UNDERSTANDING AND ADDRESSING DYSLEXIA IN TRAVEL INFORMATION PROVISION

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Abstract

Examination of cross-disciplinary literature has revealed that the cognitive (rather than physical) accessibility barriers to transport faced by individuals with dyslexia appear to be the subject of limited research. Accordingly, the research upon which this paper has drawn has sought to explore and highlight the needs and usability issues that these individuals encounter during a journey lifecycle. The paper will present findings from a series of focus groups and online discussions with dyslexic individuals coupled with available insights from the literature.

The research has highlighted a large number of practical difficulties in the task of travelling and travel information use, because these individuals are trying to function in a world created by non-dyslexics for non-dyslexics. This often leads to stress, thus aggravating the symptoms of dyslexia. Many of the difficulties are arguably also experienced more widely by non-dyslexics, but the fundamentality of dyslexia exacerbates problems so that those with dyslexia feel the effects more frequently and severely. The paper calls for greater attention to be given to the needs of dyslexics in the design of travel information provision and suggests that this will potentially benefit a much wider group of people.

1. Introduction

Travel information provision has been the subject of significant governmental attention in the UK, especially since the importance attributed to it in the 1998 Transport White Paper as part of an integrated transport system. Information serves a number of important roles (Lyons, 2006), it can:
- make the individual aware of the travel options available to them for a particular journey;
- empower the individual to make more fully informed travel choices;
- and assist the individual in being able to successfully undertake and complete the journey.

The availability and use of information services, notably via the Internet, has increased appreciably in recent years. Allied to this is the imperative of ensuring that information is meeting the needs of its users, i.e. that its provision is useful, useable and used.

The needs of users will vary, but an important user group concerns those individuals with learning disabilities. Whilst research has been conducted into the accessibility barriers to transport faced by this user group (e.g. Carpenter, 1994; Lavery, 1998a; Hunter-Zaworski, 1999) it appears that dyslexia, as a ‘Specific Learning Disability’ (SpLD), has received very limited if any attention. Yet dyslexia is one of the most prominent SpLDs in the UK – estimated to severely affect 4-6% of the population (BDA, 2003b). It is not unreasonable to assume that the problems individuals with dyslexia face on a daily basis will cause them difficulty in the transport environment, and specifically that such problems may be associated with, exacerbated by, or ameliorated by the provision of information. All users of the transport network should be able to obtain the information they require during the journey lifecycle (the process from deciding upon the need for a journey and planning it to undertaking the journey and arriving at the destination). However, at present, it would appear that a strong ‘design-for-all’ (i.e. design for the needs of the majority) philosophy exits in travel information provision, overlooking minority groups such as those with cognitive disabilities. Dyslexics see information access as essential. However, information is often either unavailable or inaccessible.

The purpose of this paper is to present new insights into the needs of dyslexics from, and frustrations concerning, travel information provision. It is based upon direct consultation with people who have dyslexia. The intention is to highlight the need to better recognise this SpLD in the
provision of information services such that dyslexic travellers are able to find them more useful, more usable and thus use them more. This in turn holds the prospect of contributing to improved overall independent mobility and reduced feelings of exclusion and dependence experienced by dyslexics. The paper first offers a brief overview to dyslexia before providing details of the research methods employed. The main element of the paper is then an examination of the findings emergent from consulting those with dyslexia.

2. Dyslexia: an overview

Dyslexia is often considered to be a recent discovery, yet the inability to read and the skill of decoding written language was recognised as early as the 1890’s, referred to as ‘word-blindness’ (Duane, 2001). The earliest case was reported in The Lancet in 1895 – that of a young boy, who was very intelligent, but who could not understand the written word (Snowling and Stackhouse, 1996; Duane, 2001). Shaywitz (1996) explains that this case captured the issue that has intrigued scientists ever since: the difficulties that otherwise bright people face in learning to read. Educationalists did not start to recognise the problem until the early 1960s, and upon investigation, psychologists and neurologists found that information in certain individuals was being stored in a different part of the brain. However, the majority of educationalists seemed reluctant to accept the construct of dyslexia, and difficulties were still put down to a lack of motivation or intellect, so there was little hope of effective support. However, since its inclusion within the 1982 Education Act, and subsequent Acts, more educationalists have moved towards acceptance (Thomson, 2000).

