of understanding of the entire journey lifecycle as it naturally occurs, and experience each stage from a dyslexic's point of view (as far as is possible if the reader is non-dyslexic). The discussion is primarily driven by empirically-based findings. However, links to the formalised body of knowledge are made where appropriate.

It emerged from Chapter 4 that the Internet has become a mainstream method for communicating travel information pre-trip, with the Government embracing it in recent

years (Lyons *et al*, 2001). Consequently, there is a strong focus within the pre-trip discussion upon the issues surrounding web-based travel information and how such services (particularly Transport Direct) should be designed to more effectively meet the needs of dyslexic people. Mode-specific experiences are drawn out where necessary. This is since it became apparent from the focus groups that although similar dyslexic traits are responsible for the problems observed across modes, the way that they manifest themselves and influence the individual is mode-specific. Visual aids<sup>30</sup> have been included where appropriate in order to assist the reader's understanding of the issues being discussed and the context within which the problems are being experienced.

The fundamental macro-level difficulties associated with dyslexia have been purposely integrated with the specific micro-level aspects of travel information design and use. This is because a causal relationship exists between the macro and micro levels - information design and use has a real impact upon the fundamental traits of dyslexia, and vice versa. Furthermore, micro-level suggestions in order to support the specific macro-level challenges sit comfortably together. Cross-referral (either within this or subsequent chapters) would make it difficult to understand the causal relationship between the macro and micro if discussed out-of-context.

## **6.2 Dyslexia and Daily Life**

All of us can suffer from mishaps and embarrassments from time to time. However, it became clear from the focus groups that the symptoms manifesting themselves as a result of dyslexia can cause a dyslexic person to experience problems on a more routinely basis. This is supported by Miles (2007). The problems experienced are largely associated with tasks which require strong phonological and visual processing, skills which dyslexic people do not possess (phonological deficits were highlighted in Chapter 3 as the most likely cause of dyslexia). Collectively, the participants quite clearly and openly expressed that living day-to-day with dyslexia is a real challenge, and physically and emotionally taxing. The difficulties that emerged correlate strongly with those which provide the strongest indicators of dyslexia from the Adult Dyslexia Checklist (see Appendix 6).

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<sup>30</sup> Courtesy of Google Images: <http://images.google.co.uk/imghp?hl=en&tab=wi> (2008)

An inextricable link between the physical and emotional symptoms of dyslexia emerged strongly from the discussions. The participants expressed a number of negative emotions as a direct result of the daily difficulties that they face. An obvious and understandable anxiety and frustration accompanies these individuals, even when they are attempting simple everyday tasks. Although stress levels are similar, the effects are felt more intensely by the most severe cases of dyslexia. Dyslexic people are trying to function in an environment predominantly defined by non-dyslexic people. This means that dyslexic's often operate inefficiently or unsuccessfully as a result. Consequently, there is a considerable lack of confidence amongst dyslexic people in their ability to complete tasks, and an absence of enthusiasm to complete them. Feelings of embarrassment and inferiority follow. A number of the participants expressed feelings of humiliation when mistakes are made in front of others, particularly if the witnesses are non-dyslexic. These feelings were not only confined to the severely dyslexic. Moderately dyslexic participants also expressed these sentiments:

*'Having dyslexia can be very embarrassing, and if things go wrong it's demoralising, it's just awful'*

(Kimberley)<sup>31</sup>

*'I used to get extra time at college to finish my work. That was really embarrassing'*

(Lawrence)

In all cases, the vicious circle caused by stress and anxiety always accompanies a dyslexic under difficult or unfamiliar circumstances (as indicated in Chapter 3). It emerged from both the focus groups and online respondents that coping strategies are used as a form of stress management. However, such mechanisms are not always available and can sometimes cease to work. This means that the person is not always able to manage anxiety levels, which can have serious consequences.

### 6.2.1 Dyslexia, Discrimination and Social Exclusion

The literature highlighted that, although there appears to be no difference in intellect between dyslexics and non-dyslexics, dyslexia is still being linked to poor intelligence. This creates a stigma towards dyslexic people and a situation where

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<sup>31</sup> Refer to Appendix 18 for the characteristics of the participants whose quotes were used in this research.

these individuals feel that non-dyslexics are acting negatively towards them. These feelings were common amongst the focus groups in particular:

*'People just thought I was lazy, not that I was dyslexic. That's why I didn't stay on at college and do other things'*

(Lawrence)

*'Yes, you say you're dyslexic, and people start talking to you like you're stupid'*

(Tina)

*'We're perceived as thick'*

(Deborah)

The psychological effect that such perceptions have upon the participants was clearly visible. They felt that until there is a greater awareness and understanding of dyslexia, dyslexic people will not be accepted in the same way as those with disabilities that are more visible and widely-accepted. The participants feel unequally treated, which the majority feel exacerbates the negative emotions that they already experience.

Lawrence's quote above highlights the relationship between the social importance of literacy and the stigma attached to poor skills in this area. Therefore, it was unsurprising that many of the participants feel incredibly embarrassed about their disability. As a consequence, a number of them have hidden the fact that they are dyslexic when in need of assistance, substituting it for a more visible disability:

*'I once said to someone that I was blind and could they say it for me very slowly. They were so sweet to me. Had I said I was dyslexic, you could almost see them 'tut'*

(Deborah)

Until the understandings and perceptions surrounding cognitive disabilities such as dyslexia improve, the participants who are quite covert about their disability revealed that they would continue to feel uncomfortable about becoming more open about the difficulties that they face.

There was a firm belief amongst both the focus groups and online fora that dyslexic people are still being hindered or prevented from doing what they want (or need) to do because they are failing to receive equal legislative and practical support to other disabilities. Although society is becoming more socially accepting of disability, there was a strong feeling that dyslexic people are still facing what could be considered a medical perspective to dyslexia, where this disability naturally results in negative social consequences, such as poor accessibility, or inaccessibility. Interestingly, these sentiments were not only reserved to the most severely dyslexic. The medical-style view where disabled people are alterable, while society is not (explored in Chapter 2), is a view that the participants feel continues to surround dyslexia, and the reason why it is still under-recognised and under-supported.

A conclusion to emerge from the literature was the need to weaken the hold of the 'us and them' mind-set surrounding learning disabilities, particularly dyslexia. When the participants were probed, they felt that the government would play a key role in fostering a greater awareness and understanding of dyslexia amongst service providers, employers and educationalists. The participants stressed how changing the fundamental attitudes of society towards dyslexia and better support for them would make life so much easier and allow them greater access to opportunities previously unavailable to them. Most importantly, they would feel more valued by society if they could play a more important role within it. Furthermore, the negative emotions routinely experienced by dyslexics would be minimised if their self-concept and the negative (mis)conceptions of others is positively changed.

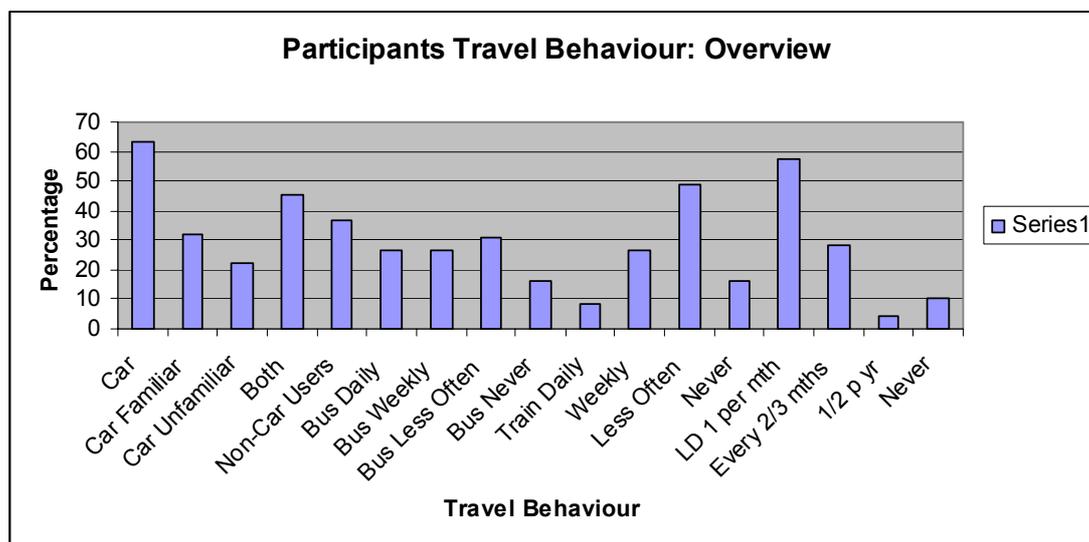
### **6.3 The Journey Experiences and Travel Preferences of Dyslexic People**

The findings of the focus groups study suggest that dyslexic people experience great difficulty within the transport environment for the reason that it places heavy demands on them in terms of language and working memory. The aspects of the travelling task highlighted in the literature as potentially problematic were confirmed during the focus group discussions and corroborated further by the online respondents. It also became clear that, although difficulties are experienced during the driving task, car travel is still favoured because of the difficulties faced with journeys involving public transport. The travel behaviour of the participants highlighted the consequential effects upon mode choice, particularly regarding public transport, as did the discussions surrounding the problems experienced using certain

modes. The results obtained from the travel behaviour screener used during recruitment are presented below.

**Participants Travel Behaviour: Overview (Focus Groups)<sup>32</sup>**

	%
<b>Car Users</b>	63.3
<b>Car: Local Familiar Journeys Only</b>	32.2 <sup>33</sup>
<b>Car: Long Distance Unfamiliar Journeys Only</b>	22.6
<b>Car: Both</b>	45.2
<b>Non-Car Users</b>	36.7
<b>Use the bus daily</b>	26.5
<b>Weekly</b>	26.5
<b>Less often</b>	30.7
<b>Never</b>	16.3
<b>Use the train daily</b>	8.2
<b>Weekly</b>	26.5
<b>Less often</b>	49
<b>Never</b>	16.3
<b>Long distance once per month</b>	57.1
<b>Every 2/3 months</b>	28.6
<b>Once or twice per year</b>	4.1
<b>Never</b>	10.2



<sup>32</sup> The questionnaire did not determine whether these journeys are undertaken independently.  
<sup>33</sup> Percentages shown originate from total usage.

### 6.3.1 Information Need, Use (and Non-Use) during the Journey Lifecycle

It emerged strongly that the participants experience real anxiety at the prospect of having to try to use existing travel information to plan and undertake an unfamiliar journey. Journeys often have to involve a non-dyslexic companion, leading to feelings of dependency. In addition, journeys are sometimes not even undertaken at all. This emerged as particularly psychologically detrimental.

Discussions surrounding the general attitudes to travelling revealed that dyslexic travellers feel it is crucial to have access to information both pre-trip and during an unfamiliar journey in order to make the trip more psychologically and emotionally comfortable. Although this can also be true of non-dyslexic travellers, the feelings of the participants are directly attributable to their disability.

In order to keep the psychological (and hence the physical) symptoms of dyslexia to a minimum and manageable level, it is crucial that dyslexic people are presented with information that they can easily process when decisions need to be made. Within this study, a large number of the participants related this to gaining the sense of safety and security that they need to in order to reach their destination. However, there was a strong feeling that this is unachievable. This due to the fact that travel information is neither available (the content isn't useful or appropriate), difficult to access or inaccessible (not in a format dyslexics can easily understand), depending upon the severity of the person's dyslexia. As a result, these individuals make frequent mistakes and misjudgements, which they consider would not occur as often or severely if their cognitive needs were addressed. The participants even related challenges to information access to being a visitor to a foreign country:

*'I can't read a timetable, it's like a foreign language to me. I don't understand all the numbers, they're small, it means nothing to me. So, I won't use a timetable'*  
(Deborah)

The feeling of 'foreignness' is supported by Pollock and Waller (1997) and Townend (1999). The 'dyslexic-unfriendliness' of travel information not only makes someone with dyslexia feel as though they are in a foreign country, but it is also construed by them as a form of discrimination and inequality. In addition, the person often has to

rely on another person in order to ‘translate’ the information into a format that they can more easily understand.

#### **6.4 The Pre-trip Planning Experiences of Dyslexic Travellers**

It emerged strongly from the focus group participants and online respondents that unfamiliar and important familiar journeys need to be planned in advance of the journey, particularly if the person is severely dyslexic. This was the case for journeys involving public and private modes of transport. The fact that information processing difficulties are more pronounced and severe within the en-route context means that this is the norm for a person with dyslexia. They may hear, read or remember information incorrectly during the journey, hence the considerable (often crucial) emphasis on obtaining as much information as possible pre-trip.

In spite of their needs, it became clear that information is not presented in a dyslexic-friendly way. The substantial amount of information that the individual is required to process makes pre-trip planning extremely difficult and time-consuming, the impact depending upon the severity of the person’s dyslexia and the traits of the individual. It is suggested that the core phonological deficits which prevent dyslexics from developing phonological reading strategies are at the root cause of these difficulties (discussed in Chapter 3). In addition, the fact that the individual is often presented with unfamiliar place names means that word recognition difficulties provide an additional challenge.

It was quite clear that the participants would like to be able to plan journeys independently. Yet, as a consequence of their disability this is not always possible. There is a clear lack of trust in their own ability to produce the correct journey plans:

*‘We would be questioning whether or not we are right, because we don’t know we’re right’*

(Stephen)

Therefore, it was unsurprising that a strong preference for collaborating with a non-dyslexic person during pre-trip planning emerged. By doing so, they can ensure (as far as possible) that the plans are dyslexic-friendly and personally suitable. Short sharp bulleted phrases are used, with visual representations depicting key points and events (i.e. landmarks, and symbols depicting arrows and traffic lights). It is well-

known that visual representations are more easily processed than alphanumerical commands by a large number of people (providing they are correctly perceived). However, the fact that the right hemisphere of the brain is strong amongst dyslexics (BDA, 2003b) provides the primary reason for the visualisation skills of these individuals and their preference for visual information.

It was notable that if the participants are unable to obtain detailed plans of the journey in advance and face the prospect of travelling alone, they feel reluctant to attempt routes or modes unfamiliar to them, even if these options provide them with a more optimal journey choice. It was clear that the stress created by the prospect of facing such unfamiliarity and uncertainty and the affect that this has upon their disability deters them from making such choices and will almost certainly revert back to a familiar method of travel, or dependence.

The focus group discussions exposed the common use of experiential-type activities as part of the journey preparation process. This process can supplement or lessen the need to access other forms of text-based information en-route. Performing a dry-run was a frequently cited example for public and private modes of travel. This activity even emerged as crucial to some of the participants in order to feel confident enough to undertake the actual journey. Both mental and physical dry-runs were discussed, with physical dry-runs accompanied by a non-dyslexic companion where possible in order to ensure that the journey is undertaken correctly. Although non-dyslexics may also perform dry-runs prior to unfamiliar journeys, the emotional traits of dyslexic people and the nature of the problems experienced en-route means that these individuals will place greater emphasis on the need to perform this process. Hence, it is suggested that this activity will be more prominent within the dyslexic population. A comment made by one of the online participants substantiates these findings:

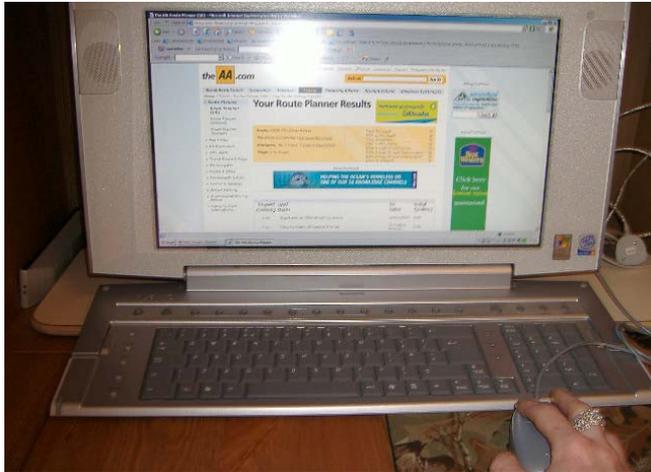
*'If I have to go somewhere new, my husband has to take me there first on a dry-run'*

(Rachel)

A further quote by the same participant suggests that dry-runs are considered an important and useful aid to travelling for the reason that they allow dyslexics to utilise their strong right-brain visualisation skills:

*'During a dry-run, I remember the route by looking at the shops and pubs etc rather than all the street names and road numbers'*

#### 6.4.1 The Web-based Journey Planning Experiences of Dyslexic People



The transport community has recognised that the Internet can facilitate more informed journey decision-making and raise awareness of the choices available (Lyons *et al*, 2001). However, usage is determined by usefulness (whether the content is helpful and informative) and usability (whether the user interface is appropriate to the user).

The literature highlighted that many of the traits of dyslexia will have a negative impact upon a dyslexic person's ability to effectively and efficiently use the Internet, the extent of which largely dependent upon the severity of the person's dyslexia. A number of explanations for these difficulties were provided by Rainger (2003). Apart from websites designed with dyslexia in mind (such as the discussion fora forming the basis of the online data collection), it emerged that websites (including sites providing travel information) are generally viewed by dyslexics as difficult to access. Accordingly, the chapter now examines the findings to emerge on the issues surrounding dyslexia and the accessibility of web-based travel information.

##### 6.4.1.1 Dyslexia and Access to Web-based Travel Information

Although a large amount of guidance exists on providing useful and useable web-based travel information (Kenyon, 2001), there was a prevalent feeling amongst the participants that existing information lacks attention to the needs of dyslexic people.

This was even the case for the online respondents, who could quite clearly make use of this communication medium. As a consequence, it was unsurprising that the participants commonly expressed feelings of anxiety and frustration in light of the fact that they are unable to easily complete the journey planning task online. Sometimes they cannot even complete it at all. The next section examines the specific issues that emerged from the discussions, along with suggestions for the design of dyslexic-friendly web-based travel information.

### *Visual Comfort*

By nature, travel information websites have to contain text-based information. For a dyslexic, this is likely to cause them visual discomfort when attempting to process the information. A large number of participants mentioned this being an issue for them:

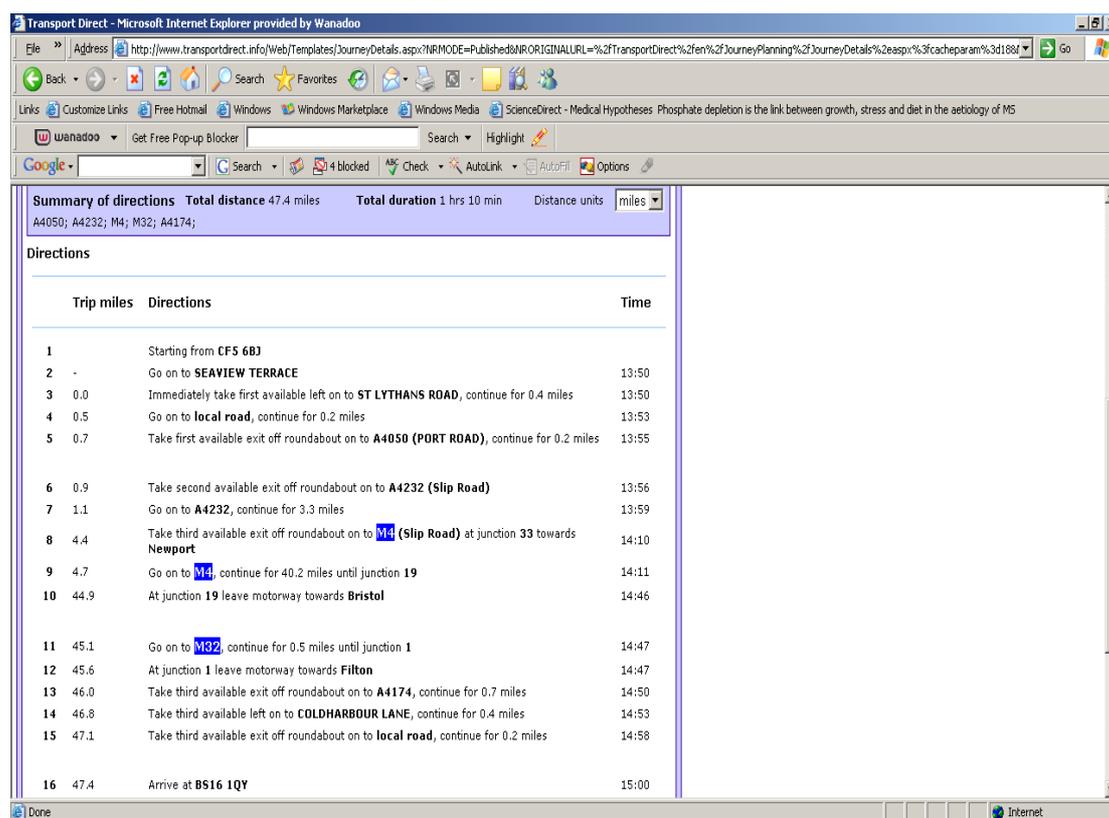
*'The print online looks blurred. It's the colour contrast and font size. It's just not friendly to me'*

(Lynn)

The focus group participants stated that they also experience double vision, vibrating words, and changes to the sequence of letters. The fact that the mind of a dyslexic person misinterprets what is seen causes these distortions (Jordan, 2004).

It emerged strongly that travel websites (particularly those providing highways information) put the participants under considerable pressure, both visually and phonologically. The websites provided by the AA and RAC were frequently mentioned in this respect. The reasons behind this largely surround the substantial amounts of text the individual is required to process and the way that the information is presented. Participants felt that sentences are too verbose and complicated, which makes it almost impossible to remember the important details. Furthermore, the insufficient use of visual representations means that they are unable to 'see the journey' and build up the mental signposts that dyslexics crucially need. Upon providing the participants with an example of the car directions produced by Transport Direct, they immediately commented on how verbose and complicated the directions were (see Figure 1 below). As a result, they felt that the directions could not be used en-route in light of the issues that they already experience with the driving task.

**Figure 1. Car Directions provided by Transport Direct**



Recommendations for improving the readability of car directions focussed around the presentation of the text to aid readability and allowing the user to more easily remember key points in the journey. Suggestions included the greater use of icons and symbols where appropriate, and brief instructions in bullet form with a line of space separating each step of the journey. The participants also felt that font and colour contrast need to be reconsidered, or the site should allow the user to personalise these attributes.

Although dry runs are performed, participants pointed out that they would prefer not to have to undertake them. This is as a result of the amount of time that this process requires. The participants suggested that a Virtual Reality version of their journey (including an auditory facility) made available pre-trip would be a useful alternative. This would allow them to walk-through and visualise the journey pre-trip from the comfort of their own home or place of work. This would be particularly useful for dyslexics with memory weaknesses because they would have the opportunity to revisit their journey as often as necessary prior to travelling. A Virtual Reality facility would be quite an ambitious undertaking. Therefore a 'deluxe dry-run' facility made available via the internet would provide a more cost-effective alternative. Having the

information available as a download to iPod or mobile device was also suggested. This is particularly useful since information received via mobile technologies does not require the user to remember it and can be referred to when necessary en-route.

### *Visual Learning*

Regardless of dyslexic severity, the participants mentioned that they can more easily learn new tasks if the information is 'visual' rather than predominantly text-based. Iconic representations, symbols and pictures all aid the learning process for dyslexic people. Learning new tasks on the Internet emerged as no exception:

*'With the Internet, if it's visual we're more likely to learn and take the information in'*  
(Tap-in)

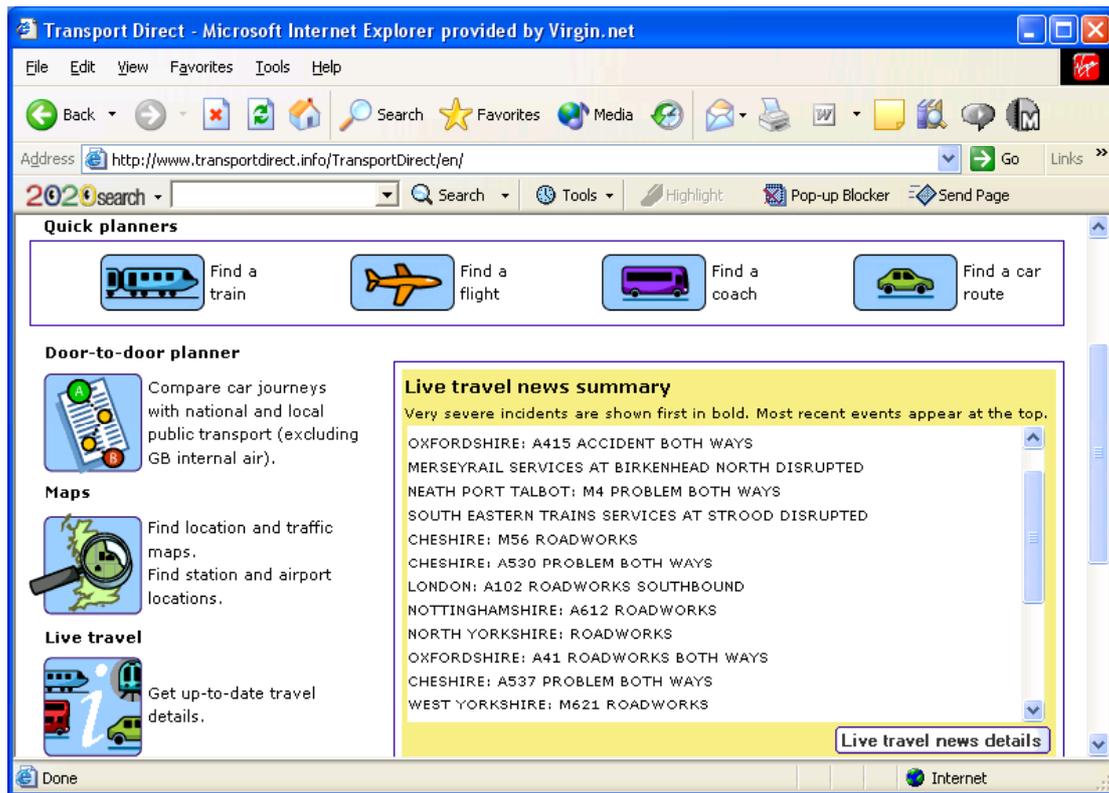
Opinions on the ability of web-based travel information to aid visual learning were predominantly negative. Travel information websites do not contain enough visual representations in order to enable dyslexic people to visualise the journey. As a consequence, they are unable to utilise their 'right-brain skills' and are driven to use weak left-brain skills. As a result, task inefficiencies and mistakes occur.

### *Visual Processing*

When the issue of visual processing was discussed in relation to Transport Direct, a prevalent feeling was that a number of pages on the site contain considerable (and often unnecessary) amounts of text-based information. Several of the pages seemed to overload the user as a consequence. The provision of a live travel news summary on the homepage (see Figure 2) emerged as one cause of overload:

*'I don't think you need the entire live travel news summary on the homepage. It's too much for me to take in too soon. It puts me off'*  
(Faye)

**Figure 2. Transport Direct Home Page**



If live travel news is to remain on the homepage, the participants made some useful (and realistic) suggestions as to how it should be presented in order to support visual processing. These are listed in Figure 3 below:

**Figure 3. Redesign Suggestions for the Provision of Live Travel News**

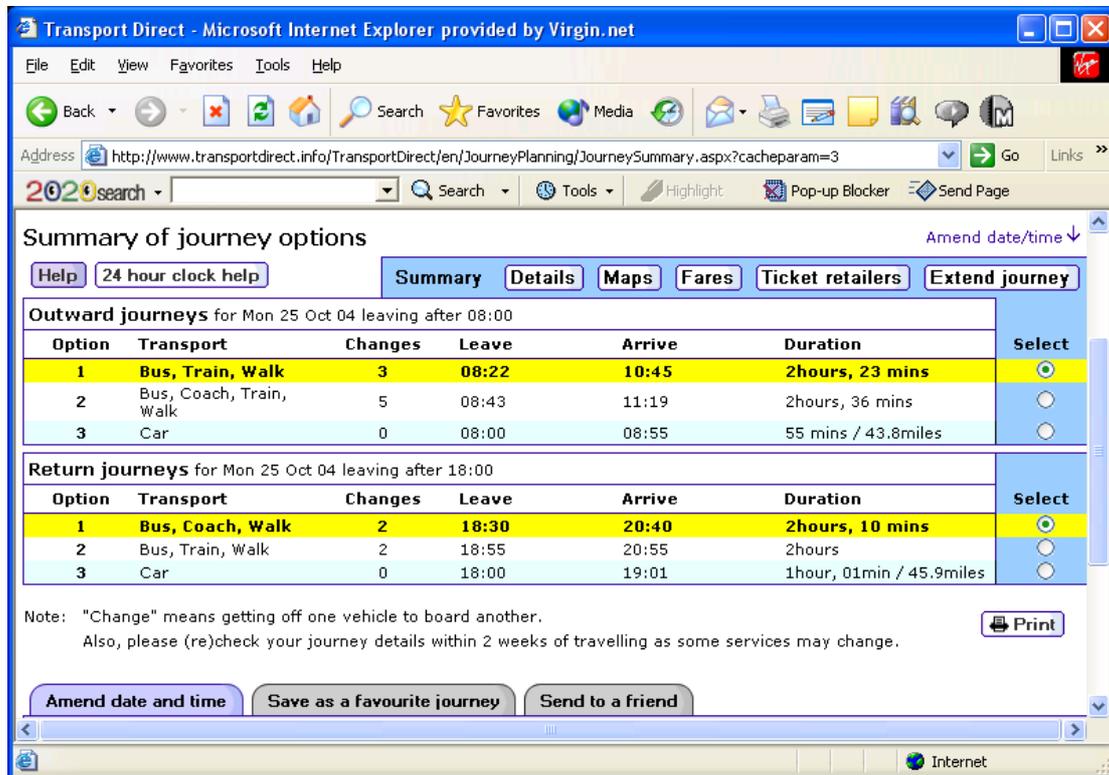
***Redesign Suggestions for the Provision of Live Travel News***

- *A clickable map on the home page with specific information filters (for region, mode and incident severity) available further into the navigational structure;*
- *Colour-coded severity of incidents rather than bold text;*
- *Information in a mixture of capital and small lettering;*
- *First item of information in bold or highlighted text.*

Websites that provide a number of system-generated journey options simultaneously also lacked positivity in relation to supporting the visual processing weaknesses of

dyslexic people. The 'journey options' page provided by Transport Direct was no exception (see Figure 4 below):

**Figure 4. Journey Options provided by Transport Direct**



Even though the first journey option is highlighted and shown first, this did not make visual processing any more efficient for the participants. It was also not immediately obvious which journey provided the best option. Additional dyslexic-specific issues associated with this page include the width of the reading lines and having to horizontally track the information. This has a considerable impact upon readability efficiency for dyslexic people.

The information provided within each journey option also attracted confusion. A large number of the participants' felt that the information is overly longwinded. The following phrase within the public transport information provided by Transport Direct frequently emerged during the discussion:

**'Take FIRST (BRISTOL) / 9A towards Bristol Temple Meads'**

It seemed that 'First' was not interpreted as the service provider (First). It was more literally taken, which is often the case for these individuals (i.e. that they should take the *first* bus that approaches them). The semantics behind the term 'towards' also proved confusing because of the difficulties dyslexics experience with spatial awareness and connective terms (Miles, 1993; Pollock and Waller, 1997). In addition, the use of all upper case lettering made information processing even more challenging. For a dyslexic, the shape of upper case letters makes the outline of the words appear too uniform.

As a consequence of that, the participants made a number of recommendations for improvements to the presentation of journey information. Information should be more explicitly stated in order to avoid confusion. They felt that the above phrase would be easier to process if it was more concise whilst ensuring that key information is not missed. The following examples provided by one of the participants (as explained to the researcher) received the support of a large number of the others:



Although participants expressed negative feelings towards the Transport Direct website, the iconic approach taken was viewed positively. The visual representations are easy to interpret and make information processing more efficient. The icons depict exactly what the person has to do (refer to Figures 5 and 6 below for examples). In spite of that, more visual representations would be welcomed.

Figure 5. The Iconic Approach of Transport Direct: The Home Page

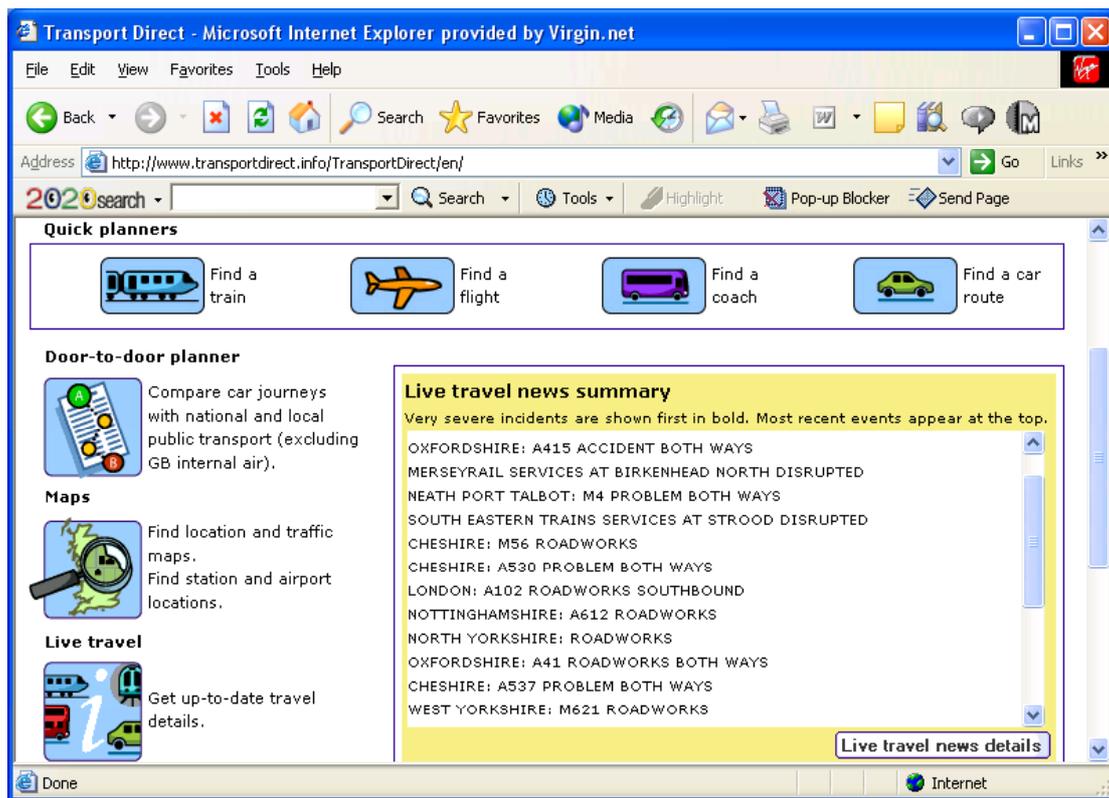
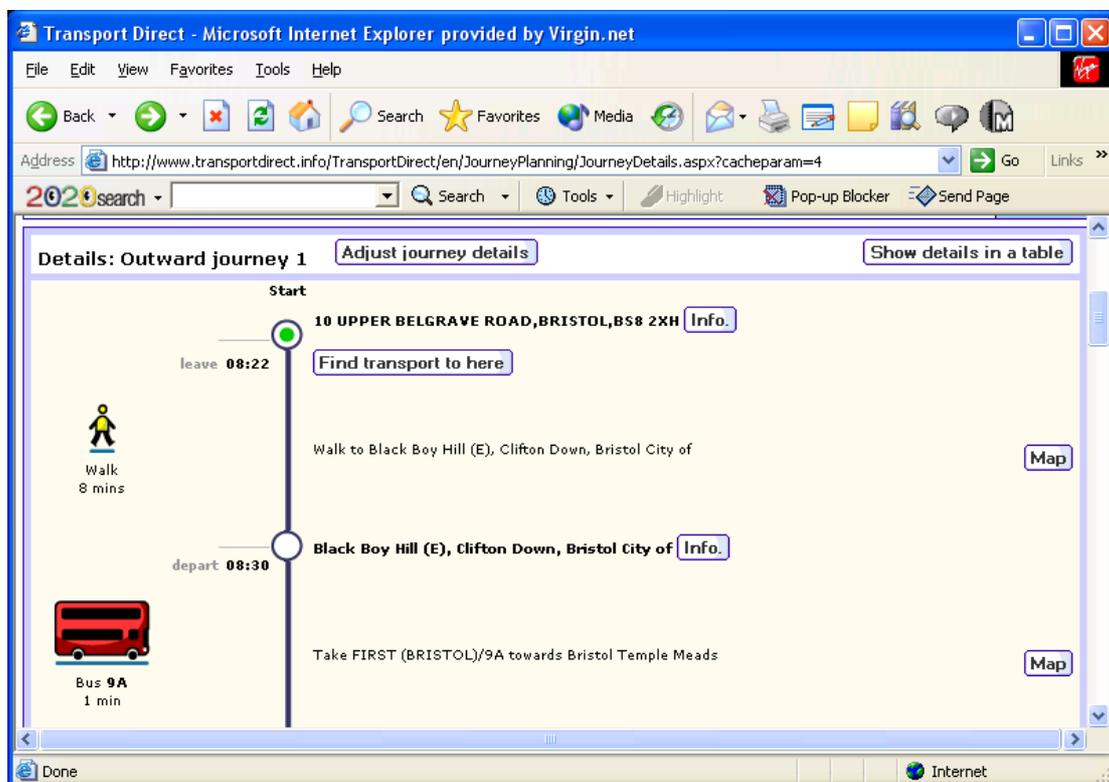


Figure 6. Transport Direct: Public Transport Information



The participants agreed that the public transport journey 'timeline' (shown in Figure 6 above) would be an ideal page to print off and take on a journey. The visual and vertically-presented flowing layout of the journey makes it easy for the participants to follow. For that reason, it was seen as reassuring, which aids stress management. In spite of this, the icons depicting interchange points *did* create a small amount of confusion. Hence, this point of the journey needs to be made more explicit to the traveller, using familiar icons. Coloured circles have already been adopted by Transport Direct, i.e. a green circle depicting point of departure and red for reaching the destination. Therefore using a similar approach to interchange points (i.e. an orange circle) would be useful, consistent and the information would be easily understood.

Caution is advised before implementing a colour coding system within travel information provision since colour preferences can be highly individual within dyslexia. It also emerged from the participants that unless the colour coding represents something fundamental to the task, then its meaning will be easily misinterpreted, particularly by dyslexic people. For example, green and red symbols depicting the point of departure and destination are easy to interpret, for the reason that they are culturally accepted consistently used symbols. However, some colour coding practices cause confusion. This emerged during the discussion on Transport Direct. Its use of colour to depict different modes of transport created a debate across all of the focus groups:

*'Why colour the train blue if I'm not looking for a blue train? That would throw me, I'd be looking for a blue train'*

(Rob)

Corrigan (2001) and Pollock (2004) explain that colour coding is often used by dyslexic people to assist with the learning process and as an aid to information organisation. Hence, it is suggested that this provides the reason why confusion surrounding the site's use of colour emerged.

### *Personalising Information*

The literature points out that dyslexia is a highly individual disability where each person experiences symptoms in different combinations and to differing degrees of

severity (Pollock and Waller, 1997; Evans, 2001; Johnson and Peer, 2003). This can also be seen by referring to the different traits of the participants of this study<sup>34</sup>. For that reason, it was unsurprising that many of the participants expressed the need to personalise the travel information that they initially obtain so that it can be more easily understood, with the level of personalisation relating strongly to dyslexic severity. In addition, personalising the information reinforces the journey being undertaken via the person's long-term memory store.

Several methods of personalising web-based travel information emerged from the focus groups, with similar methods transpiring from the online respondents. Some of the participants personalise the information online prior to printing (using the browser settings), whilst others highlight key pieces of information that they will need after printing. Some use more in-depth methods such as emailing the plans to themselves or using the cut and paste facility in order to create a Word document. Having a facility similar to this at the interface was frequently suggested. Being able to arrange via the website for the information to be sent to their mobile phone in readiness for the journey also emerged. Although text still has to be processed, this was a more attractive option than trying to process information en-route using other media.

It is unknown at present whether information presented in a more dyslexic-friendly format would completely negate the need for personalisation. The individuality of dyslexia may mean that travel information providers may not be able to make information accessible to every dyslexic individual. The participants were sympathetic to this. However, they felt that a large number of websites only allow users to personalise the information through the browser settings. It was suggested that providing the user with more control over presentation directly at the interface would be a useful step in bringing a basic level of dyslexic-friendliness into travel information provision. Suggestions include being able to personalise the font attributes (size and style) and colour contrast (of the text and background). 'Textic' is an example of a useful personalisation tool. This facility is provided at the interface of the British Dyslexia Association (2008).

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<sup>34</sup> See Appendix 6.

## Spelling

Pollock and Waller (1997) explain that difficulty with spelling is an inherent trait of dyslexia. The fact that the online discussions required text-based interaction meant that the spelling weaknesses of dyslexics were quite clear, albeit to differing degrees of severity, and not in all cases. As a result, it was unsurprising that the focus groups and online participants expressed that having to correctly input text-based information onto a web-based journey planner is challenging in light of their disability. Similarly to using a dictionary, the person has to accurately determine the first letter and be close to the correct spelling to begin locating the correct word. However for dyslexic people, an incorrect letter is often placed at the beginning of the word because spelling phonetically is commonplace. A prime example was provided by one of the focus group participants:

*'I was spelling something, which should have started with a J instead of a G. That's how things sound to me as a dyslexic'*

(Tina)

Furthermore, dyslexics cannot simply copy the place names onto the journey planner from another source. This is because of visual processing difficulties. Phonetic skills are also required in order to ensure that the words are correctly spelt. If the system generates a list of place names, this is likely to be of little use to a dyslexic. Even if the start of the word is input correctly, dyslexic people interpret the rest of the word/phrase based on the first section. They are unable to recognise differences between words. Therefore all options look similar, which results in frequent misinterpretations. The following examples illustrate this point:

- Tottenham and Tottenham Court Road;
- Regents Street and Regents Park;
- Bristol Parkway and Bristol Temple Meads.

This is still an issue even if the person is familiar with area. Thus, familiarity with the places being visited does not necessarily mean that problems will not be experienced when the place names are displayed in writing.

A number of suggestions to support spelling difficulties emerged from the discussion. These are listed in Figure 7 below:

**Figure 7. Supporting Spelling Weaknesses**

***Supporting Spelling Weaknesses***

- *Spell-checking facility*: A basic spelling-checker compares words against a vocabulary database and notifies the user when an error is being made. Allowing users to add custom words to the vocabulary (such as unfamiliar place names) would also be a valuable feature. Providing a 'phonetic spell-checker' may be useful in light of the fact that dyslexic people often spell phonetically. It should be noted that although making a spell-checking tool available at the interface may be of some assistance to dyslexic users (and other users with literacy problems), it will not completely negate the need for the user to recognise and select the correct place names from the options provided;
- *Clickable map*: removes the need to input place names and provides the user with a visual representation of the country. Although the need to identify and select text-based place names from the map is still required, the visual nature of the information lessens the opportunity for error and increases the chances of the user selecting the correct option - locations can be visualised;
- *Speech-to-text facility*: it would be far easier for dyslexic users if they were able to input information via speech rather than text;
- *Text-to-speech facility*: dyslexic people can more easily distinguish words if they are heard rather than seen in writing. 'Browsealoud' and 'Readspeaker' are examples of text-to-speech tools. Readspeaker would be a more attractive option for travel information providers due to the fact that travel information is often accessed from public locations (Browsealoud does not facilitate this).

## *Numerical Processing*

A dyslexic's grasp of numeracy is affected for similar reasons to literacy (Johnson and Peer, 2003). Therefore, it was unsurprising that the participants experience significant problems with pre-trip planning for the reason that numerical processing is required:

*'You know your train is 10.20. But you could be very late because you mix the numbers up'*

(Stephen)

*'I sometimes have to go around a roundabout several times because I mix up the numbers'*

(Deborah)

Visual processing difficulties cause numbers to look similar or become distorted. The use of the 24-hr clock exacerbates the problems experienced in light of the problems that dyslexics experience with time represented in this way. The participants with numerical processing weaknesses explained that they have to employ coping strategies in order to convert the 24-hour clock into a 12-hour format (the latter is a more familiar format and easier to process). Subtracting 12 or physically counting upwards from 12 emerged as common strategies. Correct numerical sequencing is also problematical for the reason that dyslexic people do not possess an in-built awareness of sequencing. The larger the number of digits the individual has to process, the more difficult this task becomes.

Different preferences for the representation of time emerged from the discussion. This relates strongly to the individuality of dyslexia as discussed in the literature. Some of the participants prefer to see a 12-hour format, while others would like to see a 'clickable clock face'. Text-to-speech and speech recognition also emerged. Dyslexics can more easily process orally-presented numbers because they only appear in succession. Visually-presented numbers can be presented either simultaneously *or* in succession, which puts greater demands on information processing skills (Miles, 1993). Due to the different preferences that exist, a choice for time representation transpired.

The next section of this chapter discusses the trunk stage of an unfamiliar journey from a dyslexic perspective. It begins by examining the difficulties experienced with public transport before moving onto car travel. Some of the problems discussed can also be experienced at other stages of the journey lifecycle (for example, difficulties with timetables can be experienced both pre-trip and en-route). However, the following issues are particularly well-suited to being discussed within en-route travel.

## **6.5 The En-route Journey Experiences of Dyslexic Travellers**

### 6.5.1 The En-route Experiences Associated with Public Transport



There was a similarly prevalent feeling amongst the focus group participants and online respondents that accessing information during a public transport journey poses major difficulties for dyslexic people. It is seen as a significant barrier to travel via this mode as a consequence, hence the high incidence of negativity amongst the participants towards public transport and a strong preference for car travel. Several information media were exposed as particularly problematic. These are discussed below.

### 6.5.1.1 Understanding Timetables

It was suggested in Chapter 4 that dyslexics may potentially experience problems with understanding and using timetables (The Trace Centre, 2003). The findings of this study verify this point of speculation.

Discussions surrounding public transport information acknowledged that processing timetables clearly presents dyslexic people with a considerable challenge. This emerged for timetables provided by bus and train service providers in particular. Timetables also appear to be problematic both pre-trip and en-route. Similar problems are experienced, however the en-route context worsens the effects further. The core deficits which prevent dyslexics from developing phonological reading strategies are at the centre of these difficulties, both pre-trip and en-route.

Although the participants felt that the information provided on timetables is useful, problems occur because of the amount of information displayed and the way that the information is presented. The following elements of design emerged as those causing the most difficulty for dyslexic travellers:

- The considerable amounts of alphanumerical information displayed.
- Horizontally-presented information;
- Unsuitable font style;
- Inadequate font size;
- Inappropriate colour contrast between the text and background;
- Use of glossy paper;
- Where timetables are made available online, they are not always redesigned specifically for this format.

This was verified by a number of participants of the focus groups:

*'Timetables are in small fonts, and dyslexics have trouble tracking on a linear line. So, we're using fingers or anything else to try and match up the information, which is very difficult'*

(Stephen)

'Timetables are often on white glossy paper, and the print dances'

(Peter)

'Yes, all of those lines of information, with all the different colours'

(TJ)

Similar sentiments transpired from the online respondents:

'Timetables are a nightmare. I don't know where to start with them. There's so much information to take in and it's not presented in a way dyslexics can easily understand'

(Kirsty)

Figure 8 below provides a typical example of a timetable which would be challenging for someone with dyslexia.

Figure 8. An Example of a Bus Timetable (Google Images, 2008)

Route 63: Southmoor - Hinton Waldrist - Longworth - Fyfield - Appleton - Eaton - Cumnor - OXFORD

\*OXFORD buses depart from Castle Street (Stop M1\*) outside the WESTGATE SHOPPING CENTRE

Sorry, NO SERVICE Sundays or Bank Holidays

Monday to Friday - School Days										SC	F
OXFORD, Castle Street (Stop M1*)	----	----	----	1035	1230	1400	----	1735	2300g		
CUMNOR, Glebe Road	----	----	----	1048	1243	1413	----	1753	2313		
EATON, Appleton Road	----	----	----	1052	1247	1417	----	1757	2317		
<b>APPLETON, Green</b>	----	----	----	<b>1055</b>	<b>1250</b>	<b>1420</b>	----	<b>1800</b>	<b>2320</b>		
LONGWORTH, Post Office	----	----	0854	1104	1259		r				
HINTON WALDRIST, Church Road	----	----	0858	1108	1303		r				
<b>SOUTHMOOR, Latton Close</b>	----	----	<b>0905</b>	<b>1115</b>	<b>1310</b>	----	----	----	<b>2328</b>		
notes											
	SC	SC									
<b>SOUTHMOOR, Latton Close</b>	<b>0648</b>	<b>0750</b>	<b>0905</b>	<b>1115</b>	<b>1310</b>	----	<b>1640</b>	----	----		
HINTON WALDRIST, Church Road	----	----	(0858)	1122	1317	----	1647	----	----		
LONGWORTH, Post Office	----	----	(0854)	1126	1321	----	1651	----	----		
FYFIELD, Old Forge	0652	0754	0909	1131	1326	r	1656	r	(2324)		
<b>APPLETON, Green</b>	<b>0656</b>	<b>0758</b>	<b>0915</b>	<b>1137</b>	<b>1332</b>	----	<b>1702</b>	----	----		
EATON, Appleton Road	0658	0800	0918	1140	1335	----	1705	----	----		
CUMNOR, Glebe Road	0702	0804	0922	1144	1339	----	1709	----	----		
<b>OXFORD, Castle Street (Stop M1*)</b>	<b>0720g</b>	<b>0830g</b>	<b>0938</b>	<b>1200</b>	<b>1355</b>	----	<b>1725</b>	----	----		

Monday to Friday - School Holidays										SC	F
OXFORD, Castle Street (Stop M1*)	----	----	----	1035	1230	1400	1610	1735	2300g		
CUMNOR, Glebe Road	----	----	----	1048	1243	1413	1623	1753	2313		
EATON, Appleton Road	----	----	----	1052	1247	1417	1627	1757	2317		
<b>APPLETON, Green</b>	----	----	----	<b>1055</b>	<b>1250</b>	<b>1420</b>	<b>1630</b>	<b>1800</b>	<b>2320</b>		
LONGWORTH, Post Office	----	----	0854	1104	1259	1429	(1651)	r			
HINTON WALDRIST, Church Road	----	----	0858	1108	1303	1433	(1647)	r			
<b>SOUTHMOOR, Latton Close</b>	----	----	<b>0905</b>	<b>1115</b>	<b>1310</b>	<b>1440</b>	<b>1640</b>	r	<b>2328</b>		
notes											
	SC	SC									
<b>SOUTHMOOR, Latton Close</b>	<b>0648</b>	<b>0750</b>	<b>0905</b>	<b>1115</b>	<b>1310</b>	<b>1440</b>	<b>1640</b>	----	----		
HINTON WALDRIST, Church Road	----	----	(0858)	1122	1317	1447	1647	----	----		
LONGWORTH, Post Office	----	----	(0854)	1126	1321	1451	1651	----	----		
FYFIELD, Old Forge	0652	0754	0909	1131	1326	1456	1656	r	(2324)		
<b>APPLETON, Green</b>	<b>0656</b>	<b>0758</b>	<b>0915</b>	<b>1137</b>	<b>1332</b>	<b>1502</b>	<b>1702</b>	----	----		
EATON, Appleton Road	0658	0800	0918	1140	1335	1505	1705	----	----		
CUMNOR, Glebe Road	0702	0804	0922	1144	1339	1509	1709	----	----		
<b>OXFORD, Castle Street (Stop M1*)</b>	<b>0720g</b>	<b>0830g</b>	<b>0938</b>	<b>1200</b>	<b>1355</b>	<b>1525</b>	<b>1725</b>	----	----		

Saturdays										SC
OXFORD, Castle Street (Stop M1*)	----	----	0820	1035	1230	1400	1610	1735	2300g	
CUMNOR, Glebe Road	----	----	0832	1048	1243	1413	1623	1753	2313	
EATON, Appleton Road	----	----	0834	1052	1247	1417	1627	1757	2317	
<b>APPLETON, Green</b>	----	----	<b>0836</b>	<b>1055</b>	<b>1250</b>	<b>1420</b>	<b>1630</b>	<b>1800</b>	<b>2320</b>	
LONGWORTH, Post Office	----	----	0854	1104	1259	1429	(1651)	r		
HINTON WALDRIST, Church Road	----	----	0858	1108	1303	1433	(1647)	r		
<b>SOUTHMOOR, Latton Close</b>	----	----	<b>0905</b>	<b>1115</b>	<b>1310</b>	<b>1440</b>	<b>1640</b>	r	<b>2328</b>	
notes										
<b>SOUTHMOOR, Latton Close</b>	----	<b>0905</b>	<b>1115</b>	<b>1310</b>	<b>1440</b>	<b>1640</b>	----	----	----	
HINTON WALDRIST, Church Road	----	(0858)	1122	1317	1447	1647	----	----	----	
LONGWORTH, Post Office	----	(0854)	1126	1321	1451	1651	----	----	----	
FYFIELD, Old Forge	0754	0909	1131	1326	1456	1656	r	(2324)		
<b>APPLETON, Green</b>	<b>0758</b>	<b>0915</b>	<b>1137</b>	<b>1332</b>	<b>1502</b>	<b>1702</b>	----	----	----	
EATON, Appleton Road	0801	0918	1140	1335	1505	1705	----	----	----	
CUMNOR, Glebe Road	0806	0922	1144	1339	1509	1709	----	----	----	
<b>OXFORD, Castle Street (Stop M1*)</b>	<b>0820</b>	<b>0938</b>	<b>1200</b>	<b>1355</b>	<b>1525</b>	<b>1725</b>	----	----	----	

Key to notes

SC Stop(s) served by (Please contact Stop(s) by details)

F Friday only

g Stops at Gloucester Green NOT Castle Street

r Stop(s) required passengers on board at Appleton

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In addition, individual transport operators are responsible for timetable design. This means that there is a lack of consistency, and accessibility will vary as a consequence.

If a timetable is not read efficiently or accurately, someone with dyslexia faces the prospect of missing their connection. If this occurs, unforeseeable change is forced upon them. A further problem to emerge was the fact that the information on the timetable does not always match the information displayed on the front of the vehicle or information provided at the stop/station. For a dyslexic, the information has to match in order to allow effective information processing. Otherwise, it is extremely difficult for them to determine whether they are boarding or alighting correctly.

### *Recommendations for Timetable Design*

Kenyon (2001) explains that the first level of assessment of the viability of public transport for a journey is whether the service will allow the user to depart and arrive at a convenient point at a convenient time. Timetables can therefore be considered a crucial element for travellers. However, for timetables to be useful, they must be useable. At present, this is not the case for dyslexic people. Although accessible versions of timetables can assist dyslexic people, the specific problems associated with dyslexia are not completely supported through a design-for-all approach. Following the guidelines in Figure 9 below would ensure that timetables are more appropriate for dyslexic people:

### **Figure 9. Redesign Suggestions for Dyslexic-Friendly Timetables**

***Suggestions for Dyslexic-Friendly Timetables***

- *Information which requires vertical tracking rather than horizontal;*
- *A soft contrast between the text and background;*
- *Timetables available in a 12-hour am/pm format;*
- *Use of icons, pictures and symbols where possible and appropriate;*
- *For timetables presented online: the use of a pyramidal information structure, where users are able to obtain timetable information in small steps. Hence, the resulting information is less-complicated because it is more specific to the individual's requirements.*

If redesign (or provision of a suitable alternative) proves to be a feasible option, collaboration between service providers, experts and dyslexic people will be necessary in order to ensure that timetables are dyslexic-friendly, and consistently designed regardless of the region or service operator providing them.

### 6.5.1.2 Station Monitors and Information Boards

The Trace Centre (2003) suggests that station monitors and information boards could be potentially problematic for dyslexic people. The findings of this study verify this point of speculation, particularly where bus and rail travel are concerned. Figure 10 presents two examples of information boards and monitors provided by the rail industry. It emerged similarly across the focus groups and online fora that information made available using this type of media is especially difficult to process:

**Figure 10. Public Transport Information Boards and Monitors**



A quote from one of the participants provides the main reasons for the challenges faced:

*'When you have to read the screen at the stop or station where it's got all the place names, times and platform numbers. I think it's down to colour contrast, font, it's all horizontal and presented together. I can't process the information'*

(Lynn)

The phonological and visual processing weaknesses associated with dyslexia means that it can take dyslexic people considerably longer than those without the disability to find the information that they need, with the greatest impact upon the severely dyslexic. Furthermore, these individuals are often uncertain whether their decisions are accurate. The way that information is presented on station monitors and information boards means that dyslexics are often forced to act without thinking clearly. The fact that information is often scrolling provides an additional challenge. Information does not remain static for a long enough period in order for the individual to process and correctly act upon it. When the information disappears onto the other side of the board, there is an even greater air of uncertainty. Although guidance is available to information providers on the scroll speed of information boards (Oxley, 2002)<sup>35</sup>, dyslexics require extra time to cognitively process information and assess the situation. Information providers need to take this into consideration.

As a coping strategy for the difficulties faced with station monitors and information boards, the focus groups and online respondents similarly explained that they will almost certainly seek assistance from staff in order to obtain the information that they need. However, it emerged that this isn't always possible and staff are either unavailable or lack the knowledge or patience to help them. A fellow member of the public is often approached as a consequence. Some of the participants even stressed that if they are unable to find help, they will consider modifying their travel behaviour in order to complete the rest of the journey. Some even feel it necessary to abandon the journey altogether and return home.

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<sup>35</sup> 'Inclusive Mobility – A Guide to Best Practice' (Oxley, 2002). Copies of this Guide were circulated by the Department for Transport to local authorities and major transport operators (as these organisations would be responsible for implementing best practice). The actual use of them remains unknown at the time of writing this thesis. It emerged that a more up-to-date version is currently being considered by the Access and Equalities Unit at the DfT (formerly the Mobility and Inclusion Unit)

Although guidance on the design of information boards already exists (Oxley, 2002), a number of the guidelines are not dyslexic-friendly. Accordingly, the following suggestions in Figure 11 are made in order to more appropriately support dyslexic people:

**Figure 11. Providing Dyslexic-Friendly Information Boards and Monitors**

***Providing Dyslexic-Friendly Information Boards and Monitors***

- *Reconsideration of colour contrast:* yellow text on a black background is not suitable for dyslexic people. However any change to colour contrast may have negative consequences for other disabled travellers, such as the visually impaired. For that reason, close collaboration between providers and those which could be potentially affected by such a change will be necessary before changes are implemented;
- *Increase to character size;*
- *Information on Variable Message Signs should remain static for a longer period of time than at present;*
- *Use of a 12-hour am/pm format for time representation;*
- *Increased spacing between words and characters;*
- *Access to departure information via a mobile alert service:* providing the right information via a mobile device could negate the need for the dyslexic person to refer to travel information boards.

#### 6.5.1.3 Processing Numerical Information En-route

Since dyslexic people experience difficulties processing numerical information pre-trip (explained in Section 6.4.1.1), it was unsurprising that similar difficulties are experienced en-route. The same root causes are at the centre of the challenges, yet the nature of the en-route environment exacerbates the problem. Anxieties about the on-board environment may make the journey stressful and uncomfortable for everyone (Kenyon, 2001). However for a dyslexic, these feelings will be worsened by dyslexia. The following quotes to emerge from the study illustrate the issues that dyslexic people experience with numerical information en-route:

*'Say I've got to catch a train, I really struggle, because I often get the numbers the wrong way round, I get the times wrong, the costs wrong'*

(Abbie)

*'Certain numbers I will switch. I can write 42, but reading it I'll see 24'*

(Deborah)

A commonly cited numerical problem en-route across the focus groups and online fora surrounds an inability to correctly and efficiently process bus numbers displayed upon the front of the vehicle, with the most severely dyslexic individuals experiencing the most intense difficulties. The fact that the numbers are often very close together and displayed in combination with unfamiliar place names makes boarding the correct vehicle profoundly difficult (see Figure 12 below for an example). Feelings of unease and apprehension cause the person to become indecisive about how to proceed.

**Figure 12. Processing Bus Numbers En-route**



Similar-looking numbers are particularly problematic:

*'I have to be very careful boarding the correct bus when the bus number contains 6s or 9s. I can easily mix them up'*

(Deborah)

Determining the correct fare and payment also emerged as challenging. Impatient members of staff worsen the effects of this, often causing unnecessary distress. Several references to this were made by the online participants:

*'The worst thing about travelling for me has to be bus drivers who are impatient with me when I'm trying to sort out the fare*

(Kristy)

*'There is a real lack of patience with bus drivers when paying the fare. So I only use large denominations of money and carry more money than I need so I don't have to count out as much to them'*

(Chris)

Figure 13 below highlights another common situation facing dyslexic people en-route - finding a reserved seat once on-board:

**Figure 13. Finding a Reserved Seat**



On trains in particular, there are a large number of seats in each carriage. Furthermore, the seat numbers are often displayed in small lettering, which makes visual discrimination especially challenging. Phonological and visual processing weaknesses can affect the individual's ability to match up ticket information with the seat numbers. In addition, logic has to be applied to determine which seat numbers correspond to which seats. Consequently, if the dyslexic is sitting in the wrong seat, then they will experience the further embarrassment of (and stress associated with) having to check their tickets and find another seat.

Coping strategies appear to be a common remedy to numerical processing weaknesses en-route. Examples include:

- A reliance on where the vehicle 'usually' departs (this is only a useful strategy if circumstances remain unchanged);
- Asking someone to direct or escort them to their platform, vehicle or seat;
- Taking an unreserved seat in order to remove the need to find a reserved seat;
- Pre-trip ticket purchasing/purchasing undertaken on their behalf;
- Asking someone for the time.

In order to assist numerical processing en-route, it was clear that the participants would rather not have to employ coping mechanisms for tasks that should be relatively simple to complete. The provision of dyslexic-friendly information would help to address the problems experienced. A number of suggestions emerged from the participants in relation to this. More widely available up-to-date fare information would help travellers to determine the correct fare in advance of the journey. Making this information available via a website, email or SMS service may be a feasible option. Allowing individuals to sign-up to a mailing list for fare updates is also a suggestion. Assistance with navigating to a platform or vehicle could be supported using symbols and colour coded trails:

*'As you're walking into the station, it says "platform 7 blue". You actually see it in front of you as you're walking. So you know you're following the blue line'*

(Lyn)

Although guidance already exists to assist with the design of vehicle displays (Oxley, 2002), they are still proving difficult for dyslexic travellers to process efficiently. In light of that, it is suggested that revisiting the current guidance is required in order to assess its appropriateness for dyslexic people, and verification of their use. The participants explained that finding the correct vehicle could be supported via auditory information available at the stop or via a mobile device. For example:

- 'This stop is for bus numbers 8, 8A, 9 and 9A';
- 'The next service will be the Number 8 to Whiteladies Road';

- 'The bus approaching is the 8A'.

Although it emerged that the presentation of seat numbers has improved on more modern vehicles, it is going to take some time for this to filter through to the majority of vehicles in service. Seating plans available pre-trip, with the reserved seat and route to it clearly highlighted would provide the dyslexic traveller with an overall visual picture of the vehicle and how to locate their seat.

#### 6.5.1.4 Overhead Signage at Stops and Stations

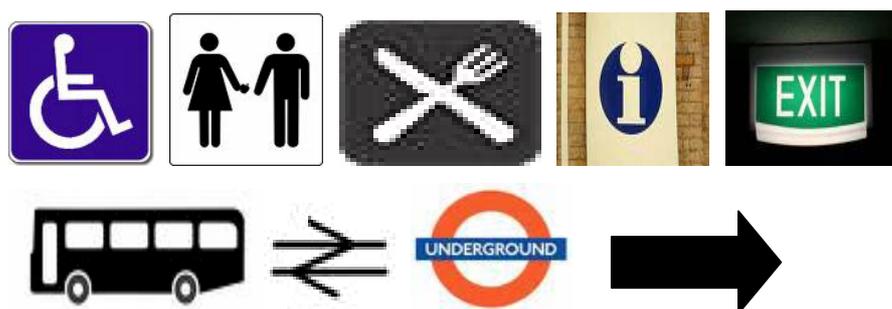
Although the discussions surrounding signage (in terms of usefulness and usability) centred largely on car journeys, the overhead signs at mainline bus and train stations also emerged. It was clear that signage is a source of information used by dyslexic users of public transport, despite their information processing difficulties. Unlike signs encountered on car journeys, the person can stop for a moment to process signage at stops and stations (see Figure 14 below):

**Figure 14. Overhead Signage provided by Public Transport**



Furthermore, overhead signs provided by public transport have more of a visual element, which allows the individual to utilise their right brain processing skills (see Figure 15 below for examples):

**Figure 15. The Use of Symbology within Public Transport**



Universally-recognised and culturally-accepted icons (such as the ones above) can assist in compensating for some of the other inherent difficulties associated with dyslexia en-route. For example, icons allow for recognition rather than having to recall information from memory during wayfinding.

Any traveller could find themselves having to stop for a moment to process an overhead sign, finishing up in the wrong place, or having to ask someone for assistance. However, the effects of a mistake will be felt far more severely by a dyslexic person in light of their cognitive weaknesses. It is also suggested that dyslexics will experience difficulties with signs that may not be problematic for non-dyslexics.

Although recommendations are already in existence for the design of station signage (Oxley, 2002), it emerged that dyslexics continue to experience difficulties processing them efficiently and effectively in order to facilitate easy wayfinding and transit. Making a visual plan of the station available to the traveller pre-trip via Internet and en-route via low-tech media or mobile technologies could assist them with this task.

#### 6.5.1.5 Processing Audible Information En-Route

The problems discussed above all relate to mastering and using aspects of written language, which is a key aspect of dyslexia. Therefore, it was unsurprising that the participants exhibited a strong preference for receiving travel information via auditory channels, even amongst the respondents who possess auditory weaknesses:

*'I prefer voice. With voice I can hear it'*

(Lyn)

### *Asking for Information: 'The Human Touch'*

When a discussion arose on the preferred media for receiving auditory-based information, a strong inclination towards asking someone for assistance emerged. The main reason for this preference involves 'the human touch' associated with this method and the human element that it brings. In other words, there is a preference for referring to 'someone' rather than 'something'. In addition to ground-level staff, participants expressed a preference for assistance via the telephone, family members, and even strangers. Although tannoy systems provide auditory information, they seem to lack the clarity needed for the participants to easily process the information provided. This transpired as an issue across the entire focus groups profile and online fora, emerging as more of an issue for the individuals with moderately severe auditory weaknesses. In addition the essential human element is absent. Stress management and persistent self-doubt could mean that dyslexics will always need human reassurance irrespective of how much information is available to them.

In order to consider the journey possible, dyslexics need to trust the information available to them. For this reason, it is suggested that dyslexics place a greater emphasis than non-dyslexics on obtaining human assistance at key points in the journey lifecycle. They also need reassurance that they are doing the right thing:

*'One of the important things about speaking to someone is you get a nod and you can check that you understand'*

(TJ)

### *Difficulties with Receiving Travel Information via Auditory Channels*

Even though there is a preference for audible information (and guidance exists in order to ensure that audible information is accessible), problems are still experienced by dyslexic people due to phonological weaknesses. The following quotes from the participants highlight the problems experienced receiving audible travel information:

*'Information is never provided in short steps which you might remember. Any sentences that extend beyond one or two words, I lose sight of the words that are important'*

(‘TJ’)

This even occurred if the information was received via human assistance:

*'They'll say turn right, turn left, go up here. By the time he's walked away, I've forgotten what he said'*

(Deborah)

The same participant also brought to light the impact this has upon her emotionally:

*'If I'm doing a journey I don't know, the man at the ticket office says you go to platform such and such, change here, change there. By the time you've got on the train, you've got no idea what he said. You've been worrying about getting on the right platform etc. You get on and think, am I on the right train?'*

The above difficulties strongly relate to the fact that information processing difficulties in dyslexics originate from both the visual and auditory modalities. The fact that dyslexics are left-ear dominant also has an impact upon a dyslexic's ability to process audible information, as does sequencing.