The term ‘dyslexia’ comes from the Greek meaning difficulty with (‘dys’) words (‘lexia’). It refers to difficulty with words spelt, read, pronounced, written, and association of meanings (Pollock and Waller, 1997). Solan (1993) recognised that a great deal of intellectual energy has been devoted to the definition of dyslexia during the past 30 years. Johnson and Peer (2002) consider the following definition provided by the BDA (2003b) as an excellent description because it concentrates on the signs and symptoms, avoiding cognitive references, as found in other definitions:

‘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, auditory and/or visual perception, spoken language and motor skills. It is particularly related to mastering and using written language, which may include alphabetic, numeric and musical notations.’

A coherent model has emerged over the past three decades, suggesting that a core phonological deficit is the main identifier and descriptor of dyslexia (Miles, 1993; Shaywitz, 1996; Evans, 2001; Thomson, 2000). Ramus et al (2003) also suggest that it is assumed the origin of the disorder is a congenital dysfunction of the left-hemisphere of the brain underlying phonological representations, while acknowledging the presence of additional sensory and motor disorders in certain individuals (Ramus et al, 2003).

The cluster of difficulties which make up dyslexia are sometimes referred to as ‘information processing difficulties’ and brain scan experiments have shown that people with dyslexia use different areas of the brain to process information, namely the right-side of the brain (BDA, 2003). One can suggest that this is why dyslexics are more creative and visual than analytical; both Albert Einstein and Leonardo Di Vinci both demonstrated dyslexic traits. Townend (1999) describes the difficulties experienced through the analogy of understanding a foreign language – struggling to read sentences and captions, missing out words not understood, and guessing a lot from the context.

3. Research methodology

As previously outlined, the main aim of the authors’ research was to explore the needs and usability issues that individuals with dyslexia encounter during the journey lifecycle. Given the paucity of existing understandings in the research literature, in-depth information about the population of interest and the travel (information) task was sought. Qualitative interviews with academic experts in dyslexia formed an early preparatory stage, leading to the undertaking of a series of focus groups with dyslexics. Online discussion was also initiated in parallel to the focus groups. Questionnaires were not considered a suitable research instrument given the nature of the
individuals under study and the difficulties they experience with information processing - concerns would have arisen in terms of them correctly interpreting written questions and the legibility of the responses given. One-to-one interviews were also deemed unsuitable because they would have been likely to make the participants nervous: being in a one-to-one scenario with a non-dyslexic interviewer may heighten their dyslexic symptoms and thus their ability to answer the questions openly, honestly and to the best of their ability.

A total of 52 people participated in a series of six focus groups. To ensure an adequate number of individuals were recruited, the original specification had to be relaxed considerably – it has been noted that dyslexics are difficult to recruit to research. A professional recruitment service was employed in addition to intermediary support enlisted by the principal author from dyslexia support groups. All groups were mixed age and mixed gender and included experience of bus, train and car use – two took place in Newbury and one in each of Birmingham, Bristol, Bromley and London. To ensure that each participant was indeed dyslexic, the BDA Dyslexia Checklist was used as a guide (Vinegrad, 1994) - nine or more positive responses to the checklist provides a good indicator of dyslexia (There are 20 questions in the checklist such as: ‘Do you find difficulty telling left from right?’; ‘Is your spelling poor?’; and ‘Do you mix up dates and times and miss appointments?’.) Participants were asked to discuss the dyslexic problems they experience on a day-to-day basis. This was followed by a discussion regarding the use (and usefulness) of travel information both before and during journeys.

As a means of eliciting views outside of the focus groups that could help verify emergent findings, the principal author participated within online discussion fora associated with dyslexia. To elicit the information required from the forum participants, the principal author posted details of the research onto each site, including background information, justification and an explanation of the aims and objectives, followed by the information required from the forum members. From examination of available literature it was clear that dyslexics experience great difficulty accessing and using web-based services because they are not dyslexic-friendly (TTR, 2004b). However, it was evident from the length and number of responses received on the chosen web fora that these individuals could quite easily use them. This may be because: (1) they are comfortable using this medium because it has become familiar to them; (2) their dyslexia is not severe enough to impose on their ability to communicate using this method; or (3) the sites are dyslexic-specific and thus follow guidelines for dyslexic-friendly web design. Observing the online discussions did reveal some fundamental dyslexic traits, most notably in the areas of writing and spelling, and this served to further highlight the difficulties experienced by dyslexics on a day-to-day basis.