Short-term/working memory is also closely tied to listening ability. A number of the participants expressed that they are able to remember what the person said at the outset (i.e. the 'primacy' stage of the dialogue), but are unable to remember what was said in the closing stages (i.e. the 'recency' stage). It also emerged that auditory difficulties are exacerbated if the connectives left or right are used by the speaker:

*'They'll tell me, and then I'll have to ask them to repeat it because I'll have forgotten the left and right'*

(Sian)

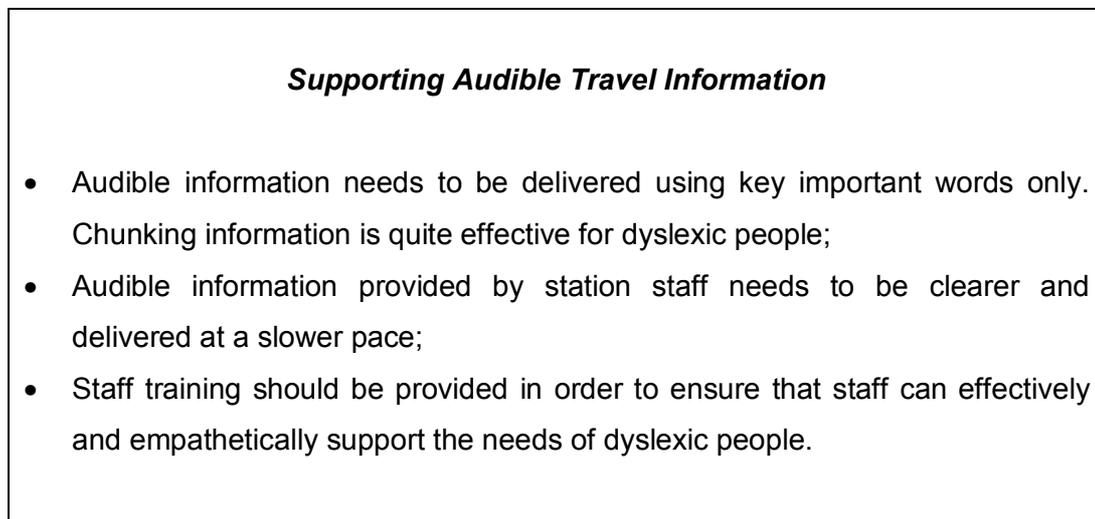
Even once the difference between connective terms is learned, dyslexic people still have to think about them carefully and distinguish between the two before acting upon them during wayfinding. It emerged that in the majority of cases, verbal labelling and naming weaknesses are at the centre of these obstacles rather than

problems with direction itself. Various coping strategies for this issue emerged. These are all visual-style cues. For example:

- Drawing left/right arrows on journey information;
- Making an 'L'-shape with the left hand;
- Wearing a watch on the left wrist to determine left;
- Writing an 'L' on the left hand.

A number of suggestions in order to assist dyslexic people with processing audible information can be put forward. These are listed in Figure 16 below:

**Figure 16. Supporting Audible Travel Information**



In addition to the difficulties experienced processing audible travel information, asking for information is also problematic. For that reason, the chapter now examines this.

*Asking for Assistance: 'Verbal Dyslexia'*

There are a number of areas of speech processing that have a direct impact upon a dyslexic person's ability to ask for information, either pre-trip or en-route. Articulatory problems, misuse of words, word-finding difficulties, and word sequencing problems emerged as a common occurrence. In addition, although non-dyslexics experience having a word 'on the tip of the tongue', for the participants this was a common occurrence (the main descriptors and identifiers behind the core speech production

weaknesses demonstrated in dyslexics have been discussed by Snowling, 1987; Stackhouse, 1990 cited Snowling and Stackhouse, 1996; Hales, 1994 cited Miles, 2004; Townend, 1999; and Beaton, 2004). In addition, the notion of 'feeling foreign' was quite clear across the focus groups. A number of the participants compared asking for information to the analogy of being in a foreign country (this has been mentioned previously).

### *Staff Empathy*

It has been mentioned previously that both the focus group participants and online respondents feel intensely negative towards transport staff. This involves both staff on-board the vehicle and at the station itself. Staff often appear unsympathetic to the problems that the dyslexic traveller is facing and lack the inclination to help them. A comment made during the online discussions verifies this:

*'The worst thing about travelling has to be bus drivers who are too impatient with me.*

*Caring drivers would make journeys by public transport much easier for me'*

(Kristy)

This consequently leads to a need to hide the real source of their problems and substitute it for something more widely acceptable (such as a physical or sensory impairment):

*'I've either said - sorry I've got a really bad hand could you write that out for me, or I would pretend I'm very low sighted and ask them to point things out to me or take me there'*

(Deborah)

In the defence of transport staff, they are often unaware that the individual requesting information from them is dyslexic. Therefore, they will be unable to assist appropriately. However, even if awareness *does* exist, the participants feel that members of staff are enormously uninformed of how to assist them. Furthermore, they seem unprepared to accommodate their needs.

A further problem to emerge was a clear lack of route knowledge among bus drivers:

*'When you ask bus drivers for information, half of them say they don't know and they can't help you'*

(Lyn)

The absence of staff empathy and route knowledge can result in negative psychological effects for dyslexic people. This was particularly the case for the severely dyslexic participants of this study. If they are unable to obtain the information that they need, they will undoubtedly experience anxiety and embarrassment. Until greater awareness of dyslexia occurs, individuals such as the participants of this study will continue to be negatively received by transport staff and feel similarly about themselves.

It was clear that a relationship exists between empathetic and knowledgeable staff and journey completion for someone with dyslexia. It transpired that the way they are received by staff and the information they receive determines whether or not they continue with the journey. In order to help dyslexic people in particular, a 'here to help' philosophy needs to be re-instilled within the transport industry. Ground-level staff should have a more positive attitude towards disability awareness, particularly where people with a cognitive disability are concerned.

#### 6.5.1.6 Information On-Board

The difficulties dyslexic people experience with accessing and using travel information continue on-board public transport. Route information is particularly important to these individuals in order to feel mentally comfortable, and to ensure that they alight correctly. Figure 17 below highlights a typical scenario facing an individual once they have boarded a bus. A strong feeling amongst the participants was that, once on board (buses in particular), the information and assistance available is inadequate for them. This was appropriately highlighted by one of the online respondents:

*'There are not enough signs and pictures posted on trains and buses to tell you where each stop is and when yours will be, and the announcements are not very clear at all'*

(Morag)

**Figure 17. On-board (Bus)**



Misreading the name of the station is one of the most frequent effects of poorly accessible on-board information for a dyslexic traveller. They can easily alight at the wrong station or miss their destination as a result. The participants of the focus groups expressed a real anxiety associated with this. Getting back on track after a mistake has been made emerged as a significant worry. There is the fear of having to deal practically and emotionally with such a change and the implications this has upon their plans. Physically counting the number of stops between the origin and destination in order to alight correctly appears to be a common coping strategy for overcoming this problem at present.

Discussions also exposed that the participants often need to ask for information on board in light of the lack of information available to them, and the fact that existing information is inadequate. A problem will arise if nobody is available to provide assistance or if the person that they have become reliant upon either disembarks or forgets to provide the information. Consequently, the dyslexic traveller is left having to work out for themselves when to alight. In this situation, heightened levels of psychological unrest are experienced. This will undoubtedly affect a dyslexic's ability to process information and make effective decisions.

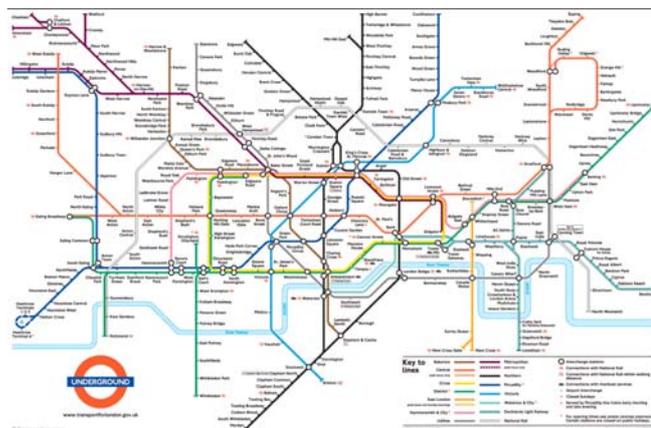
A prevalent feeling was that travel information providers do not take the needs of dyslexic people into account when deciding what types of information to provide on-board, and how to impart it. Although uncertainty during an unfamiliar journey is also known to heighten a non-dyslexic's anxiety, information providers need to understand that the effects of this situation (and the consequences resulting from situations going

wrong) are going to be felt more severely by dyslexic people. Therefore, for a dyslexic, accessible information on-board is crucial to anxiety management.

Although it emerged that on-board auditory-based information is preferred, it was clear across the focus groups and online fora that it is inconsistently applied and not always available. This issue seems to be particularly prominent within local transport provision. Auditory information should *always* be provided on-board, giving a person with additional needs in particular sufficient time to prepare for alighting. In addition, similarly to other auditory-based information, on-board announcements need to be loud and clear, and slow enough to be efficiently processed. At present, this is not always the case.

For dyslexic people, on-board information needs to support visual processing. Schematic route maps are felt to be a useful aid due to their visual nature and use of colour-coding to aid learning and wayfinding (see Figure 18 below for an example):

**Figure 18. A Schematic Map of the London Underground (Google Images, 2008)**



Although schematic-style route representations are already provided by a number of transport providers, they are not always available. On account of the usefulness and usability attached to them by dyslexic people, service providers should ensure that these types of information are available both pre-trip and on-board all of the services that they operate.

Further suggestions for improving information provision on-board included making pictures available pre-trip and availability of a short message alert service (SMS) with the option of receiving the information in an auditory format. For example:

- The number of stops between boarding and alighting;
- A 'countdown to the destination' (where the alert informs the traveller the number of stops before their destination);
- Being alerted when it is time to alight and key points to look out for;
- MMS pictures of destinations and landmarks.

It should be noted that any enhancements to on-board information provision will only be useful providing there is a match with: (1) the information available pre-trip and (2) the information available within context.

Now that the key difficulties experienced en-route by dyslexic public transport users have been discussed, the chapter now discusses car travel and the en-route experiences of dyslexic drivers.

#### 6.5.2 The En-route Experiences of Dyslexic Drivers

This study has previously highlighted a strong preference for car travel amongst dyslexic people (for those with access to it). The travel behaviour data gathered prior to the focus group sessions supports this (see Section 6.3). Although this is the case, it still emerged strongly that car travel provides major difficulties for dyslexic people. This view was supported by the online respondents

Of course, non-dyslexics can also be faced with difficulties during unfamiliar car journeys. However, the nature of dyslexia makes this task more difficult and the difficulties more persistent. As pointed out in the literature (Kirkby, 1995), driving is not an automatic skill for dyslexic people and difficulties arise from a combination of inaccessible driver information and the fundamental dyslexic traits which play a strong role in driving (most notably, information processing, motor skills, navigation, orientation and spatial awareness). As a consequence, it was unsurprising that the participants with traits directly related to driving either get lost or fear its occurrence on unfamiliar journeys. This leads to a preference to be accompanied by a non-dyslexic passenger (with the passenger taking on the role of navigator) or to be a passenger themselves. In the latter case, the driver has to be non-dyslexic *and* a confident navigator.

Several information media were exposed as particularly problematic to the dyslexic drivers participating in this study. These are discussed below.

#### 6.5.2.1 Following Text-Based Directions En-Route

Upon opening the discussion on car travel, the participants seemed quickly and naturally to lead into a conversation surrounding text-based car directions (particularly the directions produced by web-based journey planners). The online participants expressed similar sentiments on this subject, even though these individuals can quite clearly use the internet to communicate. The substantial amount of information that often has to be processed is exacerbated by the format of presentation, which leads to an inability to correctly and efficiently follow directions whilst driving. One quote from the focus groups is exemplary of the feelings across the rest of the participants of this study:

*'If I'm walking I can take my time and stop, read it and process it. But if I'm in the car and I've got to literally just look at it and work it out, it's just a nightmare'*

(Abbie)

The reasons for these difficulties are related to a number of issues associated with dyslexia. Reading speed and comprehension will prove crucial in correctly processing car directions en-route. However, dyslexic people do not necessarily possess these skills. Visual discomfort worsens the effects further. A strong relationship also exists between reading difficulties, short-term memory weaknesses and sequencing. This can affect the person's ability to correctly remember and sequence the directions.

#### *Web-Based Car Directions*

There was a strong feeling amongst the participants that web-generated car directions are too wordy and complicated for a dyslexic person to follow and remember en-route. Not only does the driver have to try and process the text in the correct order (text they already see as difficult to process), but they are simultaneously trying to orientate and navigate themselves. Long and complicated sentences are inherent within this style of information. This is obviously going to be

particularly problematic for a dyslexic person because the information extends beyond the important key words that they need as a result.

The recommendations made for processing car directions en-route demonstrated strong similarities to the suggestions made for the pre-journey stage discussed previously. However, the specific context dyslexics find themselves in en-route makes these recommendations even more important. Similarly to public transport, providers of highways information have an important role to play in ensuring that there is a good match between what the dyslexic is seeing en-route, the information available to them pre-trip and mental visualisations formed.

#### 6.5.2.2 Understanding Road Maps En-Route

It was apparent across the focus groups and online fora that schematic-style maps support dyslexic travellers. Yet the car users participating in this study have on a large number of occasions been in a situation where they were unable to understand and consequently use traditional road atlases and A to Z maps. It is suggested that the conflict between map styles is due to the fact that traditional road maps are quite different to schematic route maps and require more sophisticated phonological and visual processing skills. Short-term memory and sequencing difficulties also play a strong role in terms of piecing together the different stages of the journey and the information that has to be processed on traditional maps in order to achieve a complete journey view. The orientation and navigational weaknesses inherent of dyslexia exacerbate map processing difficulties. Someone with dyslexia will be unable to easily determine where they are at a given point in time and how to reach their destination:

*'You've got the road map, but is that place north or south of you?'*

(Stephen)

It is suggested that the difficulties experienced with road atlases and A to Z maps are an effect of complicated and inappropriate presentation. The aspects of map design which emerged as particularly relevant to someone with dyslexia include font size, colour contrasts, and the considerable amounts of text displayed simultaneously. However these are all a necessary part of map display.

A further issue occurs when routes continue onto another page of the map book. As a consequence, the journey cannot be completely visualised, which emerged as a method commonly used by dyslexic people as an aid to orientation and wayfinding. Although this cannot be avoided with map books, pull-out maps allow the driver more easily to view and visualise the journey in its entirety. For a dyslexic driver, this would negate the need to cross-reference across several pages.

Even though it was quite evident that dyslexic people struggle with maps, if the only choices available to the driver are maps or directions, it emerged that the former would be the preferred medium. It is suggested that even though there are still words to 'read' on a map, the terms used do not extend beyond key words. Furthermore, maps are more visual by nature than directions, which allow a dyslexic to engage their right-brain skills.

Highlighting key information (pre-trip) such as landmarks and towns was a common coping strategy to emerge across the sample in order to more easily process maps en-route. The very fact that this strategy is found to be useful creates an opportunity for map providers to consider the feasibility of utilising such approaches. It is suggested that online journey planning particularly lends itself to provide more personalised maps presented in greyscale with the route/key points highlighted.

A strong feeling amongst all of the participants is that, at present, maps fail to provide the visual detail that they need in order to support orientation and wayfinding difficulties:

*'Maps would be easier for me if I could see that the next thing I'm looking out for after the Red Lion pub is the Esso garage'*

(Deborah)

Tourist-style maps and Multimap emerged as enormously useful due to their visual nature (see Figures 19 a and b below for examples provided by the participants):

Figure 19a. An Example of a Tourist Information Map (Google Images)

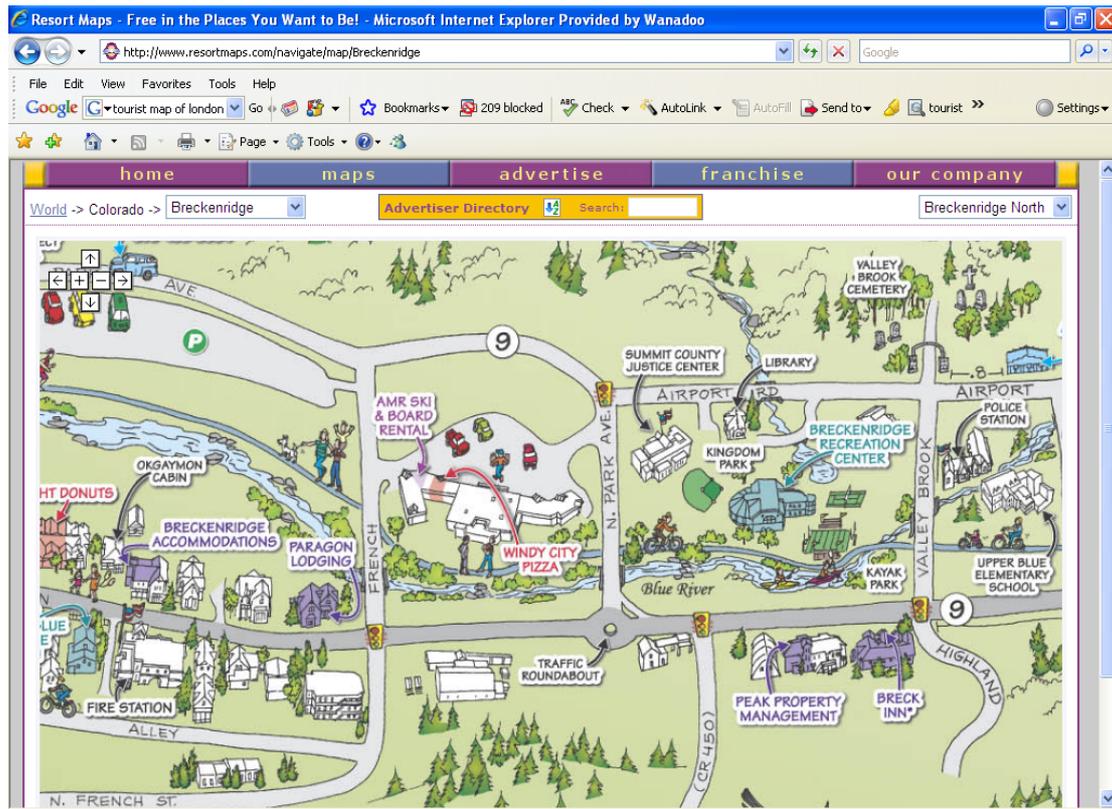
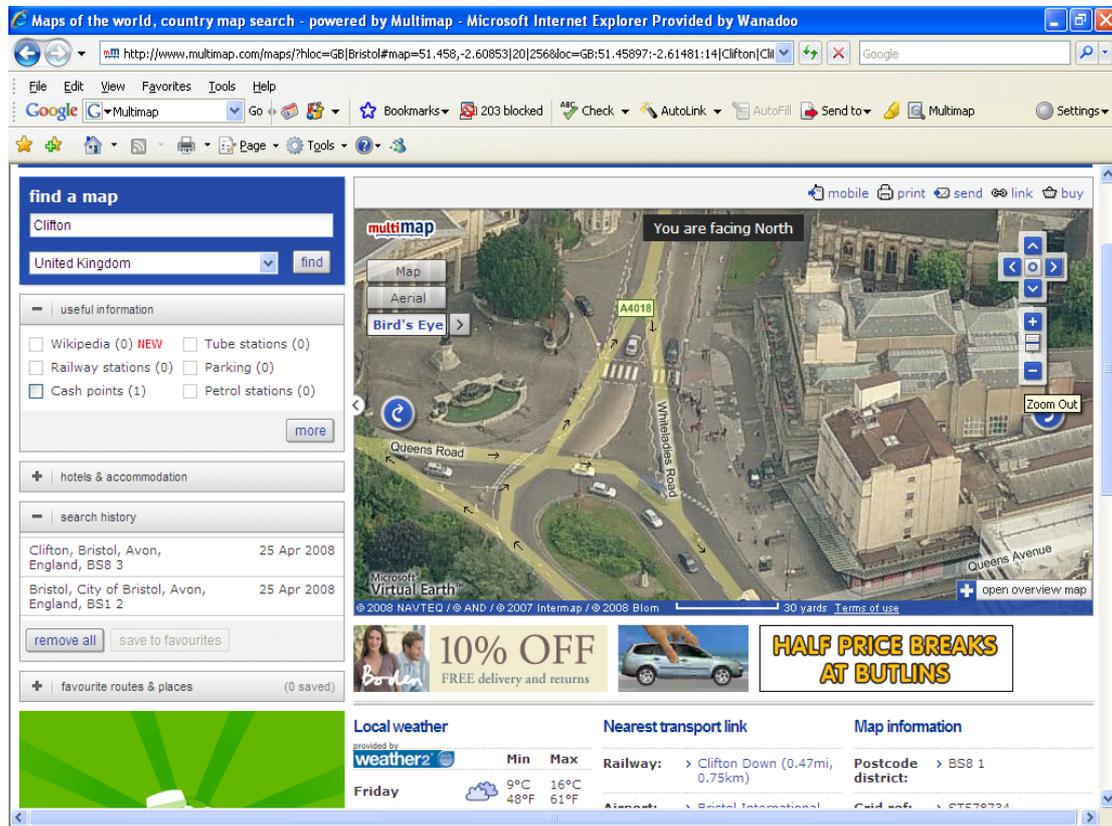


Figure 19b. Multimap



### 6.5.2.3 Following Road Signs

The focus group participants and online respondents highlighted a clear deficit with dyslexics in relation to processing the information displayed on road signs. Evidence from the literature supports this (Brachacki *et al*, 1995).

There was a strong feeling that the current design of road signs makes them difficult to process and subsequently follow, regardless of dyslexic traits and severity. This is a particularly significant issue within car travel for the reason that incorrect or inefficient decisions can have consequences of varying severities from incorrect decision-making to road traffic accidents.

The main issues for the participants concerned the substantial amounts of information the driver is expected to process simultaneously. Colour contrast can also make processing difficult because of its influence on readability. Dyslexics have to concentrate quite intensely in order to match the information on the sign with their mental notes or information that they have in front of them. Information can be easily missed or misinterpreted as a consequence:

*'I went to John Lewis' in High Wycombe. Coming back I ended up on the M1 because I had read the sign wrong. There was too much information on it for me to process all at once'*

(Deborah)

The online respondents expressed similar difficulties with road signs to the focus group participants, and for similar reasons. This provides further proof that this is a particular problem for dyslexic people:

*'Trying to figure out which way to go while you're driving is very difficult. Road signs don't help me because I mix up the numbers and misread the names'*

(Terry)

A further problem to surface relates to the number of road signs displayed concurrently. There is already a considerable amount of multitasking involved in processing a road sign whilst driving. Yet, for a dyslexic driver, selecting the correct information in good time to make the right decision is more difficult and time-

consuming when there are a number of signs to process. For that reason, a dyslexic driver will experience such obstacles to a more severe degree than someone without dyslexia.

There was a strong feeling that road sign providers are not aware that drivers with dyslexia require information as near to the door as possible for unfamiliar journeys. Providers expect drivers to inherently know when they are close to their destination and way-find without the aid of signage; signs seem to disappear. For someone with dyslexia, this makes navigation increasingly challenging. Anxiety, confusion and frustration surface, along with less confidence and security in the person's ability to reach their destination as planned. These emotions will have a knock-on effect upon the physical aspects of driving that dyslexics already find challenging. Although this situation can also be true of non-dyslexic drivers, signage this level of detail is necessary in order to aid symptom management for dyslexic people, also providing them with the confidence that they need to consider journey completion possible. Providing signage right-to-the-door is unfeasible due to the fact that each person's needs are individual. Therefore, alternative ways in which this situation can be addressed need to be uncovered.

Difficulties with road signs at roundabouts seem to be a common occurrence amongst the participants:

*'I can go around a roundabout 3 or 4 times and still not find what I'm looking for.*

*There is too much for me to take in all at once'*

(Stephen)

In addition to information processing, the multidimensional nature of the task that has to be performed at a roundabout will exacerbate the problems experienced. The driver has to manoeuvre the car, orientate themselves, deal with oncoming traffic and follow the rules of the Highway Code. Therefore, it is unsurprising that a dyslexic driver will find this an additionally challenging situation, particularly if their dyslexia is quite severe.

A particular point to emerge from the online participants surrounded the lengths that someone with dyslexia will go to in order to avoid places where a large number of signs require processing either simultaneously or in succession:

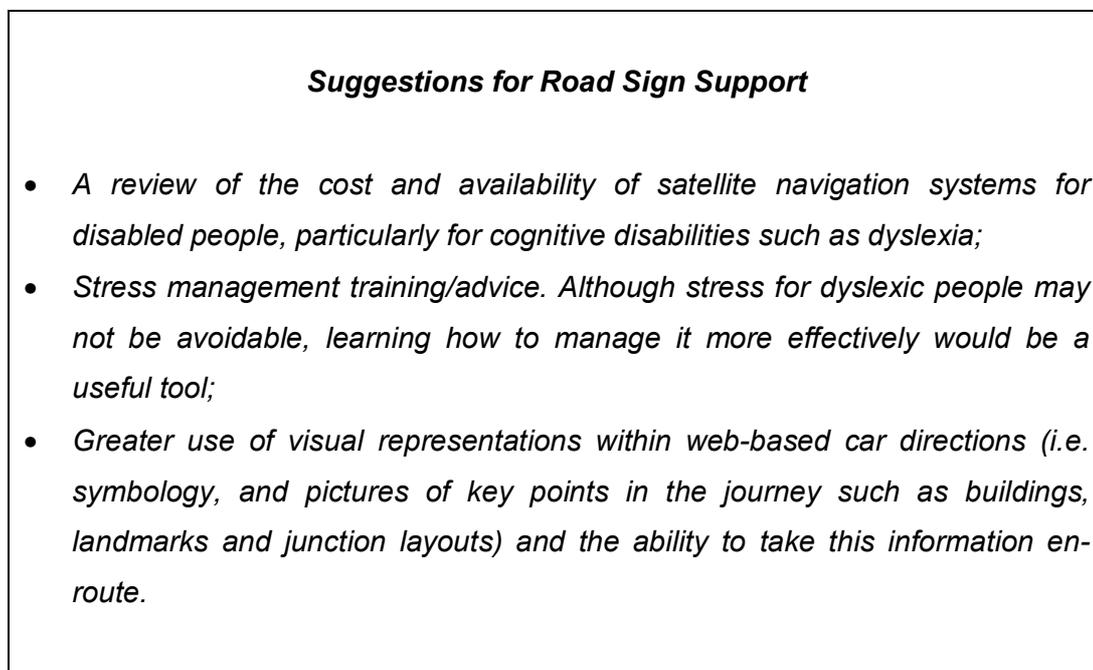
*'My doctor asked me what confuses me, and I said, driving with all the signs. I told him I would purposely not drive through certain areas because the signs are too busy'*

(Movie-Man)

Such avoidance strategies can have a number of implications. Alternative choices may be necessary in order to undertake the journey and reach the destination. This may involve a less efficient or effective route. The journey may be avoided altogether. Having to implement alternative plans or avoidance strategies angered a large number of the participants. They felt aggrieved that such tactics were necessary. They felt that better informational support should be available in order for them to continue with their plans as normal.

The following recommendations listed in Figure 20 below can be made in an attempt to support dyslexic drivers with the task of processing road signs en-route. As a result of the environmental, logistical and technological factors surrounding road sign design, recommendations for the redesign of road signs *per se* are not included. Suggestions centre on support.

**Figure 20. Suggestions for Road Sign Support**



#### 6.5.2.4 In-Car Satellite Navigation Systems

It was quite clear across the entire sample that in-car satellite navigation systems are an enormous help during unfamiliar journeys by car. These sentiments can be easily understood due to the above difficulties surrounding dyslexia and the way that traditional highways information is provided. The participants with the most severe cases of dyslexia even class these systems as essential to independent mobility. Without access to a satellite navigation system, unfamiliar journeys would have to be accompanied or may not be undertaken at all. Similarly to the human aspect to public transport information, it seems that for dyslexic drivers, satellite navigation systems are seen as a 'person looking after them', which consequently allows them to concentrate more closely on the physical driving task and managing the symptoms of their disability:

*'I purchased a road navigation system and it help tremendously! It 'points' which way to turn, talks, and turns the map so it is easy to follow'*

(Terry)

It became clear from the drivers who make use of this tool that they will almost certainly get lost without it. This is even more likely if the journey changes unexpectedly en-route. Similarly to public transport journeys that change en-route, if a dyslexic is forced to revert back to using more conventional forms of travel information, then they will in all probability experience problems. Mistakes and wrong-turnings are sure to occur.

Participants who do not have access to such tools at present (the reasons for which are unknown) perceive these systems to be enormously helpful. The reasons for the positive feelings towards satellite navigation systems stem from the way that the information is presented, and how it supports the dyslexic traits which make driving difficult. Dyslexics are 'visual navigators' and satellite navigation systems provide visual representations for the driver. Furthermore, written instructions are limited to key words only, which dyslexics are able to process and remember (see Figure 21 below for examples).

**Figure 21. Examples of In-Car Satellite Navigation Systems**



An audio facility is also available, which not only has the voice element, but the human touch as well:

*'The voice tells me where I'm going, and I can concentrate on driving'*

(Tina)

Although extremely beneficial to dyslexic people, satellite navigation systems are not necessarily the panacea. There are a wide variety of systems available, ranging from highly sophisticated to the 'cheap and cheerful'. Systems may prove too difficult for a dyslexic driver to use, or may not provide the individual with the most appropriate route. Cost is also a deciding factor, as is the advice received from the store supplying these systems. This places an importance on ensuring that a similar type of information is available pre-trip (such as via the Internet), and the ability to use this information en-route, either by means of a mobile device or print-outs created pre-trip.

### 6.5.3 Journeys That Change En-Route

Although it is widely acknowledged that non-dyslexics experience anxieties if their journey changes, most are not put off by continuing with the journey, providing information is available to help them. Inherent abilities to manage stress can also be drawn upon if required (providing the individual possesses such skills). However, this is not the case for dyslexic people. These individuals lack the spare capacity to deal with changes to circumstances, practically and emotionally. Anxiety impairs their ability to make the right decisions. Hence, these situations will affect someone with dyslexia more severely.

For the participants of this study, the possibility of dealing with unforeseen circumstances is seen as a huge barrier to undertaking unfamiliar journeys, particularly by unfamiliar modes of transport. A number of the participants stressed that they may even abandon the journey if the situation is deemed unmanageable. In these situations, up-to-date information on what is happening and what to do is crucial. For someone with dyslexia, this information is as much about obtaining mental comfort and reassurance as the information itself. However, it emerged strongly that information to help in such circumstances (particularly on public transport) is often unavailable or too difficult to use:

*'I travel by bus every day. I know exactly when I've got to press the button to get off. But once, the route changed. There was an extra bit added on, and I didn't know what to do. There was no information'*

(Lawrence)

There was a perceived usefulness attached to receiving up-to-date information on journey changes via mobile devices. Although this still means having to process alphanumeric information, the participants felt that this would lessen the need to access more conventional forms of information, which are already challenging even before circumstances change.

## 6.6 The End Leg Stage: Experiences of Dyslexic People

Figure 22 below highlights two common scenes facing a traveller at the end leg of a journey lifecycle:

**Figure 22. The End Leg Stage of a Journey Lifecycle**



The very nature of the end leg of a journey makes this stage highly challenging. Therefore it is unsurprising that, in general, little consideration is given to end legs of journeys. Taxis or lifts are cited as the most natural choice of end leg in access/egress from a bus, coach or train station. There is also a strong reliance on asking for directions at the station of arrival or en-route (Lyons, 2003).

The end leg of a journey will be especially difficult for someone with dyslexia. Information at the end leg is quite personal to the traveller and successfully completing this stage requires confidence and strong information processing skills. Dyslexic people do not necessarily possess these skills. The situation is exacerbated further by the fact that the information available (such as web-based directions and A to Z maps) is unsuitable for dyslexic people. Making mistakes caused by incorrect information processing is therefore a strong possibility for these individuals.

Dyslexic people exhibit similar behaviour to non-dyslexics at the end leg of a journey (getting a taxi or asking for directions). Yet the reasons for the behaviour demonstrated in dyslexics are directly related to their disability. Although asking for assistance is problematic and worrisome for someone with dyslexia, it is preferred to battling with traditional end leg information and the humiliation faced by getting lost or being late for an appointment. Nevertheless, these two methods are not without their challenges for dyslexic people. Auditory processing difficulties will make asking for

information and receiving it quite difficult (discussed previously). Furthermore, reaching the destination by taxi relies largely upon the traveller correctly relaying the information to the driver.

Orientation and wayfinding difficulties are not unique to the end leg of a journey. However, difficulties were frequently mentioned at this stage by both the focus group participants and online respondents because of the added complexities that the end leg creates for dyslexic people. Accordingly, the chapter now discusses this.

#### 6.6.1 Orientation, Spatial Awareness and Wayfinding at the End-Leg Stage

It was pointed out in the literature that efficient and effective wayfinding requires strong cognitive skills (Campbell and Lyons, 2008). Complex urban layouts, travelling and comprehension of directions make wayfinding in unfamiliar end leg locations difficult for most travellers. Mistakes such as missed or incorrect turnings caused by complex local transport systems and complicated street layouts can occur, and can be costly. Time is often wasted and the traveller runs the risk of missing appointments. With car travel in particular, the safety of the traveller and those around them could be at risk. For a person with dyslexia, scenarios such as this will be experienced more recurrently and severely because of their disability.