4. Findings

This section of the paper presents the main findings from the focus groups. It begins below with an examination of the impact of dyslexia on daily life and general attitudes of those with dyslexia towards travel. Emphasis is then upon the information needs and issues experienced during the journey lifecycle. In an attempt to convey to the reader the experience a journey lifecycle from a dyslexic perspective, the discussion is structured around stages of the journey: (1) pre-journey; (2) main stage/trunk leg; and (3) final stage/end leg. The local familiar stage of the journey (between (1) and (2)) is not considered because familiarity meant problems were rarely experienced. Furthermore, there was inadequate discussion time available to include the return leg.

4.1 Daily experiences of dyslexia

The focus group participants expressed a number of emotions about the difficulties they face on a day-to-day basis. An understandable anxiety and frustration accompanies them because they are trying to function in a predominantly non-dyslexic environment created by non-dyslexics. They are often expected to operate in ways that are defined by a non-dyslexic world; having to work harder or differently than normal because they are forced to use inappropriate or inaccessible tools; they often experience confusion and uncertainty, nervousness and a lack of confidence, inferiority, insecurity and frustration, which are all exacerbated by the physical symptoms of dyslexia.

Due to a continued lack of awareness created by a poor amount of media exposure and available literature, dyslexia is still being linked to intelligence. This link has created a stigma regarding dyslexics. There is a social importance attached to reading, writing and spelling and thus dyslexics will be noticed because of the difficulties they face in these areas. There were mixed feelings from
the focus group discussions as to whether this situation was improving - some have seen an improvement over the years, but most felt that there was still a long way to go before dyslexia would be accepted in the same way as other, more visible disabilities. It is important that, as a society, we do not undervalue or underplay dyslexia as a disability; it is referred to many times in the 1996 Code of Practice on Disability Discrimination and the effects of dyslexia can often be disabling and prevent the individual from doing what they want to do.

Dyslexia is influenced by context, i.e. the surrounding environment. Individuals will undoubtedly experience difficulty in environments that place heavy demands on them in terms of working memory and language, where they have to process information at speed or under stressful conditions. Travelling is a prime example. There were several items from the BDA checklist that were identified as relevant to traveller information.

4.2 Pre-journey from a dyslexic perspective

It emerged strongly from the focus groups and online fora that unfamiliar and important familiar journeys need to be planned in advance – the extent of advanced planning relates strongly to the severity of dyslexia experienced. While pre-journey planning is not exclusively a need of those with dyslexia, planning before the journey is even more important for, and considered by, dyslexics. They may hear, read, write or remember information incorrectly during the journey, leading to feelings of stress and anxiety, which heightens the dyslexic symptoms – this puts an added emphasis on pre-journey planning. Furthermore they will often mistrust information they have obtained for themselves, questioning whether or not they are correct. This leads to the need to double-check information. They would sooner hand over the planning task to a non-dyslexic; getting them to write down the information in brief and simple 'abc' language, using abstract pictorial representations wherever possible.

For the population in general the Internet has become a popular medium for information acquisition and journey planning. However, many of the fundamental traits of dyslexia will have a negative impact on a dyslexic’s ability to use the web and thus access to travel information, e.g. visual and phonological processing, memory and sequencing. The authors’ research and that of others (TTR, 2004b), highlighted that existing web-based travel information was often not easily accessible to individuals with dyslexia. Dyslexic individuals have a different learning style to non-dyslexics - there is a reliance on long-term memory due to weak short-term memory. To compensate for this, Lee, (2000; cited Townend and Turner, 2000) suggests that tasks should be easy to learn, with instructions given one at a time to avoid confusion and confirmation of the correct response given before moving onto the next step. They also point out that dyslexics forget quickly so information should be repeated. As previously mentioned above in Section 2, dyslexics use a different area of the brain to process information, the right side as opposed to the left as observed in non-dyslexics. This means that dyslexics are visual learners and can more easily process information in an ‘abstract’ form i.e. icons, symbols and pictures rather than text-based information. This was reinforced by quotes made by focus group participants:

‘You draw the traffic lights you don’t write it.’ (Deborah).

It would therefore be helpful if web-based journey planners allowed dyslexics to utilise their ‘right-brain skills’ by using more icons, symbols and pictures in journey planning information, particularly in terms of key landmark information, e.g. churches, pubs and supermarkets. This will undoubtedly help them more easily visualise what the journey will look like, and what to look out for. Participants often mentioned that they needed to create a simpler set of instructions in a more visual style than that provided by a website to aid understanding. This also makes the information more personalised, which is necessary because dyslexia is so individual – indeed it is unknown at this stage whether more accessible ‘dyslexic-friendly’ information would take away the need to personalise.

Corrigan (2001) point out that colour coding is another visualisation technique found useful by dyslexic individuals because it is used to organise ideas and as a memory prompt. Therefore it was unsurprising that colour coding used by hospitals and route maps such as those provided by Transport for London were considered useful and easy or easier to follow.

Accurate spelling requires: (1) an accurate mental image; (2) accurate awareness of letter-sounds, syllable-sounds and word-sounds; and (3) a feel for the patterning of the word through the
movement of the hand/fingers while writing/typing. Pollock and Waller (1997) point out that spelling difficulty is an inherent trait of dyslexia because affected individuals struggle with these requirements. As a result, it was unsurprising that individuals in this study cited problems with having to input origin and destination information textually in a (web-based) journey planner (such as that shown in Figure 1). Similarly to finding words in a dictionary, one has to be close to the correct spelling and have the first letter correct to begin (whereas the letter ‘J’ may be used by a poor speller at the beginning of a word that should start with a ‘G’). The provision of a list of options by the journey planner to ‘help’ the user is also of little use to dyslexics because they often cannot recognise differences in words spelt - all the different options look similar and they may not be able to pick out the correct option. Speech input was suggested as an alternative to inputting place names textually, because differences can be heard in words when spoken. A ‘clickable map’ was also a popular recommendation.

Figure 1 Journey planner input interface provided by Traveline (2006)

While it emerged that difficulties experienced during the trunk stage of a car and public transport journey are caused by similar problems, given their different contexts they are now examined separately below.

4.3 En-route: the trunk stage by public transport

Accessing information during a public transport journey poses major difficulties for individuals with dyslexia and thus becomes a barrier to travel via this mode.

Numerical information

Dyslexia literature tends to focus on literacy, but Johnson and Peer (2003) point out that number recognition, manipulation and conceptualisation can also be affected. They go on to suggest that visual perception deficits will have a marked effect on being able to process numerical information as will spatial and temporal order skills, causing rotations or inversions.

Poor numerical skills, also known as ‘Dyscalculia’, are a major barrier to inclusive participation in society because of the sheer volume of numerical information we come into contact with on a daily basis. Commonly cited problems during the focus groups were correctly interpreting bus numbers, flight numbers, platform numbers and seat numbers. Confusion with time was also a commonly cited issue. Problems interpreting the 24-hour clock were frequently mentioned; one can assume this problem is exacerbated by the fact the dyslexics cannot see the relationship between the 24-hour format and am/pm/o’clock:

‘If somebody said to me 1 o’clock, 2 o’clock, half past 3, I’m fine with that, but when it goes to the odd hours…’ (Irenie)

If a departure time of 14:35 is misread as 14:53, this would impose unforeseeable change on the individual; transport connections or appointments may be missed, stress levels increase and dyslexic symptoms worsen. Coping strategies have to be employed to convert the 24-hour clock to a more understandable format, e.g. subtracting 12, physically counting 12, 1 and 2.