Dyslexia can cause a person to feel totally lost in space once they reach the end leg of the journey. The inherent difficulties associated with connectives frequently emerged as challenging in this respect:

*'As a dyslexic, I have a terrible time with left and right. Never give me directions telling me to turn left at a certain street. I have to have an object, something to look out for like a building etc, or I get totally lost; I will automatically turn in the wrong direction'*

(Joan)

An individual's psychological state provides one determinant of their ability to face and solve wayfinding problems at the end leg (Passini *et al*, 2000). Due to the fact that the physical symptoms of dyslexia affect (and are directly affected by) emotion, if the dyslexic is experiencing negative emotions on account of wayfinding difficulties, then this will have physical consequences for them:

*'I'm walking, and think oh I've got to turn right here, and all of a sudden because I'm stressed I'm actually turning left. Then you are completely going a different way'*

(Lyn)

The above discussion has considerable implications for both public and private information providers. A rethink of how end leg information is provided in order to assist and support dyslexic travellers is required in order for them to reach their destination more efficiently and effectively. This is also crucial to anxiety management, which is notably higher at this stage of the journey. In addition, staff training should be provided for members of staff dealing directly with providing end-leg directions to the public, particularly those designing written based directions and people providing them verbally.

Suggestions for the better support of dyslexic people at the end leg of a journey demonstrate similarities to those mentioned for other information media. The participants felt that information providers should embrace the visualisation skills of dyslexic people at this stage of the journey in particular. Figure 23 below provides some examples cited during the discussions:

**Figure 23. End-Leg Symbology**



Existing end-leg instructions also include a wide use of connectives and compass points to assist wayfinding. It has been highlighted a number of times the difficulties that dyslexic people possess in relation to these types of terms. If wayfinding information became more 'visual', this would negate the need for a dyslexic traveller to face the prospect of having to determine the difference between connectives in order to navigate themselves correctly. For example:

Turn to face



Turn to 9 o'clock



However, to ensure the success of this approach, information providers would have to firstly ensure that the person is facing the correct point initially, and that they are able to easily locate the key reference points used.

#### 6.6.2 End Leg Wayfinding and Personal Satellite Navigation Systems

Having access to a satellite navigation system has previously emerged as a useful aid to navigating the end-leg of a journey by car. This tool also transpired during discussions on reaching the destination by foot, i.e. access to end-leg information via a mobile phone or PDA. The following features inherent of such systems would be useful in support of the difficulties faced by dyslexic travellers at this stage of the journey:

- Complete location maps for travel by car, bike and foot;
- Maps available on DVD (in 2D or 3D);
- Clear and visual instructions;
- An audio facility;
- Programmed points of interest including landmarks, car parks and services;
- Real-time traffic alerts;
- Route recalculation and instant rerouting if circumstances change;
- Light-adjustable interface;
- Ability to store contact information.

This chapter has presented and discussed the findings from the empirical study forming the core to this thesis: a series of six focus groups and three online discussion fora. The chapter conclusion below reconsiders the key findings and the indications that they provide.

## **6.7 Summary and Conclusion**

Prior to this study, it was considered that dyslexic people will experience problems with a number of aspects of a journey lifecycle as a direct consequence of their disability; caused, exacerbated and/or ameliorated by the provision of travel information. The empirical research forming the core to this thesis has enabled this supposition to be confirmed. The findings are supported by, and are a compliment to, previous research undertaken within both the fields of transport and dyslexia (Brachacki *et al*, 1995; Kirkby, 1995; Trace, 2003; TTR, 2004b). The attitudes and aspirations of dyslexic people regarding travel information provision have been explored in considerable depth, along with the negative effects of personal travel upon dyslexia. By doing so, the following objectives have been achieved:

1. To identify the macro and micro problems facing dyslexic people when accessing travel information during a journey lifecycle.
2. To determine whether these problems are a consequence of poor provision of dyslexia-friendly information, the fundamental traits of dyslexia, or both.
3. To consider whether the problems are specific to dyslexia or have a far wider application to non-dyslexics, though perhaps felt more frequently and severely by dyslexic people.
4. To consider what interventions should be implemented by transport policymakers and service providers in order to address the needs of dyslexic people and assist them through the journey lifecycle.

The considerable number of negative journey experiences that have emerged from this study confirms that dyslexics experience great difficulty within environments that place intense demands on language and working memory. This occurs more frequently and severely within the context of travelling for the reason that rapid changes in the environment have to be correctly perceived, and information has to be processed at speed and under stressful time-constrained conditions. In addition, decision-making has greater implications and potential repercussions within such a context. This is perhaps more notable within car travel for the reason that the safety

and protection of the driver and those around them are potentially at risk if decisions are either inefficiently or incorrectly made.

Although the problems arising have application to someone without dyslexia, the problems will be felt more frequently, severely and differently by someone with dyslexia as a direct result of their cognitive makeup. Additionally, the inextricable link that exists between the physical symptoms of dyslexia and the emotional state of the individual will also make the situation more notable for a dyslexic person. Hence, it is concluded that the nature of dyslexia makes travelling more physically and emotionally demanding and the practical difficulties more persistent, and quite different to those experienced by non-dyslexics. The situation is exacerbated by a lack of information that is appropriate for dyslexic people.

The aspects of travel information provision and access which were highlighted in the literature as potentially problematic for dyslexics have been confirmed through this study. Similar issues emerged across the focus groups and online discussion fora, with similar needs and frustrations transpiring across age and gender. There is clearly a relationship between the media cited as problematic and the traits of the individuals discussing them, with the most severe dyslexics experiencing problems the most frequently and severely. In addition, the negative experiences of the participants have undoubtedly affected their perceptions of certain modes and their consequent travel behaviour, particularly where public transport is concerned.

By openly expressing their real anxieties and emotions clearly demonstrates how emotive this topic is to dyslexic people. An understandable need for access to detailed travel information is clearly the norm rather than an exception. Someone with dyslexia has a clear lack of trust in their own abilities and hence reassurance is essential, the amount of which strongly relating to dyslexic severity. However, the fact that information is often considered, at present, to be neither useful nor useable to dyslexic people means that it cannot be used efficiently or effectively by these individuals. In some cases, information cannot be accessed at all.

Both pre-trip and en-route, dyslexic people need to feel safe and secure in order to consider the journey possible and manage their psychological well-being, particularly if the individual is severely dyslexic. Thus, accessible information is crucial to symptom management and dealing with anxiety. It is this conclusion that led the author and focus group participants in collaboration to consider what interventions

might be implemented by transport policymakers and service providers in order to better assist dyslexic travellers through the journey lifecycle. Recommendations appeared at various appropriate stages of the chapter. As a government initiative, Transport Direct provides a particular opportunity to produce more positive journey experiences for dyslexic people, which could also have long-term benefits. Although improvements have been made to this service over the past few years (a number of which have occurred in light of this study), there are a large number of suggestions that have yet to be deliberated. Even though some of the recommendations fall outside the control of Transport Direct, they still remain the responsibility of the Department for Transport. Hence, they remain firmly within the recommendations of this thesis.

It appears, from this research, that the fundamental macro-level journey problems experienced by dyslexics and the micro-level design issues are comparable across modes. We can also be certain that there are differences as a direct result of context, but similarities as a consequence of dyslexia itself. It is this conclusion that led to the emergence of congruent suggestions for more dyslexic-friendly travel information provision across private and public transport modes. Although inclusive design has been considered by the government (see Oxley, 2002), this is clearly not an appropriate strategy for dyslexic people. As a result, these individuals make frequent mistakes and misjudgements, which they consider would be solved if their cognitive needs were addressed.

The participants discussed having to implement coping strategies in order to obtain the information and reassurance that they need to complete the journey lifecycle, independently or otherwise. What has become clear is that, irrespective of the strategy implemented, negative emotions are felt for the reason that coping mechanisms have to be considered at all. Additionally, such mechanisms are not always available and can cease to work in unforeseen circumstances. Consequently, the person is not always able to manage anxiety levels and cope independently, thus the effects of the impairment become disabling. The nature of the coping mechanisms employed lends themselves to being utilised by information providers in an attempt to support dyslexic travellers. Equally, the very fact that dyslexics often experience similar feelings to a foreign visitor should be noted. Therefore, the strategies implemented to cater for individuals where English is not their first language could be adopted by, and adapted to suit travel information provision in order to assist people with a cognitive weakness. What *is* unclear at this stage is

whether the availability of more dyslexic-friendly travel information would completely negate the need of someone with dyslexia to seek additional assistance in some form.

It was recognised in literature from across the academic, government and voluntary sectors that dyslexia is an acknowledged disability under the Disability Discrimination Act. However, dyslexics are slow to see the tangible breakdown of societal barriers in light of the invisible and misunderstood nature of this disability. Consequently they continue to feel discriminated against. Participants felt that they should not have to feel singled out as a special case in modern society. Consequently, their self-concept is exceptionally negative. The DDA only provides disabled people with legislative protection providing they fall within its definition of disability. Presumably, people with mild to moderate dyslexia will often fall outside the realms of disability protection, and will consequentially experience discrimination and exclusion in some way. This makes the non-legislative guidance for the better support of dyslexia provided in this thesis even more of an important consideration.

If implemented simultaneously, it is clear that recommendations for dyslexic-friendly improvements to travel information provision in the UK have substantial implications politically, financially and technologically. This leads to the suggestion that a phased implementation should be considered. Furthermore, if providing alternative formats of information for dyslexic travellers provides a more cost-effective solution than completely redesigning existing sources, then this should also be considered. Although this may be viewed by some dyslexic people as a form of unequal burden, it is more acceptable than a provider facing accusations of discrimination.

A further aim of the core stage of empirical research was to inform a further stage of investigation. So far the findings indicate that dyslexic people face a number of practical and emotional frustrations concerning travel information provision during a journey lifecycle and consequentially experience great difficulties whilst undertaking travel-related tasks. Yet the focus group method does not allow the researcher to capture and convey the experiences of dyslexic people within context and actually connect with the emotional and informational setting within which these individuals find themselves. As discussed in Chapter 5, an ethnographic approach provides an effective tool in obtaining such a perspective. Accordingly, the thesis now turns to discuss the findings of the travel ethnography study.

## **Chapter 7**

### **Travel Ethnography Study**

#### **7.1 Introduction**

The unique set of stories developed as part of the core stage of empirical research provide new insights into the nature of dyslexia and the effects of inaccessible travel information upon this disability. However (as explained in Chapter 5) the focus groups study did not allow the researcher to actually connect with the experiences of dyslexic travellers, or observe the emotional and informational setting within which these individuals find themselves. In order to achieve such a perspective, the researcher conducted a travel ethnography study. Chapter 5 discussed the ethnography study from a methodological perspective. This chapter presents the research findings.

The chapter progresses through two principal sections. Section 7.2 describes and explains the car journey ethnographies and Section 7.3 focuses on public transport. Both sections progress through the round-trip of a journey lifecycle from pre-trip to the return journey. The three journeys undertaken via each mode are discussed simultaneously in order to highlight the generic messages and key findings that emerged. As previously explained in Chapter 5, the researcher uses the first person passive to describe and explain her observations (i.e. 'I'). Although writing in the third person is customary within academic writing, the use of the first person is very effective when used to describe and explain the findings of ethnographic research (Laurier and Philo, 2003).

The focus groups study highlights that the experiences associated with inaccessible travel information are in fact also true of people without dyslexia. Yet, it is strongly suggested that the negative impact that challenging situations can have are more pronounced and felt more frequently and severely by dyslexic people because of their cognitive makeup. In addition, the inextricable link that exists between the physical symptoms of dyslexia and the emotional state of the individual will also make the experiences more physically and emotionally demanding and the practical difficulties more persistent. For those reasons, the chapter specifically draws out the greater significance of what is being experienced by (and the relevance of the

challenges to) someone with dyslexia. The personal experiences of the researcher during the study have been omitted for similar reasons.

Visual evidence is used where appropriate in order to enhance the reader's ability to sense and understand what is being experienced from a dyslexic perspective and gain an insight into their emotions (as far as is possible if the reader is non-dyslexic). The images used were captured en-route via a digital camera. Where images were not able to be captured during the journeys with the participants, appropriate alternatives were obtained via the Internet<sup>36</sup> and retrospective journeys undertaken by the researcher.

## **7.2 The Car Journey Lifecycle**

This section discusses the experiences observed during three car journey ethnographies involving two participants - Hugh (Participant A) and Denise (Participant B). Appendices 16 and 17 present the characteristics of these participants and the journeys involved.

Journey 1 formed the pilot study. Hugh volunteered to undertake this journey. The journey involved an unfamiliar long distance journey departing from Hugh's home. I (the researcher) joined him at Paddington station - Hugh's last familiar point of reference. The driving conditions were fine and dry, with a moderate flow of highway traffic. Hugh has driven for a number of years and drives an automatic car. In addition to the simplicity, comfort and ease that this type of vehicle provides, it has also been chosen because of his disability. Hugh demonstrates a strong preference for car travel, the main reason for which is the fact that he has access to an in-car satellite navigation system.

Car journeys 2 and 3 involved an identical origin and destination, but Hugh and Denise were free to choose the route taken in between (the route is discussed as part of the findings). The journey involved an unfamiliar long distance journey to a specific suburban postal code. Journey 2 was undertaken by Hugh. The driving conditions were fine and dry, and traffic flow was moderate overall. Journey 3 took place with Denise, starting later in the day than the previous. The weather was dry but overcast with a moderate flow of traffic. Similarly to Hugh (and for similar

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<sup>36</sup> (1) Google Images (2008) - <http://images.google.co.uk/imghp?hl=en&tab=wi> and (2) Wikipedia (2008) - <http://en.wikipedia.org/wiki>

reasons), Denise also drives an automatic car. Likewise, she relies heavily on an in-car satellite navigation system, and for similar reasons to Hugh.

The prospect of having to undertake an unfamiliar car journey without access to satellite navigation really concerned Hugh and Denise. Not only did they face the prospect of having to plan an unfamiliar journey, they would subsequently have to undertake it. Nevertheless, they both freely gave their informed consent to partake in the research.

It was felt that the fact both Hugh and Denise have a number of years of driving experience would not have an adverse effect on, or consequence for the results. Even though route unfamiliarity can also make unfamiliar journeys by car more difficult for non-dyslexic people, the driving task *per se* is unconscious and automatic once learned. However, this is not necessarily the case for dyslexic people (Kirkby, 1995). The cognitive processing abilities of these individuals are weak. In addition, although both Hugh and Denise have made use of satellite navigation systems for a number of years, the journey would not involve in-car satellite navigation. Hence, this coping strategy could not be used or relied upon.

## 7.2.1 Pre-trip Planning

### 7.2.1.1 Planning the Journey to a City Centre Parking Area (Journey 1)

Prior to departure, Hugh was asked how he had approached planning for the journey. He pointed out how stressful he had found the planning task because the information available to him is not dyslexic-friendly. He explained that he had planned to the end of the trunk stage using a road map and would proceed with the end-leg stage using signs and symbols associated with a city centre. His reasons for not making use of web-based journey planners and maps in preparation for the end-leg stage centred on the fact that, for him as dyslexic, it is easier to navigate to a city centre area using visual information and clues. Maps in particular are too intricate and detailed for him to use.

In an attempt to visualise the destination (Bath) in relation to his last familiar point of departure (the outskirts of London), Hugh referred to an overall map of the UK. From this, he was able to identify the general direction in which he had to travel. He had identified two possible junctions for the exit to Bath (Junctions 17 and 18). Junction

17 would ensure that the correct exit would not be missed. However, there seemed a greater number of local roads to navigate along this route. For him as a dyslexic, this route would have been considerably more physically and psychologically demanding, which often leads to the increased possibility of getting lost. Consequently, he chose Junction 18. Even though this option necessitated a longer journey, it did not worry him because the route would provide him with a less complicated route, and hence it would be less stressful. He explained that he would have to remain quite alert and prepare to exit well in advance in order to ensure that this junction was not missed. From the map he identified and took a mental note of key points in the journey which would aid wayfinding and reassure him that he was proceeding correctly towards the city centre (the Roman Baths and Bath Spa railway/bus station).

#### 7.2.1.2 Planning the Journey to a Specific Sub-Urban Address (Journeys 2 & 3)

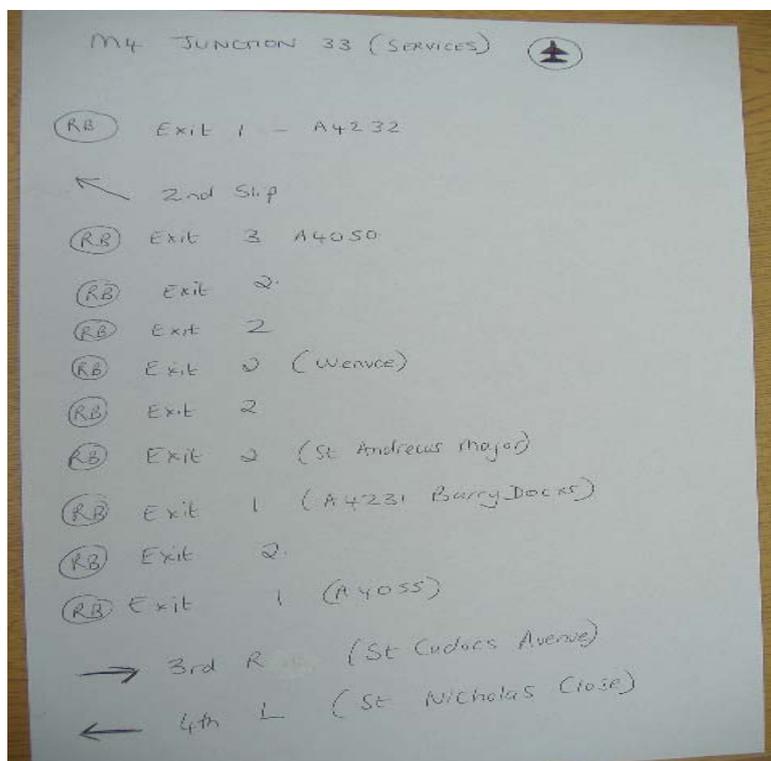
Hugh and Denise indicated that in the absence of satellite navigation, it was necessary to pre-plan this journey right-to-the-door. There would be so many local unfamiliar points to navigate, particularly at the end leg, and they both find this extremely challenging. If the journey can be prepared as much as possible pre-trip, then anxiety can be more easily managed en-route.

To plan for this journey, both Hugh and Denise primarily made use of web-based journey planning tools. Hugh had used the RAC website for reasons of familiarity. He had remembered the negativity surrounding Transport Direct from the focus groups, and hence was reluctant to create additional stress for himself by using this service. Denise *did* opt to use Transport Direct because she wanted to be able to provide its developers with valuable feedback regarding the usefulness and usability of the service. Unlike Hugh, Denise had planned the return journey in advance for the reason that she does not feel confident enough to simply reverse the journey and rely on remembering landmarks. She felt that the considerable number of roundabouts that would have to be followed would prove too challenging to navigate in this way and would prefer to be able to count the number of exits that she would need.

Even though both had opted for web-based journey planning, they still felt it necessary to personalise the information further so that it was more personal and easy to refer to. Hugh highlighted key information on his directions, particularly when a road number change occurred. Whereas Denise created a new list of directions (see Figure 24 below). Hugh describes himself as possessing weak organisational

skills. Thus, he is unable to leave adequate time in order to personalise his directions to a similar degree.

**Figure 24. Journey plans created by Denise (Participant B)**



In addition, the information generated via the Internet had failed to provide the local level focal points that they need in order to complete the end-leg stage. Consequently, additional information was obtained by contacting a person at the destination. By doing so, Hugh and Denise had deduced that Cardiff Airport and Barry Island beach were close to the destination. They subsequently noted these key points on their travel directions.

In relation to planning for unexpected journey changes, it emerged that coping mechanisms are put in place in order to ensure that the destination can be reached. Even when there is access to a satellite navigation system, contact telephone numbers are saved to a mobile phone in case of emergency (particularly the telephone number for the RAC, a friend/family member and person at the destination). It emerged that both Hugh and Denise rely heavily upon such an approach in order to manage the anxiety felt at the prospect of the journey changing or their satellite navigation system failing them. This also provides them with a necessary human point of contact and reassurance.

### 7.2.2 The Local Familiar Leg

For both Hugh and Denise, the initial leg out of London was quite familiar. Both live and travel daily in and around the area by car. Hence, this stage of a car journey poses very little problem for them and anxiety levels are reasonably low. Although the issues that affect them at this stage of the journey (such as congestion, motorcyclists, and the inconsideration of fellow road users) are not dyslexic-specific and do not negatively affect information processing, these circumstances *do* create heightened levels of tension. This may cause information processing difficulties further into the journey when circumstances are less familiar.

### 7.2.3 The Unfamiliar Trunk Leg

The unfamiliar trunk stage of journeys 1 and 3 commenced and progressed satisfactorily. Hugh and Denise explained to me that this was primarily because there were no uncertainties, and congestion was minimal. Hence, anxiety levels were relatively low. However, this was not the case for journey 2 - congestion appeared at Junction 12 of the M4. There appeared to be no information available, electronic or otherwise. This clearly caused Hugh frustration, and he became quite apprehensive. A number of thoughts arose for him:

- Where is the information to tell me what's going on?
- How am I going to deal with this situation without getting too stressed?
- If I get diverted, how am I going to cope?
- I'm going to get lost!

Half an hour passed, full of continued uncertainty. A 'Men at Work' sign appeared. Hugh automatically assumed that road works were the cause of the congestion. This eased his anxiety considerably. However, upon passing the road works, the congestion failed to clear. He became uneasy again as to the nature of the continuing delay. He pointed out that although he was unable to change the situation, he was frustrated at the lack of information enabling him to manage his anxiety. A further thirty minutes passed, with no information, or any sign that the situation was improving.

Obtaining information was becoming a matter of urgency. He could feel his stress levels increasing, and he was concerned that his dyslexic symptoms were deteriorating. This was undoubtedly impacting upon his ability to deal with the situation. At this point, he felt it necessary to telephone the RAC Traffic Line. Upon doing so, it emerged that an 'incident' had occurred just past Junction 13. This junction was now closed with a diversion in operation. At the very least, he now knew the nature of the delay. However, the prospect of a diverted route led him to feel uneasy. If the right information was unavailable during the diversion, then making a mistake and getting lost would be a strong possibility. This was preventing him from being able to manage his anxiety.

Upon exiting the motorway, the situation quickly became confusing. Although a diversion sign had been displayed, it was unclear to which direction it was referring to. He was faced with 2 directions in which to go as a consequence (see Figure 25 below):

**Figure 25. 'Diversion Confusion'**



The RAC traffic line did not mention that he would be diverted to Winchester. Therefore, he decided to follow the A4 to Newbury. He felt that this was a risky decision to make. As a dyslexic, he would need more time if he were to assess the situation more fully. Yet there was very little time available for him to think about such intricacies. Furthermore, the sophisticated level of thinking that this requires is not readily available to him. He assumed that the continued high levels of congestion that he was experiencing related to the diversion, but an element of doubt remained for the reason that he was not entirely sure of the actions he had taken. He explained that he could feel his anxieties intensifying.

The traffic was not moving, a consequence of the sheer volume. He took advantage of this and reluctantly took out a road map in an attempt to provide himself with some reassurance that he had made the right decision. It took him some time, but realised that he had taken the wrong route. He needed the A34 *before* the A4. He felt

embarrassed and irritated at what had happened and his failure to realise that he was incorrect. He concluded that he must have missed the right information on the RAC report. An hour had passed and it was already late in the afternoon. He was now facing the prospect of undertaking the end leg and return journey in darkness, which he explained made him feel really worried because it exacerbates the challenges that he already experiences.

During the diverted stage of the journey, signs and motorway symbols regularly appeared which served to reassure him that he was proceeding correctly. As a dyslexic, he will always look for something like this in order to reassure him in times of uncertainty. It allows him to more easily deal with the situation and manage the stress that he is experiencing, which makes the physical symptoms associated with his disability more manageable.

From this stage of the journey, it was clear that unfamiliar time-constrained situations present themselves with far more superior challenges to someone with dyslexia. It was clear that efficiently perceiving rapid changes in the environment was really challenging for Hugh, particularly on journey 2 (such as responding to unfamiliar road signs and situations). An unexpected situation added to the complexity of the journey and made him feel considerably more tense as a result.

#### 7.2.3.1 Approaching the End Leg

On the approach to the end leg of journey 1, Hugh moved into the left hand lane of the motorway about half a mile in advance of Junction 18. He wanted to be ready to exit in good time. Although the blue motorway sign reassured him that it would soon be time to exit, he did question himself –‘Is this Junction 18? Did I read the sign correctly? Is the sign really saying Junction 18?’ He explained to me that the numbers often jump around, which causes confusion. On journey 2, his anxiety levels also increased, even more considerably than for journey 1 because of the intricate route information that he had to follow. The airport symbol on the road sign provided him with reassurance to exit (see Figure 26a):

**Figure 26a. 'Preparing to Exit Junction 33 of the M4' (Journey 2)**



Denise's approach to preparing for the end leg stage (journey 3) involved both similarities and differences to Hugh. She did not pull in as early as Hugh, but her anxiety levels were rising and did question her numerical processing abilities. She also knew that she needed to look out for Services located at the junction (See Figure 26b):

**Figure 26b. 'Preparing to Exit Junction 33 of the M4' (Journey 3)**



Similarly to Hugh, Denise explained to me that her anxiety levels were starting to rise at the possible prospect of getting lost from this point on. Congestion levels were rising, which heightened her emotions further. She felt embarrassed and conscious that her emotional state was becoming obvious to me, and other drivers. However, she reassured herself that she had the best possible directions in order to reach the destination.

#### 7.2.4 The End Leg

##### 7.2.4.1 Journey 1

Upon exiting the motorway, there were no 'City Centre' signs available. With uncertainty, Hugh decided that he would follow the signs for Bath, until such time as signs for the city centre appeared. He would also look out for information regarding the visual landmarks that he had identified pre-trip (the Roman Baths and Bath Spa railway station).

The road signs contained considerable amounts of information. Hugh described to me how this causes the place names and road numbers to blend together, with the sequences of letters and numbers becoming disarranged at times. Furthermore, trees frequently obscured the signs. This made information processing and decision-making additionally challenging and inefficient. It was clear that this was causing his anxiety levels to increase rapidly, and the journey was becoming increasingly unfamiliar. He needed visual clues in order to determine whether he was close to the city centre, i.e. signs for the Roman Baths and the railway/bus station identified pre-trip. He felt almost certain that this strategy would lead him into the city centre. Yet at times these signs were unavailable. His stress was clearly obvious – 'Where are my beacons?' He explained that for journeys into a city centre he has to rely heavily on road signs in order to determine when the destination has been reached. This is not an ideal method of wayfinding for him as someone with dyslexia because of the effects this media has upon abilities, especially if the signs are not particularly visual.

Upon reaching Bath Spa railway station Hugh felt certain that he had now reached the city centre and proceeded to identify a suitable car park. He pointed out how stressful he finds this task. He often loses his car because dyslexia makes relocating the car difficult. Accordingly, visual reminders are an important coping mechanism for him. He came across the main bus station and decided to park in the multi-storey car

park located next to it. This was for the reason that he could use this as the point of reference for relocating his car later on. Upon identifying a parking space (located near another point of reference), he proceeded to purchase a ticket. He looked confused and agitated. Upon asking the reason for this, it emerged that he had misread the tariff chart and paid in excess for parking.

#### 7.2.4.2 Journeys 2 and 3

The end leg of Journey 2 did not proceed smoothly. Hugh could not remember what he had to do first, so he had to pull over into a lay-by to double check. As he proceeded again, he approached an exit – ‘Is this my exit already?’ He missed the turning, thinking that his exit was further along the road. He could not remember seeing an airport symbol or the road number that he would need. Both were displayed, but there was too much going on simultaneously. He exited and turned back, very irritated and embarrassed at his misjudgement. Fatigue was also evident at this point.

He soon became unsure again. To me, it seemed that no matter how many times Hugh read his instructions, he was unable to remember the information. He was looking out for the A4055, thinking that he was further into his directions than he actually was. When he could not see this road number on the sign, he panicked. He decided to pull into a Retail Park to double check. Again he had made the wrong assumption. He would in fact need the A4050 first.

As he proceeded along the A4050, he explained that the web-based information overshadowed what he really needed to look out for (for example the Pizza Hut, Premier Travel Inn, MacDonald’s). There was so much irrelevant information that he had to try and eliminate, which he could do without at this stage. He also mentioned to me that by instructing him to turn left onto Port Road, the web-based directions were useless because there were no road signs available matching this information.

As he approached the end of the A4050, he made me aware of the anxiety that he was experiencing. He did not want to make a mistake, particularly being so far into an unfamiliar area. The traffic was moving fast around him and he did not want to hold anyone up. Yet there seemed to be a mismatch between his written directions and the mental notes that he had made. He was expecting to see the airport by now. At the roundabout, he took the first exit, which happened to be the road that he

needed. It emerged that he had misinterpreted the sign, thinking that he still needed the A4050, which the sign was directing him to the left. The airport symbol directed him the same way. If he had managed to process the sign correctly, he would have noticed that this was not the case (see Figure 27 below). No issues arose at this point in the journey for Denise (journey 3). She counted the number of exits that she required, which enabled her to progress correctly. Her own written style directions had proved successful, whereas the strategy employed by Hugh had caused him to experience uncertainty (and anxiety as a consequence).

**Figure 27. 'Approaching the End of the A4050'**



As Hugh proceeded along the A4231, he felt very uneasy. He was unsure that had made the right decision at the last roundabout. However, there was nowhere for him to pull in and double-check. He was constantly looking out for a sign or landmark in order to reassure himself. It was not until he reached the end of the road and saw a sign for his destination (Dinas Powys) that he felt reassured (see Figure 28 below). He failed to remember that he had previously identified that he would need the A4055 at a later stage. Although he was only able to match the beginning and end of the phrase with his written information, he felt sure that he should follow this road:

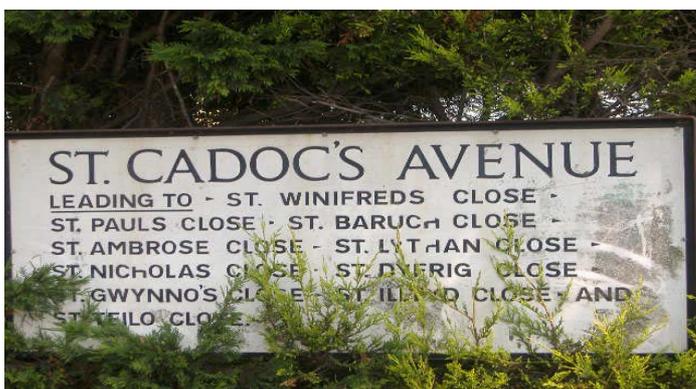
**Figure 28. 'Entering Dinas Powys'**



The RAC directions failed to inform Hugh of the number of turnings that were required in order to reach St Cadoc's Avenue. All he knew was that it would be located to his right. He missed the turning as a consequence of a connective difficulty. In contrast, the directions provided by Transport Direct informed Denise that she would need the 3<sup>rd</sup> right. She carefully counted 3 turnings before exiting, certain that this was St Cadoc's Avenue.

The sign for St Cadoc's Avenue lists the streets located within it (see Figure 29 below). In an attempt to identify the destination street (St Nicholas Close) and the number of turnings that he would need, Hugh stopped to observe the sign. He also wanted to determine whether the sign contained a logical ordering so that he could visualise the location of his destination in relation to the streets surrounding it:

**Figure 29. 'Entering St Cadoc's Avenue'**



In spite of that need, the information proved too small and cluttered to process. Therefore, in order to locate the destination, it was necessary for him to virtually stop at each street to correctly match the street sign with his instructions. Although all of the street names started and ended similarly ('St – Avenue'), he had established that no other street contained a middle section starting with the letter 'N'. He felt comfortable using this strategy to identify the destination. This was not necessary for Denise. She knew from her instructions that St Nicholas Close would be the 4<sup>th</sup> street on the left, and for that reason she counted the number of streets in order to determine that she had reached the destination.

### 7.2.5 The Return Leg

The return leg of each journey commenced after a 'comfort break', the length of which was determined by each participant.

Immediately after exiting the car park on journey 1, Hugh was looking for a blue sign that would navigate him to the motorway. However, the only signs that appeared at this stage were for local attractions. In addition, the fact that he was operating within a one-way system meant that he would not have access to all of the visual clues that he had noticed previously. Mistakes are not easy to rectify on this type of road system, especially for someone with a cognitive disability. This was clearly making him feel uncomfortable.

A bus caught his eye, so he decided to follow it for the reason that it was coming *from* the direction of the bus station. He assumed this meant it was travelling *out* of the city centre. However, the bus soon proceeded along a route accessible only to buses, which meant that Hugh had to proceed alone. He was almost certain that following the bus would be the right thing to do. The fact that his plan was unsuccessful caused him to feel angry at himself for relying on one strategy.

At times he was really uncertain which way he should go, and was often in a situation where there were cars right behind him. This meant that he was unable to stop to process the road signs and assess the situation calmly, and he often had to act incredibly quickly.

Once symbols appeared for the motorway, he felt relieved and reassured that he would soon reach a familiar point in the journey. He subsequently came across

familiar landmarks from the outbound journey, which reassured him that the journey was progressing to plan. He recalled Morrisons supermarket and Kwik Fit. He pointed out to me that he had also used a jingle in order to help him remember this – ‘you can’t get better than a Kwik Fit fitter’. Key landmarks and motorway symbols were also used on the return to the motorway for journey 2, and similarly by Denise on journey 3 (see Figures 30 and 31 below):

**Figure 30. ‘The Unfamiliar Return Leg – Journey 2’**



**Figure 31. ‘The Unfamiliar Return Leg - Journey 3’**



This chapter will now describe and explain the experiences observed during the three public transport journey ethnographies. The first journey involved Mary (Participant C). The second journey involved Hugh (Participant A), with the final journey undertaken by Donald (Participant D). The characteristics of the participants and the journeys undertaken can be found in Appendices 16 and 17.