Timetables

It emerged strongly that paper-based timetables are often seen as inaccessible in their current format. They can be difficult enough for non-dyslexics to follow, but the problem is exacerbated for dyslexics because of the readability issues associated with colour contrast and font, linearly-presented information, information overload, numbers and whole-word recognition. Findings from the focus groups and online fora reinforce a need for further attention to be given to timetable design. Figure 2 offers a suggested format to address some of the concerns above.
Figure 2  Suggestion for a redesigned timetable presentation

Departure boards and monitors

The focus group discussions highlighted difficulties associated with departure boards and monitors. It is assumed that the issue arises as a result of phonological/information processing weaknesses, colour contrast difficulties and the lateral presentation of information. The fact that information is presented at speed was also a commonly cited problem; information is in a scrolling format and does not stay still long enough for the individual to read it, interpret and act upon it correctly. Furthermore the information sometimes moves to the other side of the board, creating a sense of uncertainty. This is particularly poignant for dyslexics since they are already uncertain whether or not they are correct. Thus such electronic displays demand extra time to reassess the situation and act appropriately - additional stress will undoubtedly be experienced under these circumstances. One suggestion from participants was for relevant information to be sent to a mobile phone or other handheld device to take away the need to refer to the boards and monitors.

Human assistance

Participants highlighted their preference to refer to a ‘someone’ rather than a ‘something’. This includes telephone assistance as well as station staff. Difficulties experienced with processing the written word means that receipt of the spoken word is more accessible and efficient. The human element also provides a dyslexic with the trust and reassurance they need to actually undertake the journey, because they often mistrust the information they have obtained themselves:

‘One of the important things about speaking to someone you get a nod, and you know you can check that you understand.’ (TJ)

Even though human assistance is preferred to written information, participants did feel that information provided by telephone/station staff could be improved. At present, it can be unclear and rushed. Discussions also exposed negative feelings towards staff; they are perceived to be unsympathetic to the problems dyslexics face and lack the knowledge to help them, both in terms of the disability and travel information:

‘I once said to someone [on the phone] I was blind could you say it for me very slowly, and they were so sweet to me. Had I said I was dyslexic, you can almost see them going tut.’ (Deborah)

The current inaccessibility of information to dyslexics and the affect that stress has on their disability places huge emphasis on empathetic human assistance. If information providers and staff were more aware of the difficulties individuals with dyslexia face, then they may be more empathetic and able to provide information in an accessible way, i.e. up-to-date information provided in slower, clearer diction and brief instructions in language that is easy to understand.

Speech difficulties

Snowling and Stackhouse (1996) and Brady et al (1983; also cited Snowling and Stackhouse, 1996) suggest that individuals with dyslexia may have difficulties with speech production. Hales (2004; cited Miles, 2004) adds that organisational inefficiencies in the brain can affect speech and verbal output in dyslexics. Areas of literacy development affected include misuse of words, word-finding difficulties, sequencing problems and articulatory problems (Snowling and Stackhouse, 1996). Several focus group and online forum participants compared speech difficulties experienced en-route to being in a foreign country using the native language; this analogy has also been
Auditory difficulties

Auditory difficulties can often mean that remembering oral instructions, taking notes, remembering names and telephone numbers can be particularly problematic for dyslexics. There may be a delay between hearing and understanding the information and it can be difficult to hold large blocks of information in memory long enough to process them. Dyslexics may be unable to coordinate a listening task along with choosing key words and remembering them. Furthermore, Miles (1993) reported that dyslexics can often remember what happens at the start of a conversation or auditory instructions, but would forget what had just happened.

The above theories were substantiated during the focus groups and online discussions. It became clear why remembering directions was often cited as problematic, e.g. if someone said 'you need platform 6, just turn left', it would be remembered as 'platform 6' but not 'turn left':

'It’s not in bullet points which you might remember. Anything that extends a sentence between one or two words, I would lose sight of the one or two words that are important.' (TJ)

Journeys that change

It became clear from the focus groups that dyslexic individuals develop coping strategies, which may serve them well in ordinary circumstances, but when situations involve change and uncertainty exists, stress is experienced. This means such coping strategies cease to work, stress heightens the dyslexic symptoms and decision-making is severely affected. The prospects of last minute change and inaccessible information were seen by dyslexic participants as a huge barrier to travel by public transport:

'I travel by bus every day. I know exactly when I’ve got to press the button to get off. Once the route changed, there was an extra bit added on, and I did wonder whether I was on the right bus or not.' (Lawrence)

There was a perceived usefulness attached to receiving real-time information via mobile phone or other handheld devices during the journey because of the ability to receive the information in the most personally accessible way. Such information does not have to be remembered, it can be referred to easily and, potentially, in a more accessible format.

On-board information

A strong feeling amongst focus group participants and those participating in the online fora was that on-board information is inadequate for individuals with dyslexia to comfortably make an unfamiliar journey (probably exacerbated by difficulties associated with orientation and route sequencing, discussed later). Corrigan (2001) suggests that individuals with dyslexia often match the letters in the words as opposed to reading whole words; they may only read the first part of a sentence because they interpret the rest based on the first part. Examples of this emerged during the focus groups, e.g. Tottenham and Tottenham Court Road, Regents Street and Regents Park. Therefore mistakes are made, i.e. missed stops or incorrect disembarkment. Participants indicated, in the absence of adequate information on board, physically counting the number of stops required until their destination. One common suggestion was for all operators to provide easy-to-follow schematic route representations.

4.4 En-route: the trunk stage by car

The findings above suggest strongly that a lack of accessible information poses a major barrier to the use of public transport by individuals with dyslexia. Focus group participants saw the car as an easier and less-stressful alternative to public transport. However, even though the car is favoured over public transport, it became clear that car travel is not without its own difficulties. Dyslexic drivers described feelings of frustration which are likely to be a result of inaccessible information and fundamental dyslexic difficulties, which play a strong role in driving (information processing, reading, motor skills, coordination, navigation, orientation and spatial awareness). Kirby (1995) suggests that one of the problems lies in the processing speed required whilst driving. A driver needs to run the sequence of events to make predictions, they also need to perceive rapid changes in the environment such as responding to signs or mildly complex traffic situations and assess the
most important aspects of the traffic scene quickly. Driving is a skill that involves both brain hemispheres and in dyslexic individuals there is poor exchange of information between them.

As a result of the difficulties experienced by a dyslexic driver and the fear of getting lost, it was unsurprising that focus group and online participants cited a preference to being a ‘non-navigational’ passenger of a non-dyslexic driver, or driving accompanied by a non-dyslexic passenger who is acting as the navigator. If they have to drive unaccompanied on an unfamiliar journey, they confront challenges with maps, road signs and written directions obtained from the Internet, all of which are discussed below.

**Text-based car directions**

Reading text-based directional information can be particularly problematic for dyslexics. Gorman et al. (2003) point out that, for individuals with dyslexia, reading is not an automatic unconscious skill, with the identification and decoding of words not occurring naturally. The BDA (2006) also suggest that long and complicated sentences can be difficult to understand because dyslexics cannot correctly match up the letters and numbers if the information extends beyond the important key words. Pollock and Waller (1997) discuss the difficulties dyslexics experience with sequencing and organisation – pointing to the possibilities of car directions being read or remembered out of sequence. Miles (1993) and Corrigan (2001) discuss short-term memory and its relationship with reading. Readers with visual perceptual problems tend to rely on phonetic analysis rather than sight vocabulary, which cause a great strain on short-term memory. Individuals may be able to remember the directions at the start, but would forget the last piece of information they have read; text may be misinterpreted; words omitted or mixed up. Visual discomfort can also be experienced whilst reading such as words moving around, double vision, distortions, blurring and vibration of text, changes in the sequencing of letters and sloping pages (Jordan 2004).

A strong feeling amongst the focus groups and online forum participants was that text-based car directions obtained from the Internet are too wordy and complicated to follow on the journey (see, for example, Figure 3). Individuals are trying to process the directions in the correct order at speed and under stressful conditions, while trying to orientate and navigate:

‘If I’m walking and I can take my time and stop, read it and then you can process it, but if I’m in the car and I’ve got a literally just look at it and then work it out, it’s just a nightmare.’ (Abbie)

![Figure 3: Web-based car directions provided by The AA (2006)](image)

Johnson and Peer (2003) point out that many dyslexics recognise and understand concrete vocabulary and representations that can be associated with experiences relating to their five senses. This was reinforced by focus group participants:

‘I know as I go past this pub here, I know the next thing I’m looking out for is the Esso garage.’ (Deborah)