### **7.3 The Public Transport Journey Lifecycle**

#### **7.3.1 Pre-trip Planning**

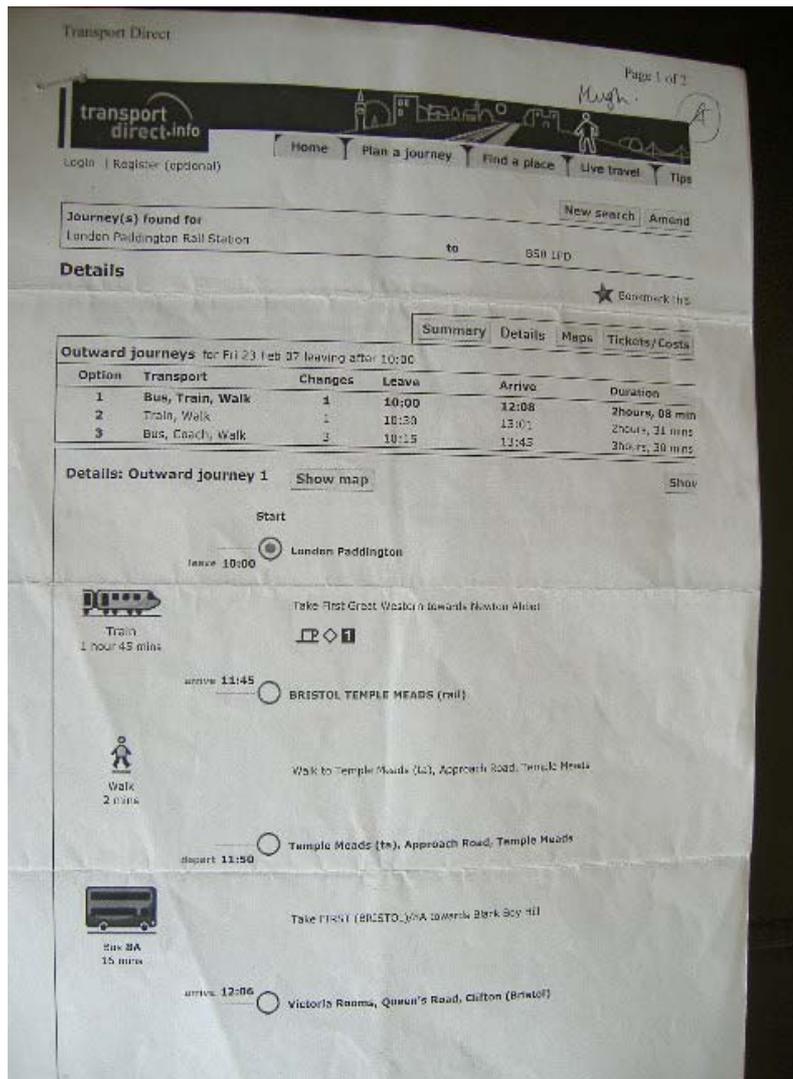
Similarly to the car journey ethnographies, Hugh, Mary and Donald all expressed real concern at making a mistake that would have a detrimental effect upon them en-route. As a consequence, pre-trip planning was essential. Telephone and web-based tools emerged as the basis of pre-trip planning for all three participants, all demonstrating a strong negativity towards paper-based media available pre-trip. Hugh felt confident enough to plan the journey himself. However, the journey by Mary was planned on her behalf. As someone with dyslexia, she finds the task of pre-trip journey planning very confusing and too challenging to undertake herself.

Similarly to Mary, Donald designates a friend or colleague to the task of pre-trip planning if possible, and for similar reasons. However, for this journey, it emerged that he was unable to organise someone to do this for him in time. He decided to use the Traveline telephone service rather than the Internet. He finds the former medium particularly useful for the reason that he can learn how to pronounce the place names, just in case he needs this information en-route.

Hugh, Mary and Donald accumulated similar information pre-trip:

- A printout of my email confirming the details of the journey (an example of the email is not provided in order to protect the identity of the participants).
- A paper-based map of the London underground, just in case the local leg of the journey changed and they needed to find an alternative route.
- A public transport timeline produced by Transport Direct (see Figure 32 below):

Figure 32. Public Transport Timeline Provided by Transport Direct



- An end-leg map. Hugh and Mary obtained their maps from Transport Direct. Both explained to me that by using the same website to obtain all of the information meant that they would not have to repeat the data input stage. Donald acquired his map via Multimap because it uses a more visual style (see Figures 33a and b below):

Figure 33a. End-Leg Map – Transport Direct

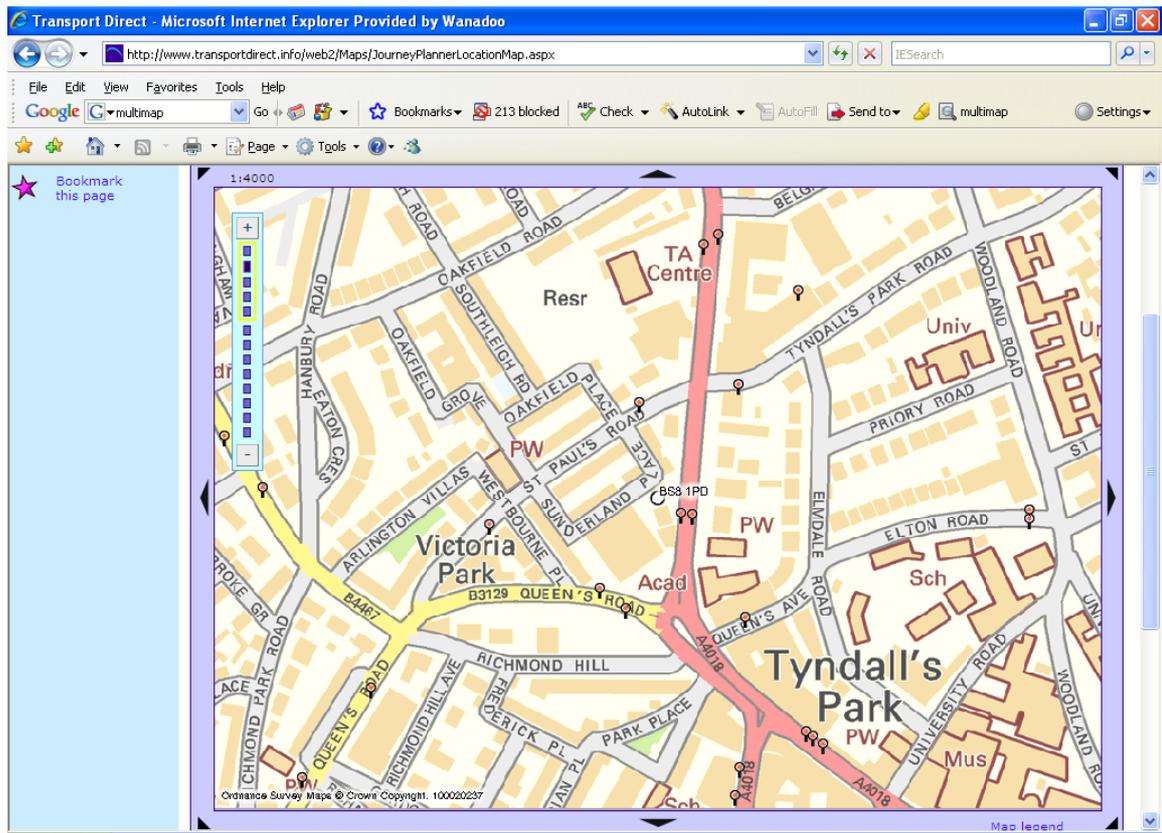


Figure 33b. End-Leg Map – Multimap

Map of BS8 1PD, United Kingdom - powered by Multimap - Microsoft Internet Explorer Provided by Wanadoo

http://www.multimap.com/maps/?hloc=GB|BS8%201PD#map=51.46387,-2.60923|16|48loc=GB:51.45883;-2.60923:16|BS8

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- Hand written copies of journey information (see Figure 34 below for an example provided by Mary):

**Figure 34. Hand-Written Instructions**



- For ease of processing, the person making journey plans for Donald commonly produces a Microsoft Word document for him (see Figure 35 below):

**Figure 35 A Personal Travel Plan – Donald (Participant D)**

<b>Meeting:</b>
<b>Venue Address:</b>
<b>Date:</b>
<b>Time:</b>

Date	Travel From	Travel To	Mode	Check-In Time	Depart Time	Arrive Time	Venue
------	-------------	-----------	------	---------------	-------------	-------------	-------

<b>Taxi Contacts:</b>
-----------------------

Donald provided me with a number of additional questions before the journey, quite specific to his needs as a dyslexic:

- At what times are the journeys direct (he only travels on direct services if at all possible)?
- How many stops are there between Paddington and Temple Meads and how long is the journey (this allows him to count the number of stops and an estimated time of arrival)?
- How frequent are the services (if he is running late or circumstances change, he will be aware when to expect the next service)?

### 7.3.2 The Local Familiar Leg

Hugh, Mary and Donald all travelled to Paddington train station via the London Underground. The 'First' Information Desk provided the meeting point for all of the journeys. Not only did this provide a familiar point of reference, but it would also allow the participants to easily obtain assistance if difficulties arose.

Mary arrived on time, but appeared tense. She explained to me that she had boarded the wrong underground train at Victoria, and unless she had built in a certain amount of additional time she would have certainly been late. She claimed that boarding the wrong train is a regular occurrence for her where unfamiliar routes and services are concerned. Although colour coding supports her information processing weaknesses, she often misreads the text-based information; her psychological and mental state directly impacting upon her cognitive abilities. In situations such as these, she fears being conspicuous. Even though her difficulties seemed to go unnoticed by the other passengers on this occasion, she still felt quite embarrassed. Wayfinding underground exacerbates her difficulties as someone with dyslexia. Connective terms are difficult enough for her to comprehend whilst travelling overground, but when travelling via the underground, it is even more challenging for her to visualise where she is. Even by looking at the map, she is often unable to determine in which direction to travel. To her there are so many exits to navigate, and people rushing to catch a connection. She explained that the more anxious she becomes, the more mistakes she seems to make.

On journey 2, it came to light that Hugh had left his journey plans at home. He could not contemplate undertaking the journey without the information, so he consequently went home to collect them, which made him late to meet me. The frustration this caused him was quite clear, blaming himself for having a 'dyslexic day'. Donald arrived fifteen minutes late (journey 3). He explained that this is often the case for him, a direct consequence of his disability. When he arrived, he appeared anxious, a combination of his late arrival and the prospect of the task ahead.

### 7.3.3 The Unfamiliar Trunk Leg

Figure 36 below illustrates the common scene facing Hugh, Mary and Donald upon their arrival at Paddington train station:

**Figure 36. 'Arriving at Paddington Train Station'**



There were people waiting patiently to depart, either embraced in conversation with others or engrossed in their own world. Other people appeared to be frantically seeking information or moving speedily towards their train. These surroundings can make it difficult for anyone trying to locate members of staff or hear announcements being made. Yet Hugh, Mary and Donald explained that dyslexia makes these tasks considerably more challenging.

Donald approached the ticket desk reluctantly and apprehensively. For him, the fact that there was only a short period of time in which to purchase his tickets exacerbated his anxieties. There was a lengthy queue, which meant that missing the train became even more of a possibility. He has additional needs for long distance journeys, which makes the purchasing process longer. He explained that he requires

an open ticket to prevent being time-constrained, and to be located in First Class to prevent being exposed to 'economy-style' noise and overcrowding. He also prefers a front-facing aisle seat for orientation purposes, and in order to prepare for alighting in good time. The next available train would involve interchanges. He became agitated, and his unease was clearly visible. He wanted to avoid interchanges at all costs. His ability to reassure himself was diminishing, and his fears for the worst were escalating. Luckily, he had pre-established which platform he would need, just in case this situation *did* arise. He explained to me that the information staff were busy, so he had to establish the platform number for himself via the departure board. As he scanned the information for the train, he felt confused, and almost sure that he was misreading the information. This was similarly the case for Hugh and Mary (see Figure 37 below):

**Figure 37. 'Obtaining the Information for Departure to Bristol Temple Meads'**



Hugh, Mary and Donald explained to me that the word 'Bristol' was used as a prompt to locating the information for Temple Meads. A discussion arose as to what would have happened if Bristol Temple Meads and Bristol Parkway had both appeared simultaneously. All stated that they would have sought assistance in that situation because making the wrong decision would have been a strong possibility, and they wanted to avoid that at all costs.

Once on board the train, it was noticeable that Hugh, Mary and Donald seated themselves near to the route information located on the window (see Figure 38 below):

**Figure 38. 'The Route – London Paddington to Bristol Temple Meads'**



During journey 1, I caught Mary frequently looking over her shoulder at the route information on the window. She explained that there appeared to be no information ahead of her, but she needed constant reassurance as to where she was in relation to her destination. She pointed out that she felt embarrassed that looking over her shoulder was necessary, and wished that she was able to refer to the information more inconspicuously (it emerged previously in Section 7.3.2 that Mary feels uncomfortable if discretion is not possible).

All three seemed to listen intently when audio announcements were provided. This information was not only welcomed and reassuring, but was relied upon at key points in the journey. However, the announcements sometimes lacked pace and clarity, and a physical presence from the train manager was not always available. Unsurprisingly, this caused apprehension and an air of uncertainty – 'where am I?' was a phrase often heard.

Bristol Temple Meads would be the next stop after Bath Spa. As soon as the train departed from Bath, Hugh, Mary and Donald were making preparations to alight, gathering up their belongings, ensuring that they had easy access to their travel plans. They all appeared nervous and explained that their tension levels were rapidly increasing. Bristol Temple Meads station appeared to be busy, and at first glance no members of staff were visible.

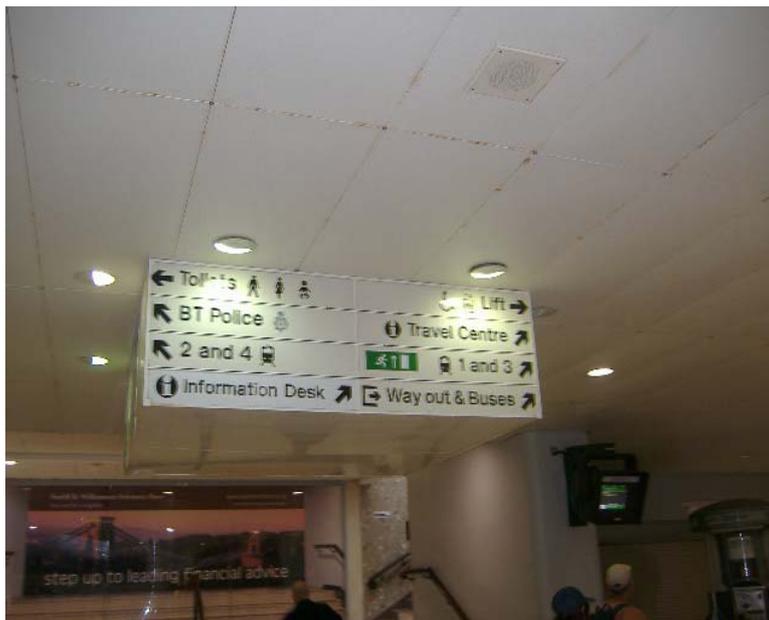
### 7.3.4 The End Leg

Mary and Hugh had chosen to complete the end leg journey by bus. In contrast, Donald had chosen to travel by train. Donald shows a particular dislike to travelling by bus because of the lack of audio-based information provision, unfriendly bus drivers, and the lack of available leg room (he is over 6ft in height).

#### 7.3.4.1 The End Leg Journey by Bus

Mary and Hugh would need to exit Temple Meads station in order to catch the bus connection (local bus services are available a short walking distance from the station). Following the exit arrows seemed unproblematic at first, until one of the arrows appeared in a diagonal fashion, which caused confusion for both of them as to the correct direction in which to proceed (see Figure 39 below for an example):

**Figure 39. 'Exiting Bristol Temple Meads Station'**



Determining which way to go from the choices available was not an easy task. Mary and Hugh both explained that dyslexia was impacting upon their ability to make a decision. Mary proceeded incorrectly, and was confronted with a dead end. Clearly she had made the wrong decision, for which she held dyslexia accountable. She returned to her last point of reference, at which time she realised the mistake that she had made.

Outside Temple Meads station, it was bustling with activity – some people were dashing for buses, whilst others queued for a taxi. Some were stationary and yet to make a decision. Buses were visible in the distance. Panic set in for Mary – ‘which bus stop do I need, and will I get it right?’

Upon referring to their instructions, they deduced that they had to walk to bus stop ‘TA’. Yet, the meaning of this was unknown to both of them – ‘was this information important?’ They both felt strongly that information sources should clarify the meaning of such codes, for the reason that it may become crucial to them further into the journey. Mary had an issue with the bus service that she would need in order to reach Victoria Rooms (the 8A). She had read it on her instructions (provided by Transport Direct) as ‘SA’, which confused her. It was only based on experience that she knew buses were not coded in that way. She explained that information needs to be clear to prevent someone with dyslexia being presented with such confusion.

As Hugh and Mary each walked towards the bus stops, they seemed to be searching tentatively for 8A. The visual difficulties that they routinely experience caused them to experience considerable difficulty ascertaining the correct bus stop - a task that *should* be relatively straightforward. Hugh explained that the numbers were placed too closely together on the sign to process easily. Rather than interpreting each bus service separately (as 8, 8A, 9 and 9A), he interpreted them as ‘88A’ and ‘99A’. The fact that the numbers were displayed horizontally exacerbated the challenges facing him as a dyslexic (see Figure 40 below):

**Figure 40. ‘Finding Bus Stop 8A’**



Both felt uncertain as to whether they were reading the information correctly. As a consequence, verification was sought on both occasions from a fellow traveller. The

time of the next service was unknown, so this had to be verified from the timetable. None of the routes seemed to stop at Victoria Rooms (see Figure 41 below).

**Figure 41. 'Studying the Timetable'**



Although the instructions informed them that they would need the bus to Blackboy Hill Top, this was not identified by Hugh or Mary. Analytical forward-thinking is required in order to realise this, which a dyslexic person does not necessarily possess. Mary particularly became confused – ‘how would I identify the right bus when it arrives?’ She started to become embarrassed and conscious that people were watching her. Even after double-checking, the destination was still not identifiable.

Hugh and Mary were both certain that they would have to ask the bus driver for information. This caused them to become even more anxious based primarily on previous negative experiences involving bus drivers. They were unsure how the driver would receive and subsequently treat them. The last thing that they needed was to be ‘singled out’ and mistreated just because they needed assistance. A number of similar issues were going through their minds as they waited for the bus to emerge:

- Would I manage to ask the right questions?
- Would the driver know the answers?
- Would the driver agree to informing me when to alight?
- Would he/she remember to do this?
- Would the driver realise that I have a disability and make me feel at ease, or would he/she treat me negatively and differently as a consequence?
- Would the driver put me enough at ease to even ask for assistance?

When the bus approached the station, this clearly intensified the existing anxieties of Hugh and Mary – ‘is this the right bus?’ Before boarding the bus, both clarified with the driver that this was the 8A to Blackboy Hill. A nod was received on both occasions.

Upon boarding the bus, both Hugh and Mary looked uncomfortable and apprehensive as they approached the driver. On both occasions, the driver looked vague, unable to provide them with any information. This provided their worst case scenario – ‘how would I alight without facing embarrassment?’ For Hugh, the arrogance and unhelpful manner of the driver made him feel anxious at the prospect of asking anything further, and decided to seek assistance from a fellow passenger instead. On Mary’s journey, the driver informed her that she was a driver in training. It was only upon receiving reassurance from the driver’s trainer that Mary’s anxieties were reduced. The trainer verified that the bus had been boarded correctly and he would inform her when the destination was reached. She felt comforted and reassured in his company as a consequence.

During both bus journeys, Hugh and Mary explained to me that they were already visualising the journey from the opposite direction in readiness for the return trip, taking mental notes of key focal points (see Figure 42 below for an example):

**Figure 42. 'The 8A Bus Journey'**



The bus driver informed Hugh upon arrival at Queens Road and advised him to alight. He became confused - 'where is Victoria Rooms, and how far away is it?' I could sense his tension and uncertainty, and he could sense the awareness of the other passengers. He was informed by a fellow passenger that Victoria Rooms was the next stop. Hence, his anxieties decreased once more. In order to alight correctly, he would need to create a visual picture of the destination. Therefore, he asked the passenger for a description of Victoria Rooms. Mary also alighted correctly, albeit for the reason that the driver's trainer prompted her when to do so.

On both occasions, Hugh and Mary emphasised that they would not have known that they had arrived. Contextual references were lacking from their information, and similarly to the car ethnographies the situation was exacerbated by trees obscuring the signage. The information is only available once alighted, and the decision to alight may emerge as incorrect (see Figure 43 below):

**Figure 43. 'Alighting at Victoria Rooms Bus Stop'**



After alighting, both explained that they would have found on-board audio announcements extremely useful. A visual of key points in the journey (particularly the destination stop) would have been invaluable (see Figure 44 below):

**Figure 44. 'Victoria Rooms'**



#### 7.3.4.2 The End Leg Stage by Train

For Donald, even though train travel is preferred, locating the correct vehicle remains challenging for him. Prior to travel, the Traveline representative had identified Clifton Down as the nearest railway station to his destination (see Figure 33b). He was informed that he would need the 'Severn Beach' train. As he approached the departure boards at Temple Meads, he could not see this information amongst the

trains listed (see Figure 45 below). He questioned the information and whether dyslexia was preventing him from seeing it correctly.

**Figure 45. 'Finding the Train to Severn Beach'**



It seemed that no matter how long he looked at the screen, he could not see the train to Severn Beach. He would have to ask someone. Asking for information and correctly receiving it en-route is incredibly challenging, and causes him to feel immensely apprehensive. A member of staff was located nearby, and to Donald he looked approachable. However, he seemed to be dealing with several requests simultaneously (see Figure 46 below). This worried Donald, in the sense that he could be relayed the information too quickly, or even incorrectly.

**Figure 46. 'The Train to Severn Beach?'**



He was informed that he would need the train to Avonmouth. But, only a short space of time existed before the train would depart. He already had to cope with the physical symptoms of his disability. Now he was also experiencing a heightened emotional state. He explained that he felt under considerable pressure, and dyslexia was impairing his judgement.

Two trains approached the platform. Yet, no information was available in order to assist him. He explained that his anxieties could not be any higher at this time. Again, he had to ask for assistance. Even after that, he continued to question his judgement in light of his current emotional state. He boarded apprehensively. Once seated, he referred to the timetable for the route - Clifton Down was five stops away (see Figure 47 below – Clifton Down is presented in bold text). Although he had to identify the destination, he explained that this visual-style information helped him tremendously. It would allow him to alight without having to worry about processing place names:

**Figure 47. 'Timetable Depicting Pictorial Information of the Journey from Temple Meads to Clifton Down'**



#### 7.3.4.3 Reaching the Destination

Hugh, Mary and Donald explained to me that they need visual references in order to orientate themselves correctly. Sometimes they will make contact with someone in order to obtain this information. This could be a friend, or someone familiar with the destination. Mary pointed out that simple friendly conversation also helps her to manage the emotional and physical symptoms that she is experiencing.

Mary noticed the West of England Academy of Art ahead of her, and immediately scanned the map to see if she could find this landmark (see Figure 48 below):

**Figure 48. 'The West of England Academy of Art'**



Hugh was aware that the destination was located on Whiteladies Road. However, the map produced by Transport Direct did not identify this road (see Figure 33a). Although there was a long road highlighted in red, its name could not be identified. He was uncertain how to proceed and reluctant to act upon an assumption alone. Consequently, the name of the road was confirmed with a passer-by before proceeding. The map provided by Multimap specifically named Whiteladies Road for ease of reference. Donald pointed out how helpful this feature was to him as someone with dyslexia – his uncertainty was replaced with a small amount of confidence. However, he did still confirm with a passer-by that he was correct.

All three managed to reach the destination. They explained to me that access to a visual of the destination would have allowed them to more easily determine that the destination had been reached. This could take the form of a picture of the building itself, or the company's logo (see Figure 49 below). Otherwise, there is uncertainty that the information is being processed correctly. Although all had arrived, they expressed how physically and emotionally exhausted they felt in light of the challenges faced en-route.

**Figure 49. 'The Destination'**



### 7.3.5 The Return Leg

#### 7.3.5.1 The Return Leg by Bus

Both Hugh and Mary had planned for the return leg of the journey. They are aware that the bus number for a return leg is often different, and therefore this information is needed in advance of the journey. They knew that they would need the Number 9 service, but again faced the task of having to identify the correct bus stop and vehicle. For those reasons, their apprehensions began to resurface.

By building up a visual picture, both assumed that the bus stop for the return to Temple Meads station would be further into the town than where they had alighted. Once they reached the bus stop area, although overhead signage was available, they chose to verify with another person that they had identified the correct stop. It emerged from the fellow passenger that two buses depart from this stop, both departing for Temple Meads station. This reassured them that they could board either bus, providing that they could correctly distinguish the 8 or 9 service from other buses arriving (see Figure 50 below):

**Figure 50. 'Overhead Signage at Bus Stop Number 9'**



On Mary's journey, the Number 8 bus failed to arrive, and the overhead signage did not change to reflect this. She became concerned that the same situation was going to occur with the Number 9 service. To her relief the Number 9 arrived. The rail symbol located on the front of the bus provided her with the certainty that she needed in order to board with confidence (see Figure 51):

**Figure 51. 'Boarding the Number 9 Bus'**



Although the bus operated on a one-way loop, Mary remembered a number of landmarks from the outbound route. These visual recollections played a strong role in helping to reassure her that she was proceeding correctly.

### 7.3.5.2 The Return by Train

Donald reached Clifton Down station quite easily, using key landmarks as aids to wayfinding. When he reached the platform, he located a timetable in order to identify when the next train would arrive. Although the timetable was relatively uncluttered, he felt confused and overwhelmed due to all the substantial amount of numerical information displayed, and the fact that the timetable separated weekday and weekend services (see Figure 52 below):

**Figure 52. 'The Timetable Board at Clifton Down Station'**

Mondays to Fridays	Saturdays	Sundays
0634	0746	sorry, there is no Sunday service
0746	0846	
0845	0946	
1015	1046	
1115	1146	
1215	1246	
1315	1346	
1415	1446	
1515	1546	
1615	1646	
1715	1746	
1843	1846	
2008	1946	
2113	2046	
2249	2146	
	2316	

A considerable amount of time passed, with no trains arriving from either direction. Furthermore, there appeared to be no assistance available and no auditory announcements provided. Donald became frustrated. He did not like the idea of waiting without any information. Consequently, he decided to telephone the Traveline information service, the number for which was pre-programmed into his mobile phone. He was informed that the train would be delayed for some time. In light of that, he decided to return to Temple Meads by taxi, otherwise he faced the prospect of travelling back to London in the dark. He had previously identified a taxi rank located outside the station. If there were no taxis available, he would have contacted a local taxi company, the numbers of which he had obtained and put into his mobile phone pre-trip.

At Temple Meads station, I could see how anxiously Hugh, Mary and Donald were trying to identify their destination from the overhead monitors. The fact that the departure times were now displayed in a 24-hour format led to greater information

processing inefficiencies than had been experienced during the outbound phase of the journey (see Figure 53 below):

**Figure 53. 'Departures'**



They remembered how to locate the station platforms based upon a visual picture created during the outward phase of the journey. Mary explained to me that the process of finding the correct platform is made even easier at this station because the platform numbers are sizeable and boldly displayed.

On all three occasions, the train was already standing at the platform. However before boarding, all confirmed with a member of staff that the train was departing for Paddington. Although the overhead signage informed them that it was the correct train, they seemed uncomfortable relying upon this alone, just in case they had misinterpreted the information before them (see Figure 54 below):

**Figure 54. 'Train Departures'**



A reflective discussion with each participant post-journey highlighted that no problems were experienced on the return leg after departing from Temple Meads. The fact that the route was now a little bit more familiar to them allowed for a relatively comfortable journey.

The final section of this chapter concludes the travel ethnography study. In an attempt to especially draw out what the research has revealed from this method, the conclusion draws upon the findings and focuses upon the generic messages/key lessons. The possible implications for the thesis are also considered and some methodological reflections provided.

#### **7.4 Summary and Conclusion**

The core stage of empirical research concluded that the negative experiences of a dyslexic traveller are not only felt physically. Considerable emotions are also driven to the surface. Therefore, a further objective of the research became:

*'To capture and convey the emotional and informational setting within which dyslexic travellers find themselves'*

In order to effectively achieve this objective (and enrich the appreciation of dyslexic travel), the researcher conducted a travel ethnography study. A methodological

discussion on travel ethnography took place in Chapter 5. This chapter presented the research findings. The ethnographic accounts of six accompanied journeys with four dyslexic travellers were described and explained. By omitting the elements of the journey lifecycle that did not address the purpose, the greater the significance of what was being emotionally experienced by the participants has been drawn out.

By using the first person passive to communicate the observations, the researcher has avoided telling a clinical story of events. The observations have been brought to life on the page and there is a real emotional texture and depth to the research. This perspective is often absent from transport research (Watts and Urry, 2008), but crucial to explaining the minutiae of travel for dyslexic people. The reader has to be able to really connect with the emotional experiences of dyslexic travellers (as far as is possible if the reader is non-dyslexic).

The travel ethnography study certainly highlights the severity of the impact of inaccessible travel information upon the psychological well-being of a dyslexic traveller. Dyslexia and the existing transport environment are clearly in tension with one another. The environment and nature of travel has a directly negative impact upon the emotional symptoms associated with this disability. Similarly, the emotions experienced negatively affect how a dyslexic functions within context. The findings also indicate a relationship between emotional state and dyslexic severity, with the most severely affected individuals experiencing the greatest impact upon their psychological wellbeing. It is clear that similar symptoms and emotions are experienced across modes when difficulties arise. Yet, it is the specific context and information media used which cause the problems to manifest themselves differently.

The findings indicate that the prospect of undertaking an unfamiliar long distance journey creates considerable psychological unrest amongst dyslexic people. The participants expressed their emotions via a number of adjectives, ranging from anxiety to real fear (depending on the severity of their dyslexia, the situation, the potential for error and the consequential effects). It is clear that pre-trip planning is not only a crucial aid to en-route travel and managing the physical/practical aspects of the disability. It is also used as a coping strategy for managing psychological wellbeing.

In relation to car travel, the findings indicate a strong link between mobility (for unfamiliar journeys in particular) and a dyslexic's use of an in-car satellite navigation

system. The fact that these systems were not available to the participants during the ethnography study highlighted a relationship between access to a satellite navigation system and psychological wellbeing. The car ethnographies also highlight the psychological effects and implications upon a dyslexic traveller of unforeseen journey changes en-route. Under those circumstances, if information is in short supply, then the effects are felt more severely than normal; getting lost is then a strong possibility.

Creating the situation where a dyslexic public transport user has to rely upon members of staff or members of the public for information and reassurance should not be encouraged. Although the human aspect to travel by public transport is welcomed and reassuring to someone with dyslexia (providing staff are empathetic and knowledgeable), it is clear that they would like greater independence when it comes to their mobility in order to feel more positive about themselves, and to show others that they *can* be independently mobile.

Dyslexic people use travel information as an emotional support mechanism across the entire journey lifecycle. Although this research highlights how information provision *can* be improved, a realistic strategy for change has to be put in place in order to make a real difference. Transport policymakers and service operators need to understand that the subsequent effects of better information access upon public transport use and the perceptions of the industry as a whole could be extremely positive.

This concludes the empirical research findings. Chapter 8 will now conclude the thesis, introducing discussion of the key findings and conclusions corresponding to the overall aims and objectives of the thesis. A methodological discussion is also provided. The chapter assesses the contribution of this research to the fields of study, and considers avenues for further research in this area.

# **Part 4.**

## **Thesis Summary and Conclusions**

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## **Chapter 8**

### **Thesis Summary and Conclusions**

#### **8.1 Introduction**

The final chapter in this thesis summarises the key findings and conclusions, and contributes some additional reflections. The first section reminds the reader of the background to the thesis. Next, the key findings and conclusions corresponding to the overall aims and objectives of the thesis are considered. This is followed by a methodological discussion. The penultimate section assesses the contribution and importance of this research to the fields of study. The chapter concludes by considering the potential that the thesis presents for further research in this area.

#### **8.2 Background to the Research**

There is a long history behind transportation and the provision of travel information within the UK. The past decade has seen a change to the nature of mobility and a transport network which has increased in size and complexity. This has created a need for multimodal travel, and hence the availability of multimodal travel information. New technological capabilities offer the opportunity to provide *integrated* multimodal travel information, where the traveller can more easily link up each stage of a multimodal journey and explore the alternative options available to them. The provision of integrated multimodal travel information has received considerable Governmental attention in the past decade. This is especially since the importance attributed to it in the 1998 White Paper as part of an integrated transport system. As part of its Ten year Plan, the Government launched 'Transport Direct', a web-based integrated multimodal travel information service.

The overall success of an integrated multimodal travel information service such as Transport Direct will be marked upon the extent to which it is being used by the public to inform their travel choices. However, for the service to be used, it must be useful and useable. The Department for Transport has supported the development of Transport Direct by implementing a research programme, complemented by a PhD studentship, the result of which is this thesis. The broad aim of the studentship was to focus upon the understanding of user needs and reactions associated with travel information services. A specific focus for the research (explained in Section 8.2.1

below) was identified through examination of the cross-disciplinary literature and consultation with academics and professionals in the fields of study.

### 8.2.1 Specific Focus of the Thesis

At the outset of the studentship, Transport Direct (as part of the research programme in place) was in the process of exploring the attitudes and aspirations of disabled people regarding travel information. The findings revealed that people with a learning disability have the greatest needs for information in order to travel comfortably and independently. Yet the author of this thesis recognised that the needs of these individuals continue to be overlooked. This acknowledgement provided the first step towards a more specific focus for the thesis.