**Following maps**

Individuals with dyslexia tend to experience difficulty processing road maps. This is likely to relate to difficulties experienced correctly processing place names and road numbers, poor short-term memory, inability to correctly sequence information and colour contrast issues. Furthermore, difficulties experienced with orientation and spatial awareness mean that they often cannot work out where they are in relation to the points of the compass and their destination:

‘Is that north or south?’ (Stephen Rose)

A strong feeling amongst the focus groups and online fora was that maps contain too much detail and not the right detail for dyslexics. In spite of this struggle with maps, there is still a preference for them relative to wordy written directions. It seems that even though there are still words to ‘read’ on
a map, maps are more visual, not extending beyond a few key words, so information overload is less likely to be experienced.

Understanding road signs

Upon seeing a road sign there is a need to understand it and act appropriately. However, past research by Brachacki et al. (1995) highlighted a clear deficit with dyslexics in relation to road signs. They suggested that dyslexics experience a greater cognitive load when trying to process information which leads to less spare capacity for other information which causes their performance to be less automatic and efficient. There was a strong feeling among the focus groups and online forum participants that the design of road signs makes them even more difficult to process. There is too much information on them to process whilst driving, which means that information can be easily misinterpreted and is often acted upon incorrectly. A further problem relates to the number of signs displayed together. This makes it difficult for these individuals to pick out the correct information in time to make the right decision because they first have to match the information they are seeing with what they have written down or memorised in preparation for the journey.

It emerged that most dyslexics require information ‘right to the door’ because this lowers the amount of stress they experience and thus their dyslexic symptoms because they then have as much information as possible on how to make the journey. Participants felt that information providers do not take this into account and expect them to know that they are close to their destination because signs seem to ‘disappear’:

‘It will say Tottenham and you drive along a mile or two and there’s another sign, and then the guy ran out, didn’t have any more signs, and you think what happened to Tottenham?’ (Trevor).

Specific difficulty experienced with road signs at roundabouts was frequently cited. This appears to relate to the need for several tasks to be undertaken simultaneously, i.e. reading the signs, orientation, navigation, putting roundabout rules into practise and dealing with the oncoming traffic. Such difficulty is exacerbated by the fact that the information obtained pre-trip does not match the information being seen at the roadside:

‘I can go round 3 or 4 times and still not find what I’m looking for; the information doesn’t match up. I couldn’t marry up what I’d got in my head.’ (Stephen Rose)

In-car satellite navigation systems

Aligned with the difficulties above, focus group participants viewed satellite navigation systems as an extremely helpful information medium for unfamiliar journeys; sometimes even classed as essential. Participants who did not have such a system also perceive it as likely to be extremely helpful. One can presume that this positive reaction to satellite navigation is because the information is presented in all the preferred formats for dyslexics, i.e. iconic representation, simple directions and audio-based information:

‘The voice tells me where I’m going.’ (Tina)

The audio-based information was even referred to as a ‘person’ looking after them, enabling them to concentrate on the driving task and keep stress levels to a minimum. It also became clear that without it, they would almost certainly get lost, particularly in circumstances where the journey changes unexpectedly.

4.5 En-route: the end-leg

Previous research suggested that people generally give little consideration, at the journey planning stage, to information at the end stage of the journey (see Lyons, 2003). However, the focus groups highlighted that individuals with dyslexia give careful consideration to this stage because the inherent difficulties with dyslexia make it extremely difficult and stressful. More sophisticated processing skills are required because information is more personal to the individual traveller. A strong feeling amongst the participants was that there is a lack of accessible/suitable information available for this stage of the journey. Furthermore the information they are seeing does not ‘marry-up’ with the information they have in front of them. Difficulties experienced with navigation, orientation and spatial awareness exacerbate the problem.
Navigation, orientation & spatial awareness

Difficulties with navigation, orientation and spatial awareness can manifest themselves at various stages of a dyslexic’s journey, including the end-leg. In relation to orientation, individuals with dyslexia can be totally confused in space and time or, as Pollock & Waller (1997) suggest, more commonly, just have a language-based difficulty with ‘connectives’, i.e. words which refer to the relative position of one object to another, with a relationship between the objects, e.g. left and right, north/south/east/west, in front of/behind. Miles (1993) suggests that single commands can be dealt with correctly, but having to distinguish one from another is when the weakness is exposed. Determining left from right is a commonly cited problem; substantiated during the focus groups and online discussions. It isn’t automatic as is the case with most non-dyslexics; they will have to think about it first. They cannot relay what they are ‘hearing’ to the correct connective, they can hear left but they cannot see it in their mind. Miles (ibid) suggests that the wrong responses are more a problem with the actual words and a consequence of verbal labelling and naming weaknesses that exist rather than problems with the directions themselves, i.e. remembering the label ‘left’ or ‘right’ as being attached to that direction and distinguishing left from right. Various coping strategies to determine left from right were mentioned during the focus groups, and using visual-style cues such as drawing arrows on their directions, hand-pointing, making an ‘L’-shape with the left hand, wearing a watch on the left wrist, writing an ‘L’ on the left hand, saying ‘right is my side of the car’ and ‘left is 9 o’clock’.

Like non-dyslexics, individuals with dyslexia are likely to get a taxi after the trunk stage of a public transport journey or ask for assistance because they feel that working it out for themselves or catching connecting modes of transport will lead to mistakes being made. Individuals that do attempt to plan this stage of the journey tend to make their own personal style directions from other information sources using brief words, symbols and pictures of landmarks.

5. Summary and conclusions

This paper has presented analysis of six focus groups and engagement with three online discussion fora. The research has enabled us to begin to understand and explore the difficulties, needs and usability issues that individuals with dyslexia encounter with travel information during the outward phase of the journey lifecycle.

It is clear that individuals with dyslexia will experience difficulty in situations that place heavy demands on them in terms of language. Travelling is a prime example of this. Non-dyslexics will also experience difficulties in these situations, however the current lack of dyslexic-friendly information, exacerbated by the nature of dyslexia, means that travel is made increasingly difficult for these individuals and they will suffer more frequently and severely as a result.

Participants expressed a number of negative emotions about the difficulties they face during the journey lifecycle; a number of them have been previously cited by Maughan (1995) and Johnson & Peer (2003). Anxiety often prevents them from easily doing what they want to do. They are trying to function in a world created by non-dyslexics for non-dyslexics. A number of practical travel difficulties have been identified, which often lead to stress, which Miles (2004) suggests aggravates and intensifies the physical symptoms of dyslexia. This will have an adverse affect on their perceptions of travel, the choices available to them and thus their travel behaviour; i.e. a less attractive (in terms of time, cost etc.) option may be chosen or they may have to travel accompanied; they may not even travel at all. As Pollock and Waller (1997) and Johnson & Peer (2003) point out, even though dyslexia manifests itself differently between individuals and to differing degrees, we can conclude that the difficulties experienced when travelling are very similar; it is more the frequency and severity of occurrence that varies. Whatever the traits or severity, the majority of dyslexics see access to information both pre-journey and en-route as essential; the right information needs to be presented to them at the right points in the journey. This will enable them to have complete awareness and a sense of security, thus keeping stress levels and dyslexic symptoms to a minimum.

Some of the problems experienced by individuals with dyslexia during the journey lifecycle are indeed dyslexic-specific. However, through this, and previous research (TTR 2004a), it becomes clear that many of the problems have far wider relevance and implications for non-dyslexics, particularly other disabled groups. This said, the fundamentality of dyslexia exacerbates these problems so that dyslexics feel the effects more frequently and severely than other people. In many
respects then it may be that through consulting people with dyslexia, concerns over the content but especially the presentation of information for end-users more generally are more readily highlighted. We suggest for such reasons the findings of this research are particularly significant. Acting upon these findings should assist in further improving the information services available to the public and in turn lessening both the frequency and severity of negative experiences of individuals, especially those with a highly individualised learning difficulty such as dyslexia.

By reporting back the accessibility problems experienced by dyslexics, it is hoped that this will highlight such problems, advance understanding in this area more generally, thus enhancing recognition of dyslexia as a disability within the transport industry. If problems can be addressed then better travel information provision is likely to play its part in helping transform some dyslexics from immobile individuals or dependent travellers into more confident independent individuals able to travel and to consider a possibly wider set of options in order to do so.

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7. References