Dyslexia is a specific learning disability, where the difficulties are particularly related to aspects of mastering and using written language. For that reason, it was reasonable to assume that the difficulties facing someone with dyslexia will be extremely prominent when faced with travel information access and use. A focus group including a number of dyslexic people confirmed this proposition. Further examination of the literature confirmed that the barriers to transport facing dyslexic people have received very limited attention. Yet the incidence of dyslexia is quite significant, severely affecting up to 6 per cent of the UK population. This thesis addresses an obvious research deficiency by investigating the needs of dyslexics from, and frustrations concerning, travel information provision.

#### 8.2.1.1 Aims and Objectives

The specific aim of the research was to:

*‘Explore and understand the information needs and usability issues individuals with dyslexia encounter during a journey lifecycle; and translate those needs into recommendations for transport policymakers and service providers’*

The following objectives enabled the above aim to be achieved:

1. To identify the macro and micro problems facing dyslexic people when accessing travel information during a journey lifecycle.

2. To determine whether these problems are a consequence of poor provision of dyslexia-friendly information, the fundamental traits of dyslexia, or both.
3. To consider whether the problems are specific to dyslexia or have a far wider application to non-dyslexics, though perhaps felt more frequently and severely by dyslexic people.
4. To consider what interventions should be implemented by transport policymakers and service providers in order to address the needs of dyslexic people and assist them through the journey lifecycle.

As the research developed, a further aim emerged as important. The focus groups study concluded that the negative experiences of a dyslexic traveller are not only felt physically. The effects are also felt emotionally. Therefore, a fifth objective of the research became to connect with the emotional experiences of dyslexic travellers:

5. To capture and convey the emotional and informational setting within which dyslexic travellers find themselves.

The next section discusses the key findings and conclusions, making reference to these objectives.

### **8.3 Key Findings and Conclusions**

#### 8.3.1 Models of Disability, Discrimination and Social Exclusion

The genesis of disability has evolved considerably over time, both in terms of the perceptions of society and the support and interventions provided for disabled people. For a number of years, disabled people were marginalised by the medically-based ethos of society's political, educational and welfare institutions. However, through years of legislative change and a move to an approach emphasizing a more social-relational perspective, it is clear that the attitude towards disabled people is changing, as is the care and support being provided for them.

In spite of this, dyslexic people are experiencing the benefits of the social culture of disability at a considerably slower rate than other disabled people. Consequently, these individuals have to try and function in a non-dyslexic environment using inappropriate tools. The difficulties faced will not only make dyslexic people feel discriminated against and excluded from certain places, but the independence of

these individuals will also be affected. The increasing negativity dyslexic people feel as a result can lead to less of a desire to interact with others as a consequence. This self-exclusion and social isolation can lead to loneliness, depression, and an exacerbation of the physical symptoms related to their disability.

All individuals possess a combination of abilities and limitations as part of their cognitive makeup. However, dyslexic people are not similarly viewed. The medical model of disability is firmly embedded within the understanding of dyslexia, with definitions focusing primarily upon the medical facets of the condition. In addition, dyslexia is inappropriately associated with a lack of motivation and poor intellectual ability as a result of a lack of awareness. Consequently, society has no choice but to view and treat it negatively. It seems that the very people attempting to change society's perceptions of dyslexia are preventing a more social perspective from materialising due to the way that they continue to conceptualise it.

With the amount of legislative protection and support now in place for disabled people, dyslexia should not mean the denial of equity and social inclusion. However, legislation alone is unable to influence future policy and practice. A combination of law enforcement and promoting the benefits of the social disability model to the *whole* of society is necessary so that dyslexic people no longer feel marginalised:

*'Initiatives to reduce discrimination should make use of the iron fist of law within the velvet glove of persuasion'*  
(Sayce, 2003)

Proactive multidisciplinary collaboration between legislators, service providers and educationalists is a driving force for change. A persistent multistranded strategy is needed, one which grasps the exasperations of anti-discrimination and the social impairments that lead to exclusion for dyslexic people.

### 8.3.2 Dyslexia and Travel Information Provision

The incidence of dyslexia within the UK is substantial, and it is a recognised disability within the Disability Discrimination Act. In spite of this, there is a lack of recognition of dyslexia across the transport industry, particularly within travel information provision. At present, the distinct needs of dyslexic people are being lost within a strategy which is based upon the attitudes and aspirations of the majority of disabled people. For

someone with dyslexia, the barriers to information access are just as restrictive and non-trivial as the physical barriers are to someone with a physical disability. Travel information provision is seen as a significant barrier to travelling via public transport in particular. Essentially, dyslexic people are facing limited travel horizons and mobility-related exclusion because of the causal relationship that exists between macro and micro-level transport problems, i.e. the fundamental traits of dyslexia and travel information provision. This provides crucial evidence that travel information providers need to ensure that priority is given to addressing the specific needs of dyslexic people.

The transport industry needs to understand that the challenges faced by dyslexic people and the needs of these individuals are distinct because of their cognitive makeup. Left-brain analytical-type deficits resulting from phonological weaknesses exist alongside right-brain strengths associated with visual-spatial thought, intuitiveness and creative thinking. As a result, the cognitive demands placed upon these individuals are considerably higher than those placed upon non-dyslexics, which makes the practical difficulties more pronounced and persistent. The inextricable link that exists between dyslexia and stress will also make the challenges more significant. The support that dyslexics require in order to deal with challenges faced within the transport system is distinctly different from non-dyslexics. Travel information is seen as a key support mechanism across the entire journey lifecycle for dyslexic people. In order to manage the symptoms of dyslexia and psychological well-being, dyslexic people need access to information which allows them to utilise their right-brain cognitive style.

The table overleaf provides an overview of the key recommendations arising from this research, and to whom they are addressed.

RECOMMENDATION	ADDRESSEE
Greater support for travellers with numerical processing weaknesses related to the 24-hour clock	All travel information providers
Allow the user to personalise information presentation at the interface rather than via browser settings (e.g. via a 'Textic'-style toolbar on the interface)	All online travel information providers
Greater support for user's with spelling weaknesses	All providers of online journey planning services
Review of end leg information provision	All providers of online journey planning services
Use of Virtual Reality to support pre-trip journey planning (i.e. an online 'deluxe dry-run' facility)	All providers of online journey planning services
Greater use of visual representations and 'contextual references' to support text-based journey planning information	All providers of pre-trip planning services, particularly online providers
Accessibility testing with people with learning disabilities, including a good-sized sample of dyslexic people	All providers of online unimodal and multimodal travel information services
Implementation of a more pictorial and schematic approach to presenting journey information (e.g. the journey 'timeline' provided by Transport Direct)	All providers of online unimodal and multimodal travel information services
Review of readability and usability of car journey planning information	All providers of online and telephone-based car journey planning services
Review of information provided for drivers when delays occur	The Department for Transport, the Highways Agency, providers of online and telephone-based car journey planning services
Greater use of visual representations and 'contextual references' on maps, online and offline	Providers of road maps and A to Z maps, providers of online map-based information
Provision of personalised maps to supplement personal journey planning information	Providers of online map-based information
Review of usefulness and usability of information provided via mobile devices	All travel information services providing (or those with the potential to provide) mobile services
Review of usefulness and usability of live travel news	All travel information services providing live travel news
Review of usefulness and usability of information currently provided on-board vehicles, and level of consistency of information provision within and across regions	All bus and train operators
Review of usefulness and usability of information currently provided at local bus stops and railway stations, and level of consistency of information provision within and across regions	All bus and train operators

Access to a greyscale plan of the station highlighting route to required platform, along with the information provided in a bulleted list of instructions	All train operators
Access to a greyscale plan of the train highlighting route to reserved seat	All train operators
Greater support for bus and coach users with numerical processing weaknesses, particularly in relation to front of vehicle displays	All providers of bus and coach services
Audible information provision at bus stops and on-board	All bus operators
A designated member of staff available at every mainline station trained to a good standard in disability awareness, including dyslexia awareness	The Department for Transport
Elocution training for ground-level staff and telephone operators	The Department for Transport
Increase access to fare information, online and offline	The Department for Transport
Ensure dyslexic people are included within any future strategies related to Demand Responsive Transport and Flexible Transport Services	The Department for Transport
Review of cost and availability of satellite navigation systems to people with cognitive disabilities such as dyslexia	The Department for Transport
Stress management advice and training available to public transport and road users	The Department for Transport
Create a comprehensive document for the transport sector providing operational guidance on how to address the needs of dyslexic people	The Department for Transport
Adapt an existing online travel information service (e.g. Transport Direct) to better suit the needs of dyslexic people in order to assess the effects upon mode choice, behaviour and attitudes towards different modes	The Department for Transport
Undertake quantitative-based research in order to generalise the existing research findings to dyslexic people outside of those already studied	The Department for Transport
Qualitative-based research involving dyslexic people under the age of 18 and between 60-75 who travel/have the potential to travel independently	The Department for Transport
Research into the perceptions and interventions of transport sectors in other countries, particularly Northern America and the Nordic countries	The Department for Transport

Ensure trees do not obscure road and bus stop signage	Public Authorities
Support for the 'Myguide' initiative outside England	Northern Ireland, Scottish Government, National Assembly for Wales

Dyslexic-friendly travel information can ameliorate the access barriers to transport for dyslexic people. Easily accessible information can provide reassurance that all of the links in the journey chain are achievable or proceeding to plan, and real-time information can provide support if re-routing occurs. As a key government initiative, Transport Direct provides a particular opportunity to embrace the recommendations provided in this thesis and provide better support for dyslexic people.

Whether the information supports or substitutes conventional forms of travel information, dyslexic-friendly information could broaden the travel horizons of dyslexic people, allow them to be more independent, and provide greater opportunities for social inclusion. For Government, the subsequent effects of better information access upon public transport patronage and use of the road network (and the perceptions of the transport industry as a whole) could be extremely positive.

#### **8.4 Methodological Discussion**

There are many paths available which can take the researcher to their destination, and different methods can yield different insights. By examining the nature of the research aims and objectives (listed in Section 8.2.1.1 above), a qualitative two-stage approach involving focus groups and a travel ethnography study was complementary and effective. Focus groups were well-suited to the first four objectives of the research. The attitudes and aspirations of dyslexic people regarding travel information were effectively explored by means of this method. Travel ethnography corresponded well to the fifth objective. Ethnography has only emerged within transport research in recent years, with 'mobile ethnography' ('research-on-the-move) appearing even more recently (Watts and Urry, 2008). This thesis not only adopted travel ethnography and mobile ethnography, it also adapted these techniques for application in a new area of research. By doing so, the researcher reached beyond what other research methods could have achieved.

When taken together, these two methods have provided a depth and texture to the research, a perspective often overlooked in transport research, and one that neither technique could have offered alone. Exploratory research to chart the dimensions of

previously unstudied social settings and intensive investigations of the subjective meanings that motivate individual action are particularly well served by such a technique (Schutt, 2006).

#### 8.4.1 Methodological Challenges

##### 8.4.1.1 Sampling and Recruitment

From an exploratory perspective, the research was incredibly challenging. The psychological and emotional symptoms associated with dyslexia provided the researcher with a number of methodological challenges. By discussing the difficulties faced and the way in which they were overcome, this thesis has provided a useful contribution towards undertaking transport research with dyslexic people, and how future studies can absorb and deal with similar issues if they arise. The nature of dyslexia had a particular impact upon recruitment, with potential participants reluctant to become involved as a result. Research participation places dyslexic people under considerable strain cognitively, and the fear of stepping outside a familiar 'dyslexic circle' is daunting and approached with caution. Self confidence and esteem amongst these individuals is also quite low, and having to discuss their problems with non-dyslexic people is of great concern. The travel ethnography study in particular meant that these individuals would have to confront their problems and operate within the very context that causes them distress. Consequently, recruitment and ethics had to be handled with care and sensitivity, with considerable time and emotional investment required on the part of the researcher in order to ensure that strong and trusting long-lasting relationships were firmly in place.

Although the recruitment challenges faced during this research has led to the use of moderately-sized samples, the sample's *were* 'fit for purpose'. This study aims not to establish statistically-verifiable facts, but to advance theoretical and contextual understanding. This type of understanding requires qualitative empirical findings that demonstrate depth and texture, which is most effectively achieved using moderately-sized samples (Corbetta, 2003).

##### 8.4.1.2 Research Ethics

Research ethics assumed great importance throughout the development and implementation of the methodologies used. This research involved *real* people, and

thus required the researcher to consider the legal and ethical implications of the research. The fact that qualitative methods dominated the research approach led to a range of ethical considerations to emerge. In addition to Data Protection compliance, procedures had to be set in place in order to ensure that the participants were fully aware of the true nature of the research, and protected from risk or harm. Addressing these issues was of particular concern within this research. The sample comprised of a vulnerable minority group of society undertaking in-depth exploratory research, and the methods used could potentially affect the physical and/or psychological well-being of the participants.

#### 8.4.1.3 Uniqueness of the Findings: Dyslexics versus Non-Dyslexics

Recognition was made in Chapter 5 of the absence of non-dyslexic control groups from this research, in what is a case study rather than a comparative study as a consequence. Although this research concludes that the challenges faced by dyslexic travellers and the needs of these individuals are unique because of their cognitive makeup, this needs to be verified by incorporating non-dyslexic people into further research.

### **8.5 Importance of the Research**

*'We have more information than we can use, and less knowledge and understanding than we need. We seem to collect information because we have the ability to do so, but have not devised means of using it. The true measure of any society is not what it knows, but what it does with what it knows'*

(Warren Bennis, no date; cited Krueger & Casey, 2000)

This thesis synthesises the two previously disparate literatures of dyslexia and transport studies. By investigating the attitudes and aspirations of dyslexic people regarding travel information provision, a significant research deficiency has been addressed. The research presents one of the first in-depth qualitative studies of its kind, with the empirical insights having significance for academia, professionals and government.

Given the paucity of existing understandings in the literature surrounding dyslexia, the research advances understanding by presenting new in-depth insights into the needs of dyslexics from, and frustrations concerning travel information provision and

the inextricable link with the fundamental traits of dyslexia. The research also makes a significant contribution to the literature surrounding models of disability by highlighting that the medical model of dyslexia is firmly embedded within the transport industry, and the lives of dyslexic people are restricted and negatively shaped as a consequence.

Dyslexia is a *specific* learning disability. As such, the challenges of dyslexic people are not going to be easy to define or accommodate. However, this does not mean that the specific needs of these individuals should not be considered. In order to have a positive impact upon the travel behaviour of dyslexic people and their perceptions towards the transport industry, policymakers and service providers need to understand what it means to have dyslexia before they can address it within travel information provision. This thesis effectively supports the drive towards greater recognition and awareness of (and support for) dyslexia within the transport industry. Although the research provides much to consider, it constitutes an important opportunity to positively change the lives of dyslexic people.

The implications of this thesis in relation to social inclusion and independent mobility are significant. It is certain that changing the fundamental attitudes of the transport industry towards dyslexia would provide a positive step forward in achieving greater social inclusion for dyslexic people. Furthermore, by understanding the challenges and providing assistance that is useful and useable to the dyslexic traveller, it is hoped that this will improve the ability of these individuals to travel independently and build their confidence to do so. This in turn could provide greater access to opportunities previously unavailable, create better social opportunities, and more positive life experiences. To this end, the research has the potential to further embed the social model of disability within dyslexia, and embedding the social model of dyslexia within transport.

## **8.6 Further Research**

The limitations of individual research instruments are widely accepted, and it is not always possible to collect all of the data that we require using a single study or single methodology (Axhausen, 1998). Further research would contribute to the existing body of findings and expand knowledge. This thesis presents great potential for future research in this area. Two potential next-stage research opportunities are

outlined below. A proactive approach should be taken, one which understands and absorbs the methodological challenges faced within this research.

#### 8.6.1 Creating a Dyslexic-Friendly Travel Information Service

This thesis predominantly highlights the attitudes and aspirations of dyslexic people regarding travel information provision. Obtaining the views of (and working alongside) professional stakeholders in order to create a dyslexic-friendly travel information service (or the opportunity to adapt existing services) would be a positive next step. This in turn could form the basis of a study into the effects of a more dyslexic-friendly travel information service upon the mode choice and travel behaviour of dyslexic travellers, either in the form of a cross-sectional study, or following a sample during a longitudinal study.

#### 8.6.2 Quantitative Research

Different methods are appropriate for different research questions and different stages of theoretical development (Lockyer, 2006). Although it has not been the intention as part of this research to generalise to dyslexic people outside of those studied, making such generalisations would now be appropriate. Using a quantitative-based survey to investigate the attitudes and aspirations of a larger number of dyslexic people towards travel information provision has been identified as a way of making such generalisations. In addition, this approach could be used in order to assist transport policymakers and service providers consider how to prioritise the recommendations arising from the research.

### **8.7 Concluding Statement of the Author**

*'There are always multiple realities of a situation, depending on where the person is, how they see and feel things, and why. This research has taught me to be less judgemental and more accepting of others, and how to treat people with the utmost respect. Whether the participants' stories were uplifting, humbling or upsetting, it was an honour to hear the wisdoms that they share, and bring their experiences to the forefront of research'*

# **BIBLIOGRAPHY & APPENDICES**

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# Bibliography

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# Appendices

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## **Appendix 1. Disability Legislation.**

### **Key Statutes Relating to Disability, Discrimination & Equality (listed chronologically):**

- Mental Deficiency Act 1913
- Disabled Person's Act 1944 (employment)
- Mental Health Act 1959
- Chronically Sick and Disabled Persons Act 1970
- European Communities Act 1972
- Representation of the People Act 1983
  
- The Mental Health Act 1983 reconfigured social rights for people with mental illness. This replaced the 1959 Act in three distinct areas:
  - 1 Reduction in the duration of compulsory orders.
  - 2 Narrowing of definitions to remove 'mental handicap', unless there was 'abnormally aggressive or seriously irresponsible conduct'.
  - 3 The consent of patients and its confirmation by three appointees of the new Act Commission was required prior to psychosurgery or other 'irreversible or hazardous' treatments were undertaken. In 2005, this Act was still under review (Borsay, 2005).
  
- Disabled Person's Act 1986
- The NHS and Community Care Act 1990 attempted to transform community care and the way health and social services were made available to disabled people, bringing in commercial sector principles in an attempt to improve service delivery (Borsay, 2005).
- Disability Discrimination Act 1995 - Guidance and Code of Practice (the DDA is discussed below)
- Meaning of 'Disability' Regulations 1996
- The Human Rights Act 1998.
- The Disability Rights Commission Act 1999 aimed to establish a Disability Rights Commission and make provision as to its functions (Sayce, 2003).
- Health Act 1999
- Access to Justice Act 1999
- Equality Commission 2001

- Mental Health Bill 2002
- Mental Capacity act 2005
- Disability Discrimination Bill 2005
- Equality Act 2006

### **The Disability Discrimination Act (DDA) 1995.**

The Disability Discrimination Act 1995 aims to end the discrimination that disabled people face. The Act requires public bodies to promote equality of opportunity for disabled people. It also allows the government to set minimum standards:

*‘The DDA makes it unlawful to discriminate against disabled persons in connection with employment, the provision of goods, facilities and services or the disposal or management of premises; to make provision about the employment of disabled persons; and to establish a National Disability Council’*

The DDA has been significantly extended, particularly by the Disability Discrimination Act 2005 (formally the ‘Disability Discrimination Bill’).

Part 1 of the DDA defines and discusses the meaning of ‘disability’ and ‘disabled people’. Part 2 deals with employment. Part 3 examines goods, facilities and services (including information), along with the disposal and management of premises. Parts 2 & 3 also make it unlawful to discriminate against disabled people in relation to property, premises and leases. Part 4 is related to the provision of education. Further access rights relating to making adjustments to the delivery of services were brought into effect in 1999 and 2004 (Doyle, 2005).

The following are examples of discrimination under Part 3 of the Act:

- Refusing to provide the same goods, facilities and services as a provider would to the general public. For example, refusing to admit a person with multiple sclerosis into a restaurant because of their disability.
- Providing a lower standard of service. For example, restricting disabled persons to matinee theatre performances only.
- The terms, on which the service is being provided. For example charging different prices to disabled people.

- Failure to make reasonable adjustments so that disabled people are unable to use certain goods, facilities or services.

Transport has been provided under the Railways Act 2004 and several parts of the DDA:

- Part 2 – Transport Employers.
- Part 3 – Transport Services.
- Part 5 – Public Transport, including certain aspects of taxi, aviation and shipping provision. Part 5 is different to the provisions made under the other parts of the Act for the reason that it has allowed the government to set minimum standards and technical regulations defining vehicle accessibility (Doyle, 2005).

2005 brought important changes to the DDA via the Disability Discrimination Bill. Improvements to the accessibility of rail vehicles and Blue (formally Orange) Badge parking provided two key focal points (Doyle, 2005).

Under EU law, protection is provided for disabled people under:

- The Directive on the Provision of Safe and Accessible Transport;
- The European Charter on Access to Transport Services and Infrastructure (DPTAC, 2004b)

### **Specific Strategies Related to the Learning Disabled**

It has been over 30 years since the last government White Paper relating specifically to providing the learning disabled with better opportunities and choices. Since the governmental devolution of the UK, each regional area of the UK has provided different policies and levels of judicial protection for people with learning disabilities. The regional policy reviews that have led to key changes to the way services and support have been developed for such people include:

- 'The Same as You' 2000 (Scottish Executive)
- 'Fulfilling the Promises' 2001 (National Assembly for Wales)
- 'Equal Lives' 2005 (Department of Health and Social Services and Public

Safety, Northern Ireland)

- 'Better Services for the Mentally Handicapped' 2001 (Department of Health, England)

Each of the above policies has subtle differences; one could suggest as a result of prevalence and the perspectives of the policymakers. However Gates (2007) explains that *all* promote the rights of people with learning disabilities and their rights to social inclusion, independent living and anti-discrimination.

The White Paper 'Better Services for the Mentally Handicapped' 2001 (Department for Health was introduced in an attempt to close down large institutions dedicated to supporting people with mental illnesses and learning disabilities and instead, the Government developed services for these individuals in the community. But there were still major problems, such as a lack of choice and opportunities in many areas such as housing, education, employment and transport. The Department of Health voiced strongly that these individuals were still being marginalised. In response, the Government produced another White paper entitled 'Valuing People: A New Strategy for Learning Disability in the 21<sup>st</sup> Century', which set out their new and continuing commitment to improving the lives of such people in the 21<sup>st</sup> Century. The key objectives of the White Paper included:

1. Modernising day services for people with learning difficulties in order to make them more 'person-centred'.
2. Increasing the number of people with learning difficulties in work, including paid work.
3. Promoting the active involvement of people with learning difficulties in local planning processes through Learning Disability Partnership Boards and increasing social support for citizen advocacy and self-advocacy (Clarke, 2005).

Clarke (2005) suggests that 'Valuing People' represented major progress in the drive towards ensuring that the learning disabled were heard. It acknowledged the position of people with a learning disability in society, highlighted their rights to independence, choice and inclusion and showed a real move towards recognising the fact that these individuals should have equal citizenship.

However, in a critical response to the Valuing People strategy, a report entitled

'Making Things Happen' highlighted that Governmental departments were still not doing enough to take the 'Valuing People' strategy forward. The government were criticised for not producing a 'Learning Disability National Service Framework' and for not financially supporting the proposals. This was despite the later publication of 'Planning with People: Towards Person-Centred Approaches', which discusses building a 'people-centred organisational culture' (Clarke, 2005).

## **Appendix 2. The Web Accessibility Initiative (WAI) and Web Content Accessibility Guidelines (WCAG).**

The Web Content Accessibility Guidelines (WCAG) form part of the Web Accessibility Initiative (WAI), which provides strategies, guidelines and resources in order to support accessible design solutions. The WCAG guidelines have been developed by a group consisting of W3C members and invited experts. The first set of guidelines was produced in 1999. Each guideline has a checkpoint which constitutes website accessibility. There are guidelines at 2 different levels:

1. Level 1.
2. Level 2 - encompasses many of those from Level 1 with further additions specific to disabled people. Guidelines are also more precisely testable at this level - 'True/false' criteria are used as opposed to checkpoints.

There are 3 levels of priority. Each level ensures a greater level of site accessibility:

1. Impossible to access some of the information on the site. This is considered to be the absolute minimum level of compliance ('must satisfy').
2. Web developers should satisfy these checkpoints or some groups of people will find it difficult to access information on their site. This is considered to be the preferred level of compliance ('should satisfy').
3. If Web developers satisfy these checkpoints the majority of users will be able to access ALL of the information on their site. This is considered to be the optimum level of compliance ('may satisfy').

There are also 3 levels of conformance:

1. Level 'A': all Priority 1 checkpoints are satisfied. This is known as 'WCAG A' compliant.
2. 'Double-A': all Priority 1 and 2 checkpoints are satisfied. This is known as 'WCAG AA' compliant.
3. 'Triple-A': all Priority 1, 2, and 3 checkpoints are satisfied. This is known as 'WCAG AAA' compliant.

All UK government websites have to comply with WCAG Priority 1 Level 'A'. However by 31<sup>st</sup> December 2008 government sites must comply with Level 2 AA. The

European Commission and the RNIB suggest that this should affect more positive change in relation to discrimination and social exclusion (Accessibility 101, 2007).

Validating site content is possible through software tools and human review. Organisations demonstrating conformance to WAI and WCAG are permitted to display the badge below, corresponding to the level of compliance that it has achieved (conformance claims are not verified by W3C):



*Applicability of the WAI to People with Learning Disabilities.*

The 'People First' group assessed the WAI guidelines for their accountability of the needs of people with learning disabilities. They produced a list of the guidelines that they felt to be applicable (Brown, 2002):

1. Provide page content in a form that may be processed visually, i.e. icons, visuals and images.
2. Use visual cues for function, meaning and structure: Adoption of easy to understand standardised symbols would make accessibility easier. Navigation aids should be at the top of the page where everyone can see them.
3. Provide auditory equivalents to text and visuals: There is a concern that people with a learning disability do not have access to screen reading technology and therefore will not be able to access the information.
4. Meaning equivalence: The amount of text contained on the site should be right for the target groups who will be using the site.
5. Provide auditory cues for function, meaning and structure using language people will understand.
6. Awareness and prior knowledge of the target audience: People with a learning disability should be involved during website development.
7. Global and 'webbed' issues: The key issue here is about keeping the site simple and easy to use. Too many features make it inefficient and hard to use. Providing too many links makes navigation difficult. Search engines for key words can often be unpredictable and the results can be confusing, particularly for people with processing difficulties.

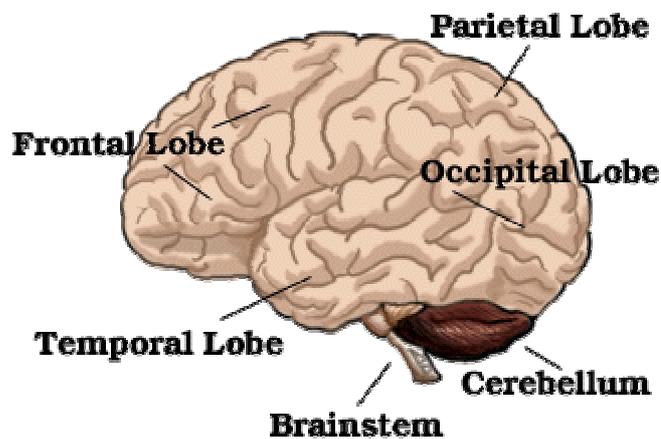
8. Font: When using different fonts, one needs to be careful that they are easy to read. There should be a consistent use of fonts throughout the website so people can understand the site's layout in a consistent size.

### Appendix 3. The Human Brain.

The human brain has three distinct (but connected) parts:

1. The **cerebrum** ('the brain') – consists of two large hemispheres (left and right).
2. The **cerebellum** ("little brain") - two smaller hemispheres located at the back of the cerebrum.
3. The **brain stem** - central core that gradually becomes the spinal cord, exiting the skull through an opening at its base.

The Human Brain (Courtesy of Google Images, 2008)



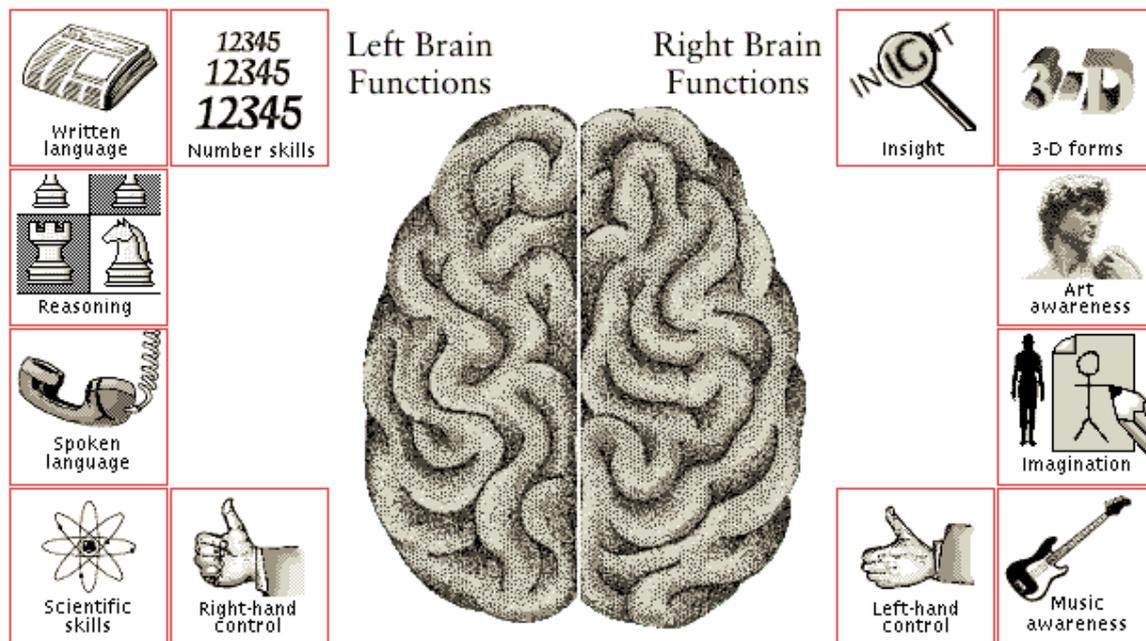
Most high-level brain functions take place in the **cerebrum**. It receives information from all the sense organs and sends motor commands to other parts of the brain and the rest of the body. Motor commands are transmitted by the motor cortex. The sensory cortex receives input from the sense organs.

The **cerebellum** coordinates body movements. All motor activity depends on this part of the brain. The cerebellum is divided into two lateral (side-by-side) lobes connected by a finger-like bundle of white fibres. The outer layer (or cortex) of the cerebellum consists of fine folds. As in the cerebrum, the outer layer of cortical grey matter surrounds a deeper layer of white matter and nuclei. Three fibres bundles called cerebellar peduncles connect the cerebellum to the three parts of the brain stem. The cerebellum coordinates voluntary movements by fine-tuning commands from the motor cortex in the cerebrum. The cerebellum also maintains posture and

balance by controlling muscle tone and sensing the position of the limbs (Microsoft Encarta, 2007).

Two large cerebral hemispheres make up approximately 85 percent of the brain's weight. Communication between the two hemispheres is through several concentrated bundles of axons. The diagram below shows the left and right brain and associated skills:

### Left and Right Brain Function (Microsoft Encarta, 2007)



## **Appendix 4. Other Theories Supporting the Causes of Dyslexia.**

### **The Rapid Auditory Processing Theory**

Ramus (2003) found that a large number of academics and practitioners have investigated and consequently supported a competing theory associated with the main cause of dyslexia. It is claimed that a phonological deficit is secondary to a more basic auditory deficit. The latter is seen as the direct cause in the course of development of the phonological deficit and hence the difficulty in learning to read (Ramus, 2003).

The 'rapid auditory processing theory' suggests that the deficit lies in the perception of short or rapidly varying sounds. Evidence supporting this theory stems from dyslexics showing poor performance on a number of auditory tasks including frequency discrimination (Ramus, 2003). Ramus (2003) also agrees that the failure to correctly represent short sounds and fast transitions could subsequently lead to dyslexia. This may be particularly evident when such acoustic events are the cues to phonetic contrasts, for example 'ba' versus 'da'.

### **The Visual Processing Theory**

Ramus (2003) suggests that a visual impairment gives rise to difficulties with processing alphanumeric text. His discussion is deepened by examining research where the findings suggest that the physical affects of a visual dysfunction may take the form of increased visual crowding, poor vergence<sup>37</sup> or unstable binocular fixations<sup>38</sup>. A person with visual dyslexia may experience double vision, vibration or blurring of text, changes to the sequencing of letters, letter reversal, parts of words may disappear, letters may change shape, words may spin or the page may appear sloping (Jordan, 2004). Below is an example of how dyslexics may see the word 'cat':

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<sup>37</sup> The simultaneous movement of the pupils of the eyes towards or away from one another during focussing (Oxford English Dictionary, 2004)

<sup>38</sup> Vision using both eyes with overlapping fields of view, allowing for the perception of depth (OED, 2004).

CAT TAC TAC CVA  
 CAT TAC TAC CVA  
 CAT TAC TAC CVA  
 ACT TCA TCA VCA  
 ACT TCA TCA VCA  
 ACT TCA TCA VCA  
 ATC CTA VTC CVA  
 CTA ATC CTA VTC  
 ATC CTA VTC CVA  
 VTC CTA VTC CVA

The cause of these visual difficulties stems from the division of the visual system into two pathways: (1) magnocellular and (2) parvocellular<sup>39</sup>. The visual theory of dyslexia suggests that the magnocellular pathway is disrupted, leading to deficiencies in visual processing, abnormal binocular control and visuospatial attention<sup>40</sup>. Ramus (2003) reported further evidence on magnocellular dysfunction from studies associated with brain imaging, anatomical studies and psychophysical research<sup>41</sup>. These studies highlighted a decreased sensitivity in the magnocellular range<sup>42</sup>.

### **The Cerebellar/Automacity Theory**

The cerebellum is the part of the brain at the back of the skull which coordinates and regulates muscular activity (OED, 2004). It also plays a role in motor control and speech articulation<sup>43</sup>. The Cerebellar theory suggests that the individual's cerebellum is mildly dysfunctional. This results in a number of cognitive difficulties which correspond to those experienced by dyslexics. The cerebellum plays a role in the automatising of overlearned tasks such as reading, typing and driving. Hence, a weakness would affect (among other things) the learning of grapheme-phoneme correspondence.

Support for this theory comes from Nicolson and Fawcett (1990) and Fawcett and Nicolson (2001; cited Ramus, 2003). These academics all reported evidence of poor performance of dyslexics in a large number of motor tasks, in dual tasks and in time estimation, stemming from cerebellar dysfunction.

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<sup>39</sup> Subdivisions of the visual system (Beaton, 2004).

<sup>40</sup> Relating to or denoting the visual perception of the spatial relationships of objects (OED, 2004).

<sup>41</sup> The relationship between physical stimuli and mental phenomena (OED, 2004).

<sup>42</sup> Although these studies strongly emphasized the visual contribution to reading problems, they did not exclude phonological deficits.

<sup>43</sup> A diagram of the human brain can be found in Appendix 4.

## **The Magnocellular Theory**

Ramus (2003) points to a theory that unites all of the above. This theory suggests that magnocellular dysfunction is not restricted to visual pathways but also extends to the auditory and tactile modalities. Accordingly, this theory is viewed by academics as accounting for all known manifestations of dyslexia: auditory, visual, tactile, motor and consequently the phonological; each forming part of a more general magnocellular dysfunction (Murphy, 2003).

## **Appendix 5. Making Information Dyslexic-Friendly.**

### **Presentation of Information and Page Design**

Horton (1989; cited Rainger, 2003) and Morkes and Nielsen (1997; cited, Rainger 2003) discuss recommendations for information and page design. They recommend that page layouts should be designed to reduce the cognitive burden associated with spatial visualisation and visual motor coordination. The issue of scannability was also discussed. Dyslexics may not be able to easily scan through documents. They would be able to use their reading time more effectively if they could easily identify the information that they need. To enhance efficiency, Morkes and Nielsen (1997; cited Rainger, 2003) suggest that the writing style used should be scannable, concise and objective. Headings should be clear and easy to identify with key information presented towards the top centre of the page. It should also clearly stand out from the body of the text. Interface objects that enhance scanning include the use of icons, headings in large or bold type, and the use of highlighting, bulleted lists and indexes. In addition, a limited amount of information should be presented to prevent memory overload. Short line lengths and manageable chunks of information with clear spacing in between can also be used to guide the reader. This also allows the individual time to absorb the material.

Johnson and Peer (2003) and Rainger (2003) point out that the presentation of information will affect its visual perception and readability. Dyslexic individuals suffering from visual processing difficulties rely heavily of good presentation of information. This is so that they can easily identify and process the information that they need. They suggest increased line spacing, for example 1.5-2.0. They also recommend wide margins and short paragraphs to break up the text. Italics or underlining should be avoided because, to a dyslexic, this can make the words run together.

### **Font Style and Size**

Rainger (2003) suggests that the font style used should be rounded. It should reflect ordinary cursive writing, contain clear definable letter shapes and clear spacing between letter combinations. Good examples include Arial, Verdana and Tahoma.

For dyslexics, fonts where letters are unusually shaped or too close together<sup>44</sup> can be difficult and consequently time-consuming to read. For example the combination 'rn' can look like the letter 'm' to people with poor visual discrimination abilities (Johnson and Peer, 2003).

In relation to text size, Johnson and Peer (2003) recommend a minimum size of 12-pt as a guide. Anything smaller is considered too difficult to read by those with visual discrimination difficulties. However, print that is too large can impede the reader. They are trying to 'chunk' the text for meaning for the reason that not enough words can be scanned at once. Johnson and Peer (2003) also suggest avoiding all text presented in capital or small letters because these types of readers cannot grasp the shape of the letters. In addition, the outline of the words is too uniform. Therefore, a mixture of capital and small letters is going to be the most effective way of presenting words within sentences to a dyslexic. This will enhance reading efficiency.

### **Paper Type and Colour Contrast**

The visual processing difficulties experienced by dyslexics have important implications for an information provider's choice of paper type and colour contrast. The density of the paper should be heavy enough so that text does not show through the other side. Paper that allows this to happen makes it difficult for a dyslexic to read the text. Paper in 80 or 90 Gms' is quite effective.

Corrigan (2001) and Rainger (2003) explain that people with dyslexia can also experience readability difficulties if the colour contrast is inappropriate. Accordingly, the recommendations in the literature strongly suggest that the choice of colour for images, text and background should be given high priority in information design. There should be a sufficient contrast between the fore and background. A cream, off-white or pastel-coloured<sup>45</sup> background is preferred because of glare. Foreground text or objects can be more easily distinguished from the background with these colours (this is providing the text colour provides a suitable contrast). A low contrast between the print and background makes text easier to read. For example white text on a blue background is quite effective. However, a white background is not the preferred choice because of the glare that can be experienced. This combination can also cause the person to see 'rivers' of white space on the page and text 'dancing around'

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<sup>44</sup> Such as Times New Roman.

<sup>45</sup> Pale blue or yellow is preferred.

on the page. Black or dark blue text should be presented on an off-white or pastel-coloured background.

The literature suggests that the following colour combinations should be avoided as a result of the poor contrast between them and the visual effects experienced as a consequence:

- Green and red
- Red and purple
- Red and black
- Yellow and white
- Pink and lavender
- Black and white

### **The Use of Language**

Johnson and Peer (2003) explain that text accessibility depends on familiarity with the vocabulary and understanding the literary conventions used. For that reason, they suggest that design of the language structure is quite significant. Short transparent sentences with a simple structure will be easier to read than ones that are cryptic and obscure in nature. Johnson and Peer (2003) add that dyslexics live in a world of three-dimensional reality. This means that they can more easily recognise and understand concrete vocabulary that can be associated with experiences. The language used should be designed to create a script of images in the person's mind. It should enable them to more easily absorb and remember the information. They also need reassurance from the outset that all of the information provided will be easy to read. Therefore introductory text should be clear and easy to read, providing them with the confidence and motivation to continue reading.

### **On-line Interaction**

#### *Recommendations for Web-based Navigational Structures.*

Rainger (2003) explains that dyslexic people make fewer navigational mistakes if the hierarchical structure of the site is broader rather than deeper. This is because dyslexia makes it difficult for the person to figure out which way to navigate and remember the path that they have taken. However, if a broader structure is provided

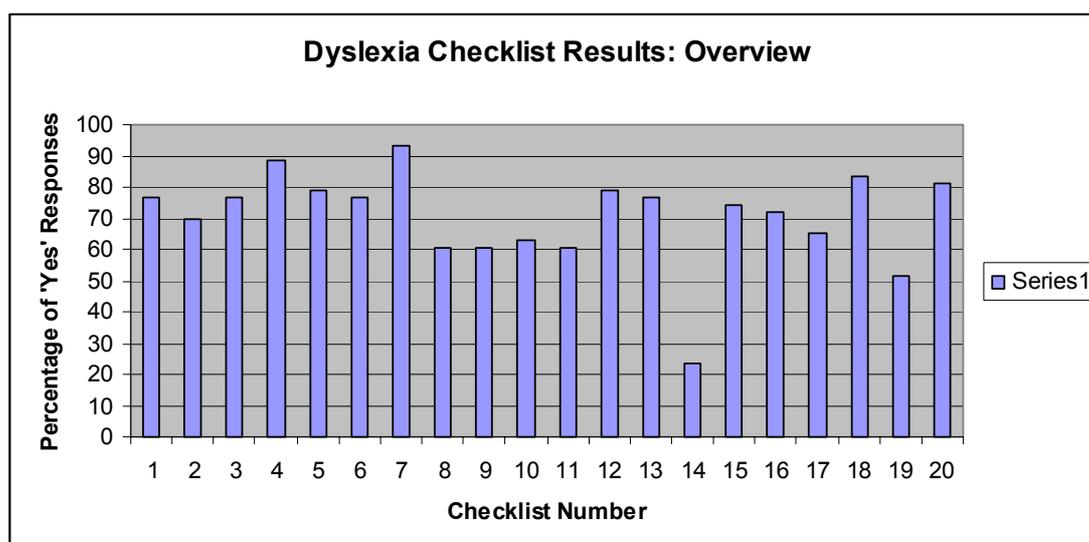
for ease of navigation, then there is the potential for information overload. To avoid this, Rainger (2003) suggests that hyperlinks should be boxed or grouped in columns. The columns of information should be vertically presented. Dyslexics find it difficult to follow information presented horizontally in light of visual processing and memory difficulties.

### *Site Learnability*

Dyslexics have different learning styles. Consequently, Johnson and Peer (2003) suggest a multisensory approach to learnability. This ensures weak or preferred senses are supported. Recommendations include text-to-speech facilities and providing the user with plenty of time for initial learning and task completion. Instructions should also be provided one at a time to avoid confusion, with a response provided in order to signify the end of a particular task before the user moves on. Lee (2000) explains that utilising right-brain visualisation skills can enhance site learnability. For example making effective use of colour and graphical representations at the interface, i.e. recognisable familiar icons.

**Appendix 6. BDA Adult Dyslexia Checklist Results: Overview (Focus Groups)<sup>46</sup>.**

	Yes (%)
1. Difficulties with left and right	76.7
2. Difficulties with map reading, navigation, orientation and spatial relationships	69.8
3. Difficulties reading aloud	76.7
4. Reading is inefficient	88.4
5. Remembering the sense of what has been read is difficult	79.1
6. Reading long books is difficult	76.7
7. Poor spelling	93
8. Handwriting is difficult to read	60.4
9. Confused when speaking in public	60.4
10. Writing down telephone messages correctly is difficult	62.8
11. Getting the sounds in the wrong order when saying a long word	60.4
12. Doing sums in the head without using fingers or paper is difficult	79.1
13. Numbers are mixed up when dialling a telephone number	76.7
14. Incorrect sequence for months going forwards	23.3
15. Incorrect sequence for months going backwards	74.4
16. Dates and times are mixed up and appointments are missed	72.1
17. Mistakes are made when writing cheques	65.1
18. Form-filling is difficult	83.7
19. Numbers are mixed up	51.2
20. Learning multiplication tables at school was difficult	81.4



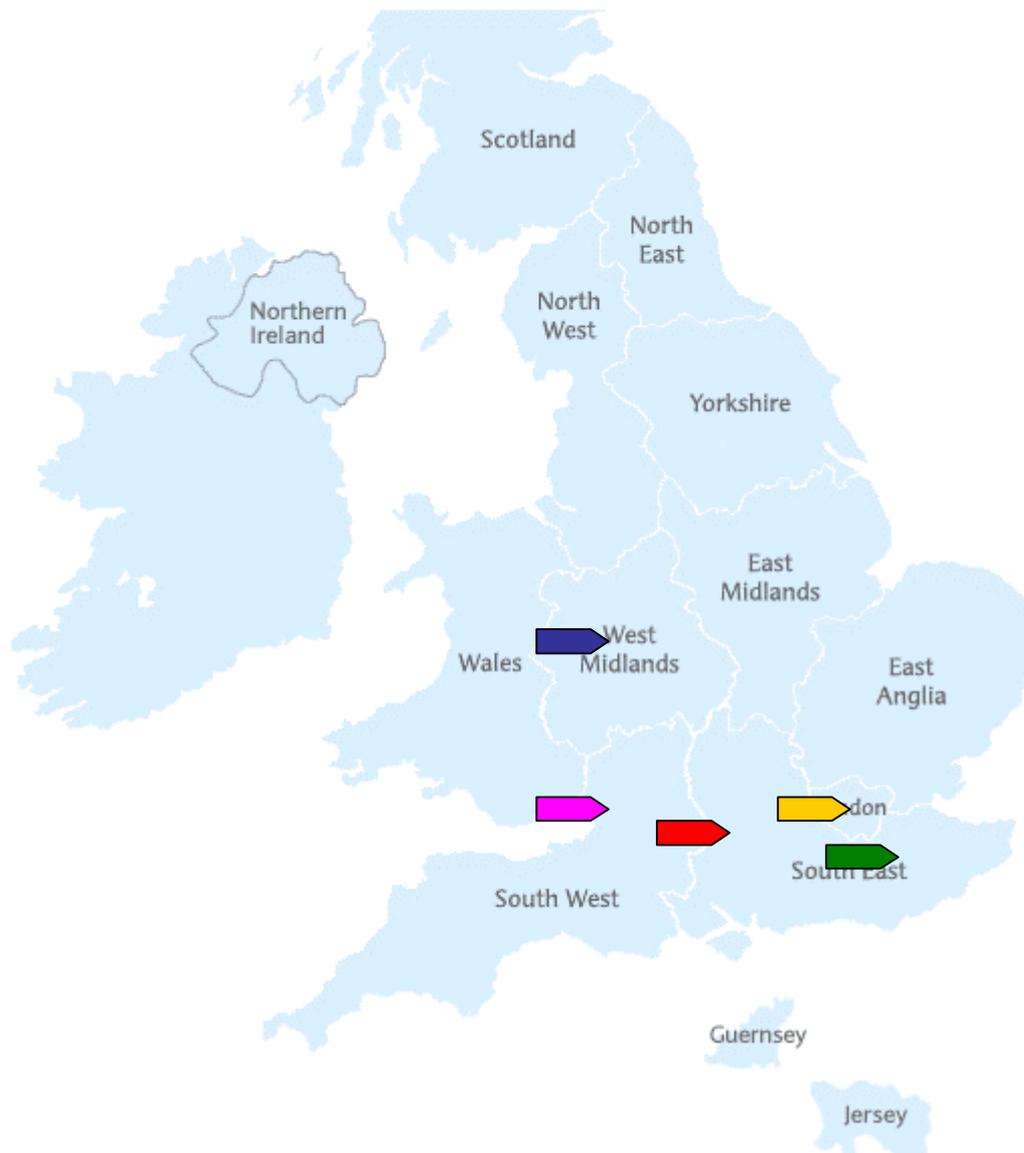
<sup>46</sup> n = 52

**Appendix 8. Proposed Focus Groups Specification.**

<b>Group Number</b>	<b>Number in Group</b>	<b>Gender</b>	<b>Age</b>	<b>Mode of Travel</b>	<b>Location</b>
<b>1</b>	6-10	Mixed	Mixed 18-60	Bus & Rail Journeys: All use bus or train at least once a week At least half travel beyond local area (50 miles) at least ten times a year At least half do not have a car	TBA
<b>2</b>	6-10	Mixed	Mixed 18-60	Car Journeys: At least half drive beyond their local area (50 miles) at least ten times a year	TBA
<b>3</b>	6-10	Male	Mixed 18-60	Bus & Rail Journeys: All use bus or train at least once a week At least half travel beyond local area (50 miles) at least ten times a year At least half do not have a car	TBA
<b>4</b>	6-10	Male	Mixed 18-60	Car Journeys: At least half drive beyond their local area (50 miles) at least ten times a year	TBA
<b>5</b>	6-10	Female	Mixed 18-60	Bus & Rail Journeys: All use bus or train at least once a week At least half travel beyond local area (50 miles) at least ten times a year At least half do not have a car	TBA
<b>6</b>	6-10	Female	Mixed 18-60	Car Journeys: At least half drive beyond their local area (50 miles) at least ten times a year	TBA

**Appendix 9. Focus Groups Schedule.**

Focus Group	Location	Date	Time
1.	Newbury, Berks ●	Tuesday 12 <sup>th</sup> October 2004	7.30 pm
2.	Bromley, Kent ●	Monday 18 <sup>th</sup> October 2004	7.30 pm
3.	Birmingham ●	Tuesday 19 <sup>th</sup> October 2004	1.00 pm
4.	Bristol ●	Wednesday 20 <sup>th</sup> October 2004	7.00 pm
5.	London ●	Monday 25 <sup>th</sup> October 2004	6.30 pm
6.	Newbury, Berks ●	Tuesday 26 <sup>th</sup> October 2004	7.00 pm



## **Appendix 10. Recruitment Information.**



### **Gloucestershire Dyslexic Association**

**Sandford Park Offices**

**College Road**

**Cheltenham**

**GL53 7HX**

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### **Research Study:**

**Understanding and Addressing Dyslexia in Travel Information Provision.**

### **Support Group Information Sheet**

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Your support group has been invited to take part in a study being conducted by the University of the West of England and the Department for Transport.

Before you decide to take part, it is important that you understand why the research is being undertaken, what it will involve, and the benefits of becoming involved.

This information sheet provides you with an introduction to the study. You can then think about whether your group should take part. Discuss it with others if you wish. If you change your mind and decide not to take part, no further contact will be made.

- **What is the purpose of the study?**

In the past, the barriers to transport facing people with dyslexia has received very limited if any attention. Yet, it is one of the most prominent specific learning disabilities in the UK.

In light of the manner in which dyslexia affects daily life, it is reasonable to assume that difficulties will be prominent when faced with the task of travelling and accessing travel information (examples of 'travel information' include timetables, maps, written directions, signs, displays, information obtained from the internet, telephone, mobile phone, and station staff).

This research seeks to investigate and understand the needs of dyslexics from, and frustrations concerning, travel information provision. We will also look at how these problems can be addressed.

- **If we decide to take part, what will we have to do?**

#### **Step one: Invitation to take part:**

The recruiter will contact you shortly to enquire as to whether you wish your support group to take part in the study. If you do decide to take part, they will ask you to identify suitable participants from your support group. If you decide not to take part, no further contact will be made.

#### **Step Two: Focus groups**

The study will begin with a series of focus groups (group discussions). A focus group typically brings together between six and ten individuals for a face-to-face discussion on a topic of interest. Participants provide a flow of input and interaction related to a particular topic, bringing their opinions to the surface, with the opportunity to diversify onto other related topics.

Focus groups offer a way of placing people in a more natural, real-life situation where they can more comfortably listen and respond to the comments and opinions of similar individuals. Furthermore, their semi-structured nature stimulates discussion, allowing individuals to discuss their experiences, raise issues of concern.

#### **Step Three: If your participants agree to take part:**

They will be asked to sign an 'informed consent' form. This states that:

- they have freely agreed to take part in the research;

- they agree to us collecting information from them;
- we will keep all of the information we collect anonymous and confidential;
- they are free to withdraw from the study at any time.

- **How will the data be collected?**

The researcher will take an audio record of the focus group discussions.

- **What are the benefits of taking part?**

The uniting of two previously unrelated fields of study (transport and dyslexia) will produce a novel understanding of a dyslexic's journey experiences and travel behaviour. For that reason, the research has significance for both academia and the Government.

The research also has considerable implications for mobility-related exclusion and dependency. Mobility represents individuality, freedom, escape, self-expression and control. Yet, the specific travel information needs of dyslexic people are being overlooked. As a result, they will either revert back to habitual behaviour, or trips will not be undertaken, which can fundamentally lead to dependence or mobility-related exclusion.

By changing the fundamental attitudes of society towards dyslexia and highlighting how dyslexic people can be better supported would provide a positive step forward in achieving greater social inclusion for dyslexia people. Furthermore, by tackling the issues and providing more appropriate journey support, it is hoped that this will improve the ability of a person with dyslexia to travel independently and build their confidence to do so. This could provide them with better social opportunities and more positive fulfilling life experiences.

**If you have any other questions please contact:**

**Deborah Lamont, Researcher**

**Telephone Number: 07745 198106**

**E-mail Address: [deborah.lamont@uwe.ac.uk](mailto:deborah.lamont@uwe.ac.uk)**

**Appendix 11a. Screening Process: Dyslexia Checklist (BDA; Vinegrad, 1994)**

Please tick **Yes** or **No** to each question. Don't miss any questions out. If in doubt tick the answer that you feel is true most often.

	Yes	No
1. Do you find difficulty telling left from right?		
2. Is map reading or finding your way to a strange place confusing?		
3. Do you dislike reading aloud?		
4. Do you take longer than you should to read a page of a book?		
5. Do you find it difficult to remember the sense of what you have read?		
6. Do you dislike reading long books?		
7. Is your spelling poor?		
8. Is your writing difficult to read?		
9. Do you get confused if you have to speak in public?		
10. Do you find it difficult to take messages on the telephone and pass them on correctly?		
11. When you say a long word, do you sometimes find it difficult to get all the sounds in the right order?		
12. Do you find it difficult to do sums in your head without using your fingers or paper?		
13. When using the telephone, do you tend to get the numbers mixed up when you dial?		
14. Do you find it difficult to say the months of the year forwards in a fluent manner?		
15. Do you find it difficult to say the months of the year backwards?		
16. Do you mix up dates and times and miss appointments?		
17. When writing cheques do you frequently find yourself making mistakes?		
18. Do you find forms difficult and confusing?		
19. Do you mix up bus numbers like 95 and 59?		
20. Did you find it hard to learn your multiplication tables at school?		

**The items on the questionnaire that best discriminate between dyslexic and non-dyslexic individuals (in order of importance) are:-**

Order	Item
1.	Q17
2.	Q13
3.	Q7
4.	Q16
5.	Q18
6.	Q10
7.	Q19
8.	Q14
9.	Q20
10.	Q4
11.	Q1
12.	Q11

**If the majority of these items are ticked, this is a strong indication of dyslexia. Nine or more YES (positive) responses on the questionnaire, as a whole are therefore a powerful indicator of dyslexia.**

## Adult Dyslexia Checklist - Example

**Name:** Stephen

Please tick **Yes OR No** to each question.

	<b>Yes</b>	<b>No</b>
1. Do you find difficulty telling left from right?	/	
2. Is map reading or finding your way to a strange place confusing?	/	
3. Do you dislike reading aloud?	/	
4. Do you take longer than you should to read a page of a book?	/	
5. Do you find it difficult to remember the sense of what you have read?	/	
6. Do you dislike reading long books?	/	
7. Is your spelling poor?	/	
8. Is your writing difficult to read?	/	
9. Do you get confused if you have to speak in public?	/	
10. Do you find it difficult to take messages on the telephone and pass them on correctly?	/	
11. When you say a long word, do you sometimes find it difficult to get all the sounds in the right order?	/	
12. Do you find it difficult to do sums in your head without using your fingers or paper?	/	
13. When using the telephone, do you tend to get the numbers mixed up when you dial?	/	
14. Do you find it difficult to say the months of the year forwards in a fluent manner?	/	
15. Do you find it difficult to say the months of the year backwards?	/	
16. Do you mix up dates and times and miss appointments?	/	
17. When writing cheques do you frequently find yourself making mistakes?	/	
18. Do you find forms difficult and confusing?	/	
19. Do you mix up bus numbers like 95 and 59?	/	
20. Did you find it hard to learn your multiplication tables at school?	/	

**Appendix 11b. Screening Process: Recruitment Questionnaire.**



**DFR PROJECT 1856 RECRUITMENT QUESTIONNAIRE**

---

**Introduction: Good morning/afternoon/evening. My name is..... (SHOW ID) and I am conducting some research on behalf of University of West of England. We are keen to know the problems that you experience travelling and accessing travel information before & during a journey & how these problems can be addressed. We are holding a focus group discussion at a nearby venue. To ensure that we talk to a cross section of individuals - may I ask you a few brief questions?**

Q1. Firstly, can I check that you have been officially diagnosed with dyslexia?

YES	1	
NO	2	<b>THANK &amp; CLOSE</b>

Q2. Which of the following age bands do you fall into please?

18 - 35	1
36 - 50	2
51 - 70	3

Q3. Recruiter: Confirm respondent gender

Male	1
Female	2

Q4. Are you are car owner/driver?

YES	1	<b>ASK Q5</b>
NO	2	<b>ASK Q6</b>

Q5. Are your car journeys mostly.....

Local/familiar journeys	1
Unfamiliar/Outside local area	2

Q6. How often do you travel by bus?

Daily	1
Weekly	2
Less often	3
Never	4

Q7a. How often do you travel by train?

Daily	1
Weekly	2
Less often	3
Never	4

Q7b. How frequently do you travel outside your local area?

At least once per month	1
Every two or three months	2
Once or twice per year	3
Never	4

**RECRUITER: PLEASE EXPLAIN A LITTLE ABOUT FOCUS GROUPS [AS NECESSARY] TO PUT RESPONDENT AT THEIR EASE.**

Q8 Would you be willing to attend a focus group on this topic?

YES	1	<b>CONTINUE BELOW</b>
NO	2	<b>THANK &amp; CLOSE</b>

Respondent Name \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

Tel no \_\_\_\_\_

**INTERVIEWER DECLARATION**

**I have recruited this person to the criteria specified by this questionnaire and other briefing provided.**

**SIGNED** \_\_\_\_\_

**DATE** \_\_\_\_\_

## Recruitment Screener - Example: Stephen



### DFR PROJECT 1856 RECRUITMENT QUESTIONNAIRE

---

**Introduction: Good morning/afternoon/evening. My name is..... (SHOW ID) and I am conducting some research on behalf of University of West of England. We are keen to know the problems that you experience travelling and accessing travel information before & during a journey & how these problems can be addressed. We are holding a focus group discussion at a nearby venue. To ensure that we talk to a cross section of individuals - may I ask you a few brief questions?**

Q1. Firstly, can I check that you have been officially diagnosed with dyslexia?

<u>YES</u>	1	
NO	2	<b>THANK &amp; CLOSE</b>

Q2. Which of the following age bands do you fall into please?

18 - 35	1
<u>36 - 50</u>	2
51 - 70	3

Q3. Recruiter: Confirm respondent gender

<u>Male</u>	1
Female	2

Q4. Are you are car owner/driver?

<u>YES</u>	1	<b>ASK Q5</b>
NO	2	<b>ASK Q6</b>

Q5. Are your car journeys mostly.....

<u>Local/familiar journeys</u>	1
Unfamiliar/Outside local area	2

Q6. How often do you travel by bus?

Daily	1
Weekly	2
Less often	3
<u>Never</u>	4

Q7a. How often do you travel by train?

Daily	1
Weekly	2
<u>Less often</u>	3
Never	4

Q7b. How frequently do you travel outside your local area?

At least once per month	1
<u>Every two or three months</u>	2
Once or twice per year	3
Never	4

**RECRUITER: PLEASE EXPLAIN A LITTLE ABOUT FOCUS GROUPS [AS NECESSARY] TO PUT RESPONDENT AT THEIR EASE.**

Q8 Would you be willing to attend a focus group on this topic?

<u>YES</u>	1	<b>CONTINUE BELOW</b>
NO	2	<b>THANK &amp; CLOSE</b>

## **Appendix 12. Participant Information Sheet.**



### **Research Study**

#### **Understanding and Addressing Dyslexia in Travel Information Provision**

#### **Information Sheet**

You have been invited by your support group to take part in a study being conducted by the University of the West of England and the Department for Transport.

Before you decide to take part, it is important that you understand why the research is being undertaken, what it will involve and the benefits of becoming involved.

This information sheet provides you with an introduction to the study. You can then think about whether to take part. Discuss it with others if you wish. If you change your mind and decide not to take part, no further contact will be made.

- **What is the purpose of the study?**

In the past, the barriers to transport facing people with dyslexia has received very limited if any attention. Yet, it is one of the most prominent specific learning disabilities in the UK.

In light of the manner in which dyslexia affects daily life, it is reasonable to assume that difficulties will be prominent when faced with the task of travelling and accessing travel information (examples of 'travel information' include timetables, maps, written directions, signs, displays, information obtained from the internet, telephone, mobile phone, and station staff).

This research seeks to investigate and understand the needs of dyslexics from, and frustrations concerning, travel information provision during a journey. We will also look at how these problems can be addressed.

- **If I decide to take part, what will I have to do?**

The study will begin with a series of focus groups (group discussions). A focus group typically brings together between six and ten individuals for a face-to-face discussion on a topic of interest. Participants provide a flow of input and interaction related to a particular topic, bringing their opinions to the surface, with the opportunity to diversify onto other related topics.

Focus groups offer a way of placing people in a more natural, real-life situation where they can more comfortably listen and respond to the comments and opinions of similar individuals. Furthermore, their semi-structured nature stimulates discussion, allowing individuals to discuss their experiences, raise issues of concern.

If possible, we would like you to bring along examples of travel information that you have used in the past.

- **How will the data be collected?**

The researcher will take an audio record of the focus group discussions (all information will be kept secure and confidential).

- **What are the benefits of taking part?**

The uniting of two previously unrelated fields of study (transport and dyslexia) will produce a novel understanding of a dyslexic's journey experiences and travel behaviour. For that reason, the research has significance for both academia and the Government.

The research also has considerable implications for mobility-related exclusion and dependency. Mobility represents individuality, freedom, escape, self-expression and control. Yet, the specific travel information needs of dyslexic people are being overlooked. As a result, they will either revert back to habitual

behaviour, or trips will not be undertaken, which can fundamentally lead to dependence or mobility-related exclusion.

By changing the fundamental attitudes of society towards dyslexia and highlighting how it can be better supported within transport provision would provide a positive step forward in achieving greater social inclusion for dyslexic people. Furthermore, by tackling the issues and providing more appropriate journey support, it is hoped that this will improve the ability of a person with dyslexia to travel independently and build their confidence to do so. This could provide them with better social opportunities and more positive fulfilling life experiences.

**If you have any questions please contact:**

**Deborah Lamont, Researcher**

**Telephone Number: 07745 198106**

**E-mail Address: [deborah.lamont@uwe.ac.uk](mailto:deborah.lamont@uwe.ac.uk)**

### Appendix 13. Focus Groups Profile.

<b>Group</b>	<b>Location</b>	<b>Number</b>	<b>Gender</b>	<b>Age</b>	<b>Mode of travel</b>
<b>1</b>	Newbury	8	4 male 4 female	Mixed	6 car: - 2 local/familiar only - 3 long distance/unfamiliar only - 1 both 2 bus frequently <sup>47</sup> 1 train frequently 6 frequent long distance travel <sup>48</sup>
<b>2</b>	Bromley	9	6 male 3 female	Mixed	6 car: - 3 local/familiar only - 3 both 3 bus frequently 3 train frequently 9 long distance travel
<b>3</b>	Birmingham	10	4 male 6 female	Mixed	6 car: - 1 local/familiar only - 2 LD/unfamiliar only - 3 both 5 bus frequently 3 train frequently 4 long distance travel
<b>4</b>	Bristol	8	4 male 4 female	Mixed	5 car: - 2 local/familiar only - 1 LD/unfamiliar only - 2 both 4 bus frequently 1 train frequently 7 long distance travel
<b>5</b>	London	9	4 male 5 female	Mixed	4 car: - 4 both 8 bus frequently 8 train frequently 9 long distance travel
<b>6</b>	Newbury	8	4 male 4 female	Mixed	5 car: - 2 local/familiar only - 2 LD/unfamiliar only - 2 both 4 bus frequently 2 train frequently 8 long distance travel

<sup>47</sup> 'Frequently' has been interpreted as daily or weekly travel.

<sup>48</sup> 'Frequent' has been interpreted as travel once a month or every 2-3 months.

## **Appendix 14. Focus Groups Topic Guide.**

### Part One – Introduction.

- Welcome & introduce myself
- Aims of the research & the focus groups study
- How the focus groups will be conducted/use of the data
- Brief round of introductions

### Part Two – Dyslexia.

- The aspects of dyslexia each participant suffers from most frequently/severely, how they cope with these difficulties (refer to list A).

### Part Three – Pre-Trip Planning.

- Do the participants plan their journeys pre-trip? How important is this task?
- Sources of travel information used? Problems with these? How could access to these media be improved?
- What happens if the participant is unable to obtain the information that they need pre-trip?
- Introduce Transport Direct (screen shots -B) – impressions?

### Part Four – En-route Experiences.

- Do they find certain types of journeys difficult (distance, familiarity)?
- Certain modes favoured for certain journeys? Certain journeys avoided?
- Do they take pre-trip information on the journey? How is it used?

#### Part Five - Public Transport.

“Most of you use / have used public transport (apologies to those who cannot participate in this part of the discussion. We will move on to car journeys shortly). Let’s discuss the frustrations you face (or have faced in the past) in relation to information used during a journey by public transport.”

#### Part Six – Car Journey Experiences.

“Imagine you have to make an unfamiliar journey by car. Let’s discuss the frustrations you may face (or have faced in the past) in relation to information used during a journey by car.”

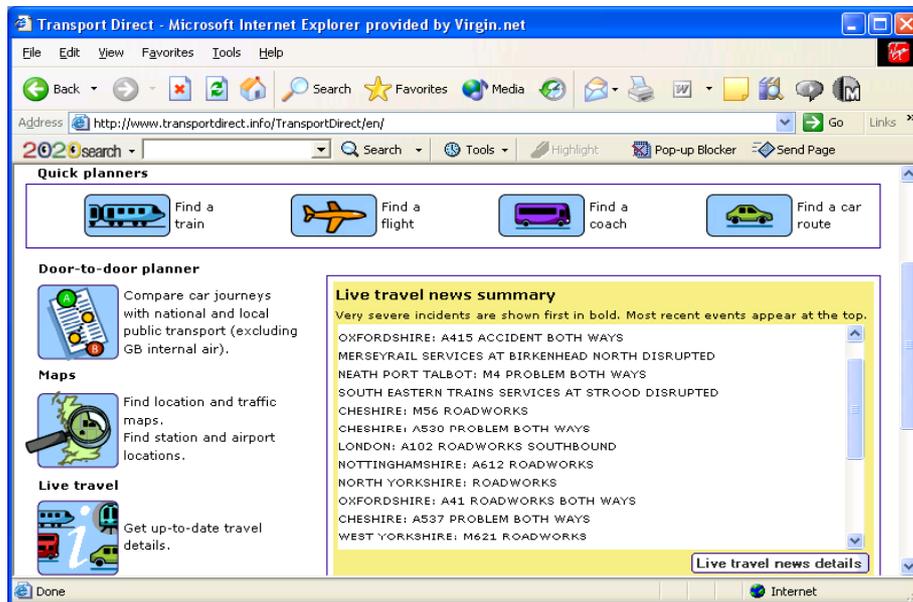
#### Part Seven – Close and Thankyou’s.

## **A – The Difficulties Associated With Dyslexia**

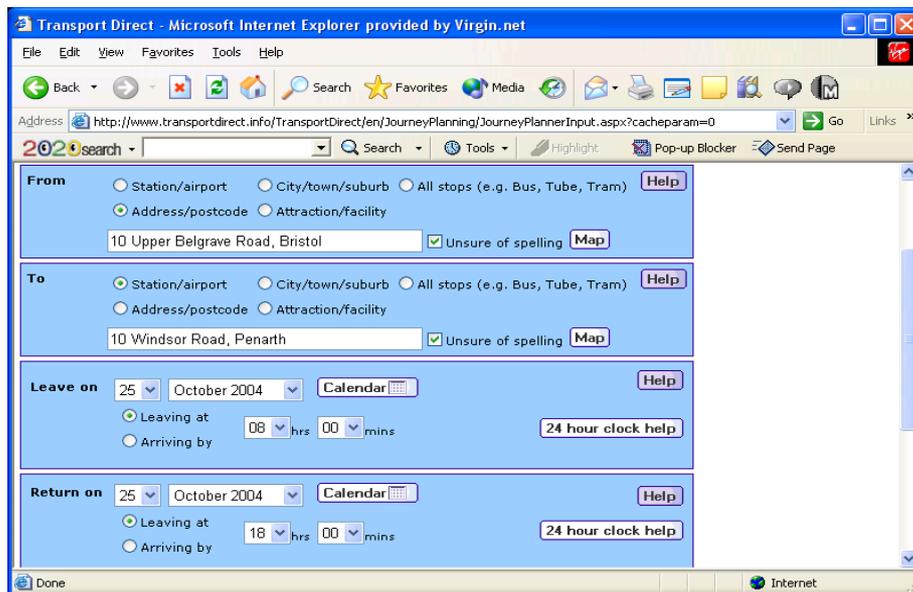
- **Listening**
- **Motor Skills**
- **Navigation and Wayfinding**
- **Numbers**
- **Organising Things**
- **Orientation and Spatial Awareness**
- **Reading**
- **Sequencing**
- **Short-Term Memory**
- **Speech**
- **Spelling**
- **Writing**

## B: Transport Direct<sup>49</sup>.

### 1. Home Page



### 2. Journey Planner



<sup>49</sup> Each screen shot was size A4.

### 3. Journey Options

Summary of journey options

Amend date/time

Help 24 hour clock help Summary Details Maps Fares Ticket retailers Extend journey

Outward journeys for Mon 25 Oct 04 leaving after 08:00

Option	Transport	Changes	Leave	Arrive	Duration	Select
1	Bus, Train, Walk	3	08:22	10:45	2hours, 23 mins	<input checked="" type="radio"/>
2	Bus, Coach, Train, Walk	5	08:43	11:19	2hours, 36 mins	<input type="radio"/>
3	Car	0	08:00	08:55	55 mins / 43.8miles	<input type="radio"/>

Return journeys for Mon 25 Oct 04 leaving after 18:00

Option	Transport	Changes	Leave	Arrive	Duration	Select
1	Bus, Coach, Walk	2	18:30	20:40	2hours, 10 mins	<input checked="" type="radio"/>
2	Bus, Train, Walk	2	18:55	20:55	2hours	<input type="radio"/>
3	Car	0	18:00	19:01	1hour, 01min / 45.9miles	<input type="radio"/>

Note: "Change" means getting off one vehicle to board another.  
Also, please (re)check your journey details within 2 weeks of travelling as some services may change.

Print

Amend date and time Save as a favourite journey Send to a friend

### 4. Public Transport Journey Representation

Details: Outward journey 1 Adjust journey details Show details in a table

Start

10 UPPER BELGRAVE ROAD, BRISTOL, BS8 2XH Info

leave 08:22 Find transport to here

Walk 8 mins

depart 08:30 Black Boy Hill (E), Clifton Down, Bristol City of Info

Take FIRST (BRISTOL)/9A towards Bristol Temple Meads

Bus 9A 1 min

Map Map

## 5. Car Directions

Summary of directions Total distance 47.4 miles Total duration 1 hrs 10 min Distance units miles

Directions

Trip miles	Directions	Time
1	Starting from CF5 6BJ	
2	Go on to SEAVIEW TERRACE	13:50
3	0.0 Immediately take first available left on to ST LYTHERNS ROAD, continue for 0.4 miles	13:50
4	0.5 Go on to local road, continue for 0.2 miles	13:53
5	0.7 Take first available exit off roundabout on to A4050 (PORT ROAD), continue for 0.2 miles	13:55
6	0.9 Take second available exit off roundabout on to A4232 (Slip Road)	13:56
7	1.1 Go on to A4232, continue for 3.3 miles	13:59
8	4.4 Take third available exit off roundabout on to M4 (Slip Road) at junction 33 towards Newport	14:10
9	4.7 Go on to M4, continue for 40.2 miles until junction 19	14:11
10	44.9 At junction 19 leave motorway towards Bristol	14:46
11	45.1 Go on to A172, continue for 0.5 miles until junction 1	14:47
12	45.6 At junction 1 leave motorway towards Filton	14:47
13	46.0 Take third available exit off roundabout on to A4174, continue for 0.7 miles	14:50
14	46.8 Take third available left on to COLDHARBOUR LANE, continue for 0.4 miles	14:53
15	47.1 Take third available exit off roundabout on to local road, continue for 0.2 miles	14:58
16	47.4 Arrive at BS16 1QY	15:00

## 6. Map Information

Transport Direct - Microsoft Internet Explorer provided by Virgin.net

Address: d4&NRNODEGUID=%7b1EBFE8C6-B374-44A5-818D-E53D7EE66E3C%7d&NR CACHEHINT=NoModifyGuest&cacheparam=7

Map Symbols

- Transport
  - Bus/Coach stops
  - Rail stations (inc. Underground, Metro)
  - Airports & ferry terminals
  - Taxi ranks
- Accommodation
- Sport & entertainment
- Attractions
- Health
- Education
- Public buildings & services

Show selected symbols

**Appendix 15. Informed Consent.**

**‘Understanding and Addressing Dyslexia in Travel Information Provision’**

**Informed Consent Form**

**Venue:**

The focus group will be recorded and transcribed.

All data will be held securely and kept confidential.

Your name will not appear on the transcripts.

The researcher may use selected quotes from the focus group discussion when writing research reports.

**If my words are used in the research report:**

- I would like to be referred to as .....
- I have no preference

**I have read the information about the project and I agree that my contribution to the focus group can be used by the research team.**

**Name.....**

**Signature.....**

**Date.....**

## **Appendix 16. Travel Ethnography Participant Profiles.**

### **Name: Hugh (Participant A)**

- Gender: Male
- Ethnic Origin: Black (UK national)
- Age: 46
- Occupation: Owner of a travel agency

	Yes	No
1. Do you find difficulty telling left from right?	/	
2. Is map reading or finding your way to a strange place confusing?	/	
3. Do you dislike reading aloud?	/	
4. Do you take longer than you should to read a page of a book?	/	
5. Do you find it difficult to remember the sense of what you have read?	/	
6. Do you dislike reading long books?	/	
7. Is your spelling poor?	/	
8. Is your writing difficult to read?		/
9. Do you get confused if you have to speak in public?	/	
10. Do you find it difficult to take messages on the telephone and pass them on correctly?	/	
11. When you say a long word, do you sometimes find it difficult to get all the sounds in the right order?	/	
12. Do you find it difficult to do sums in your head without using your fingers or paper?	/	
13. When using the telephone, do you tend to get the numbers mixed up when you dial?	/	
14. Do you find it difficult to say the months of the year forwards in a fluent manner?		/
15. Do you find it difficult to say the months of the year backwards?	/	
16. Do you mix up dates and times and miss appointments?	/	
17. When writing cheques do you frequently find yourself making mistakes?	/	
18. Do you find forms difficult and confusing?	/	
19. Do you mix up bus numbers like 95 and 59?	/	
20. Did you find it hard to learn your multiplication tables at school?	/	

Total: 90% positive responses

### **Travel Behaviour**

Q4. Are you are car owner/driver?

YES  
NO

1  
2

**ASK Q5**  
**ASK Q6**

Q5. Are your car journeys mostly.....

Local/familiar journeys	1
<u>Unfamiliar/Outside local area</u>	2

Q6. How often do you travel by bus?

Daily	1
Weekly	2
<u>Less often</u>	3
Never	4

Q7a. How often do you travel by train?

Daily	1
Weekly	2
<u>Less often</u>	3
Never	4

Q7b. How frequently do you travel outside your local area?

<u>At least once per month</u>	1
Every two or three months	2
Once or twice per year	3
Never	4

**Name: Denise (Participant B)**

- Gender: Female
- Ethnic Origin: White British
- Age: 35
- Occupation: Sales

	Yes	No
1. Do you find difficulty telling left from right?	/	
2. Is map reading or finding your way to a strange place confusing?	/	
3. Do you dislike reading aloud?	/	
4. Do you take longer than you should to read a page of a book?	/	
5. Do you find it difficult to remember the sense of what you have read?	/	
6. Do you dislike reading long books?	/	
7. Is your spelling poor?	/	
8. Is your writing difficult to read?		/
9. Do you get confused if you have to speak in public?	/	
10. Do you find it difficult to take messages on the telephone and pass them on correctly?	/	
11. When you say a long word, do you sometimes find it difficult to get all the sounds in the right order?	/	
12. Do you find it difficult to do sums in your head without using your fingers or paper?	/	

13. When using the telephone, do you tend to get the numbers mixed up when you dial?	/	
14. Do you find it difficult to say the months of the year forwards in a fluent manner?		/
15. Do you find it difficult to say the months of the year backwards?	/	
16. Do you mix up dates and times and miss appointments?	/	
17. When writing cheques do you frequently find yourself making mistakes?	/	
18. Do you find forms difficult and confusing?	/	
19. Do you mix up bus numbers like 95 and 59?	/	
20. Did you find it hard to learn your multiplication tables at school?	/	

Total: 90% positive responses

### Travel Behaviour

Q4. Are you are car owner/driver?

<u>YES</u>	1	<b>ASK Q5</b>
NO	2	<b>ASK Q6</b>

Q5. Are your car journeys mostly.....

Local/familiar journeys	1
<u>Unfamiliar/Outside local area</u>	2

Q6. How often do you travel by bus?

Daily	1
Weekly	2
<u>Less often</u>	3
Never	4

Q7a. How often do you travel by train?

Daily	1
Weekly	2
Less often	3
<u>Never</u>	4

Q7b. How frequently do you travel outside your local area?

At least once per month	1
<u>Every two or three months</u>	2
Once or twice per year	3
Never	4

**Name: Mary (Participant C)**

- Gender: Female
- Ethnic Origin: White British
- Age: 57
- Occupation: Special needs teaching assistant

	Yes	No
1. Do you find difficulty telling left from right?	/	
2. Is map reading or finding your way to a strange place confusing?	/	
3. Do you dislike reading aloud?	/	
4. Do you take longer than you should to read a page of a book?	/	
5. Do you find it difficult to remember the sense of what you have read?	/	
6. Do you dislike reading long books?	/	
7. Is your spelling poor?	/	
8. Is your writing difficult to read?		/
9. Do you get confused if you have to speak in public?	/	
10. Do you find it difficult to take messages on the telephone and pass them on correctly?	/	
11. When you say a long word, do you sometimes find it difficult to get all the sounds in the right order?	/	
12. Do you find it difficult to do sums in your head without using your fingers or paper?	/	
13. When using the telephone, do you tend to get the numbers mixed up when you dial?	/	
14. Do you find it difficult to say the months of the year forwards in a fluent manner?	/	
15. Do you find it difficult to say the months of the year backwards?	/	
16. Do you mix up dates and times and miss appointments?	/	
17. When writing cheques do you frequently find yourself making mistakes?	/	
18. Do you find forms difficult and confusing?	/	
19. Do you mix up bus numbers like 95 and 59?	/	
20. Did you find it hard to learn your multiplication tables at school?	/	

Total: 95% positive responses

**Travel Behaviour**

Q4. Are you are car owner/driver?

YES 1 ASK Q5  
NO 2 ASK Q6

Q5. Are your car journeys mostly.....

Local/familiar journeys 1  
 Unfamiliar/Outside local area 2

Q6. How often do you travel by bus?

Daily 1  
Weekly 2  
 Less often 3  
 Never 4

Q7a. How often do you travel by train?

Daily 1  
Weekly (mainly in the summer) 2  
 Less often 3  
 Never 4

Q7b. How frequently do you travel outside your local area?

At least once per month 1  
 Every two or three months 2  
 Once or twice per year 3  
 Never 4

**Name: Donald (Participant D)**

- Gender: Male
- Ethnic Origin: Black (UK national)
- Age: 48
- Occupation: Director - Adult Dyslexia Organisation

	Yes	No
1. Do you find difficulty telling left from right?	/	
2. Is map reading or finding your way to a strange place confusing?	/	
3. Do you dislike reading aloud?	/	
4. Do you take longer than you should to read a page of a book?	/	
5. Do you find it difficult to remember the sense of what you have read?	/	
6. Do you dislike reading long books?	/	
7. Is your spelling poor?	/	
8. Is your writing difficult to read?	/	
9. Do you get confused if you have to speak in public?	/	
10. Do you find it difficult to take messages on the telephone and pass them on correctly?	/	
11. When you say a long word, do you sometimes find it difficult to get all the sounds in the right order?	/	
12. Do you find it difficult to do sums in your head without using your fingers or paper?	/	
13. When using the telephone, do you tend to get the numbers mixed up	/	

when you dial?		
14. Do you find it difficult to say the months of the year forwards in a fluent manner?	/	
15. Do you find it difficult to say the months of the year backwards?	/	
16. Do you mix up dates and times and miss appointments?	/	
17. When writing cheques do you frequently find yourself making mistakes?	/	
18. Do you find forms difficult and confusing?	/	
19. Do you mix up bus numbers like 95 and 59?	/	
20. Did you find it hard to learn your multiplication tables at school?	/	

Total: 100% positive responses

### Travel Behaviour

Q4. Are you are car owner/driver?

YES	1	<b>ASK Q5</b>
<u>NO</u>	2	<b>ASK Q6</b>

Q5. Are your car journeys mostly.....

Local/familiar journeys	1
Unfamiliar/Outside local area	2

Q6. How often do you travel by bus?

Daily	1
<u>Weekly</u> (last resort)	2
Less often	3
Never	4

Q7a. How often do you travel by train?

Daily	1
<u>Weekly</u>	2
Less often	3
Never	4

Q7b. How frequently do you travel outside your local area?

<u>At least once per month</u>	1
Every two or three months	2
Once or twice per year	3
Never	4

**Name: Deborah (The Researcher)**

- Gender: Female
- Ethnic Origin: White British
- Age: 33
- Occupation: Academic

	Yes	No
1. Do you find difficulty telling left from right?		/
2. Is map reading or finding your way to a strange place confusing?		/
3. Do you dislike reading aloud?		/
4. Do you take longer than you should to read a page of a book?		/
5. Do you find it difficult to remember the sense of what you have read?		/
6. Do you dislike reading long books?		/
7. Is your spelling poor?		/
8. Is your writing difficult to read?		/
9. Do you get confused if you have to speak in public?		/
10. Do you find it difficult to take messages on the telephone and pass them on correctly?		/
11. When you say a long word, do you sometimes find it difficult to get all the sounds in the right order?		/
12. Do you find it difficult to do sums in your head without using your fingers or paper?		/
13. When using the telephone, do you tend to get the numbers mixed up when you dial?		/
14. Do you find it difficult to say the months of the year forwards in a fluent manner?		/
15. Do you find it difficult to say the months of the year backwards?		/
16. Do you mix up dates and times and miss appointments?		/
17. When writing cheques do you frequently find yourself making mistakes?		/
18. Do you find forms difficult and confusing?		/
19. Do you mix up bus numbers like 95 and 59?		/
20. Did you find it hard to learn your multiplication tables at school?		/

Total: 0 positive responses

**Travel Behaviour**

Q4. Are you are car owner/driver?

YES  
NO

1     **ASK Q5**  
2     **ASK Q6**

Q5. Are your car journeys mostly.....

<u>Local/familiar journeys</u>	1
Unfamiliar/Outside local area	2

Q6. How often do you travel by bus?

Daily	1
<u>Weekly</u>	2
Less often	3
Never	4

Q7a. How often do you travel by train?

Daily	1
Weekly	2
<u>Less often</u>	3
Never	4

Q7b. How frequently do you travel outside your local area?

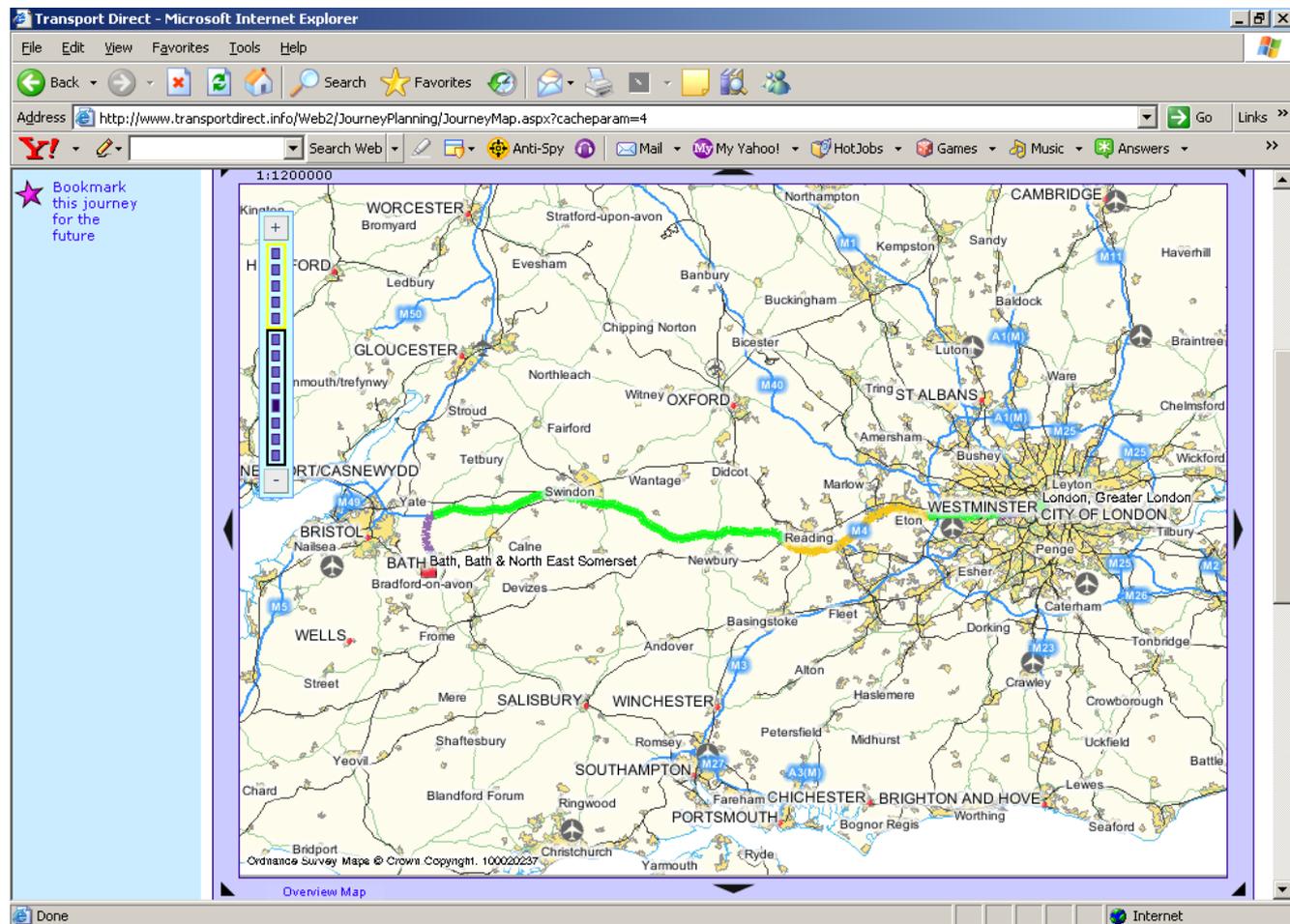
At least once per month	1
<u>Every two or three months</u>	2
Once or twice per year	3
Never	4

## Appendix 17. Travel Ethnography Schedule.

### Car Journey 1 – the Pilot Study (Participant A - Hugh)

The pilot journey involved an unfamiliar long distance car journey from Hugh's home to a car park in Bath City Centre (total miles = 245). The date of the journey was Saturday 18<sup>th</sup> November 2006, leaving from Paddington train station at 10.00am. The screenshot below highlights the unfamiliar stage of the journey (the end point of London onwards):

### Map Representing Car Journey 1 - London to Bath City Centre (Transport Direct, 2008)

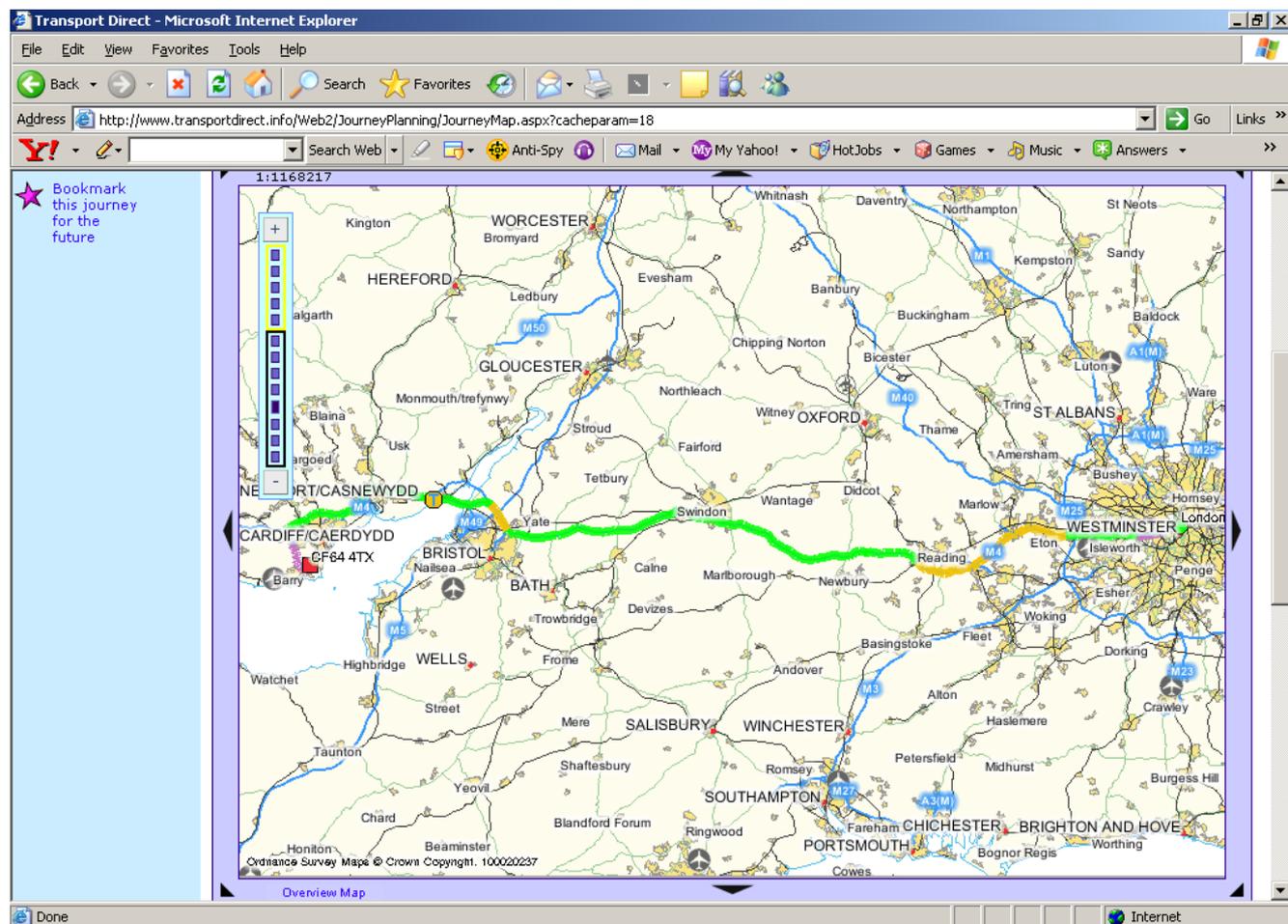


## Car Journey's 2 & 3 (Participant A – Hugh; Participant B – Denise)

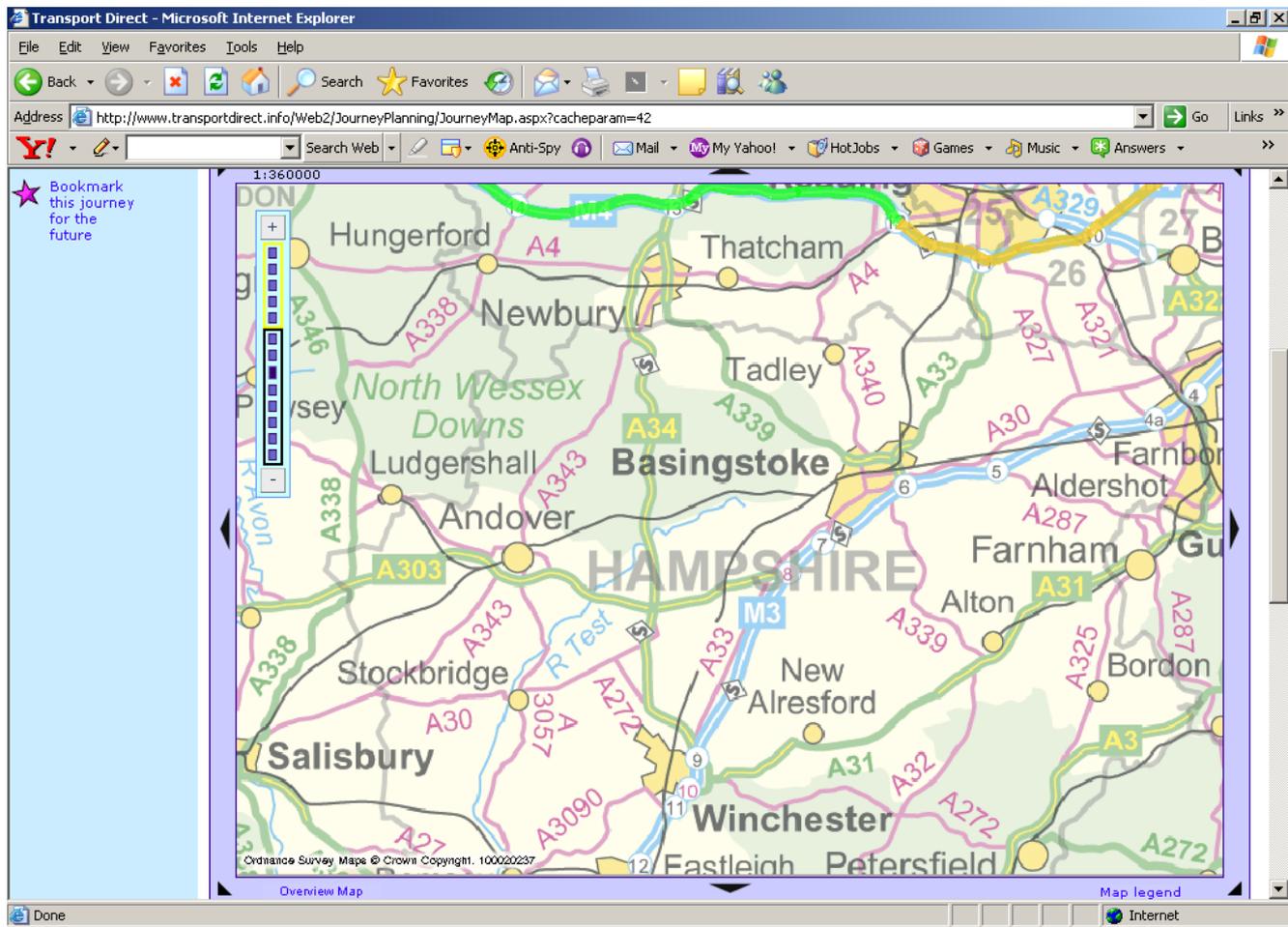
These 2 journeys involved an identical origin and destination, but Hugh and Denise were free to choose the route taken in between. The journey would be an unfamiliar long distance journey from the participant's home to the researcher's home address in Cardiff (CF64 4TX), a trip of 390 miles.

Journey 2 was undertaken by Hugh on Saturday 16<sup>th</sup> December 2006, leaving Paddington station at 11am. Journey 3 took place with Denise on Wednesday 17<sup>th</sup> January 2007, leaving Paddington station at 2.30pm. The screenshot below highlights the unfamiliar stage of the journey (the end point of London onwards):

## Car Journeys 2 & 3 - London to CF64 4TX (Transport Direct, 2008)



The map below shows the diverted route taken during journey 2:



## **The Public Transport Journey**

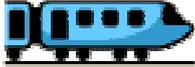
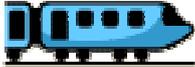
All 3 of the public transport journeys involved the same origin and destination - an unfamiliar long distance journey between the participant's home and a specific address in Bristol (JBP Associates, 6 Whiteladies Road, Bristol, BS8 1PD).

The first journey involved Mary (Participant C) on Friday 23<sup>rd</sup> February 2007, meeting at Paddington at 10.00am. Journey 2 was undertaken with Hugh (Participant A) on Saturday 24<sup>th</sup> February 2007, meeting at 11.00am. The final public transport journey was undertaken with Donald (Participant D) on Saturday 2<sup>nd</sup> June 2007, meeting at 12.00pm.

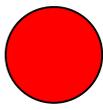
The participants were free to choose the route taken in between the origin and destination. Hugh and Mary travelled by train and bus, while Donald travelled solely by train. The routes and modes of travel used follow on the next page.

## Travel Ethnography: Routes and Modes

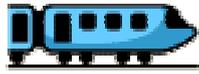
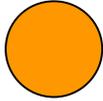
### Hugh (Participant A) and Mary (Participant C)

		HOME to LONDON PADDINGTON (UNDERGROUND)
		LONDON PADDINGTON to BRISTOL TEMPLE MEADS (RAIL)
		BRISTOL TEMPLE MEADS to VICTORIA ROOMS (BUS)
		VICTORIA ROOMS to BS8 1PD (WALK)
		BS8 1PD to QUEENS ROAD (WALK)
		QUEENS ROAD to BRISTOL TEMPLE MEADS (BUS)
		BRISTOL TEMPLE MEADS to LONDON PADDINGTON (RAIL)
		LONDON PADDINGTON to HOME (UNDERGROUND)

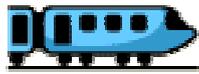
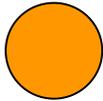
Donald (Participant D)



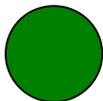
HOME to LONDON PADDINGTON  
(UNDERGROUND)



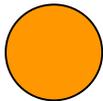
LONDON PADDINGTON to BRISTOL TEMPLE  
MEADS (RAIL)



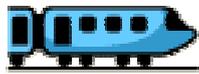
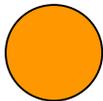
BRISTOL TEMPLE MEANS to CLIFTON  
DOWN (RAIL)



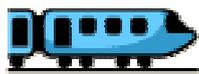
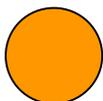
VICTORIA ROOMS to BS8 1PD (WALK)



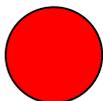
BS8 1PD to CLIFTON DOWN (WALK)



CLIFTON DOWN to BRISTOL TEMPLE  
MEADS (RAIL)



BRISTOL TEMPLE MEADS TO LONDON  
PADDINGTON (RAIL)



LONDON PADDINGTON to HOME  
(UNDERGROUND)

## **Appendix 18. Focus Groups Study: Participants Characteristics<sup>50</sup>**

1. **Abbie** - young adult female; 55% positive responses to checklist; experiences difficulty mainly with reading and numbers.
2. **Chris** - online participant; adult male.
3. **Deborah** - adult female; 65% positive responses to checklist; experiences difficulty mainly with reading, writing, spelling and numbers.
4. **Faye** - adult Female; 60% positive responses to checklist; experiences difficulty mainly with reading, spelling, writing, sequencing and listening.
5. **Joan** – online participant; adult female.
6. **Kimberley** - adult female; 55% positive responses to the BDA checklist; experiences difficulty mainly with writing and spelling.
7. **Kirsty** - online participant; adult female.
8. **Kristy** - online participant; adult female.
9. **Lawrence** - young adult male; 80% positive responses to BDA checklist; experiences difficulty mainly with reading, writing and spelling.
10. **Lyn** - adult female; 85% positive responses, experiences difficulty mainly with reading, writing, spelling, speech, memory, numbers, sequencing, orientation and navigation.
11. **Lynn** - adult female; 95% positive responses to checklist; experiences difficulty mainly with reading, writing and spelling.
12. **Morag** – online participant; adult female.
13. **Movie-Man** – online participant; adult male.
14. **Peter** - adult male; 65% positive responses; experiences difficulty mainly with reading, writing, spelling, listening, speech, numbers and sequencing.
15. **Rachel** - online participant; adult female.
16. **Rob** - adult male; 55% positive responses; experiences difficulty mainly with reading, spelling, listening, sequencing and memory.
17. **Sian** - adult female; 75% positive responses to checklist; experiences difficulty with dyslexic-related aspects of literacy, plus listening, navigation, orientation and memory.
18. **Stephen** - adult male; 100% positive responses to BDA checklist; experiences difficulty mainly with reading, writing, spelling.
19. **Tap-in** - adult female; 90% positive responses; experiences difficulty with mainly with reading, sequencing and memory.

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<sup>50</sup> Only the characteristics of the participants whose quotes were used in Chapters 6 and/or 7 are listed.

20. **Terry** – online participant; adult male.
21. **Tina** - adult female; 65% positive responses to checklist; experiences difficulty mainly with reading, writing, spelling, sequencing, orientation, navigation and memory.
22. **TJ** - adult male; 65% positive responses; experiences difficulty mainly with reading, writing, spelling, speech, numbers and sequencing.