"I'm not stupid" - Attitudes Towards Adaptation Among People with Dyslexia

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Abstract A significant portion of the population have dyslexia, which is commonly associated with reading and writing difficulties. In the context of developing materials well-suited for users with reading disorders, one solution has been to develop materials especially targeted at dyslexic users. However, how are the attitudes among users with dyslexia towards adaptation? In this paper, we report the findings from qualitative interviews with 20 adults with dyslexia. The main finding was that they were sceptical towards adapted products, among others because it made them "feel stupid" and because the adapted format affected the reading experience negatively. In this paper we argue to instead work within the universal design paradigm, trying to develop products and services usable by all people, thus reducing the need for particular user groups to utilise "special solutions".

Keywords: Dyslexia, Adaptation, Universal design.

1   Introduction

Dyslexia is a widespread cognitive impairment, which is prevalent in 5-10 % of every population [1]. Most dyslexic people experience reading and writing difficulties, and a majority of dyslexics also exhibit reduced concentration [2], impaired short-term memory [3] and poor rapid naming skills [4]. Consequently, many activities in everyday life may be cognitively challenging for dyslexic users. Examples of potential difficulties range from reading text [5] to web navigation [6] and searching for online information [7].

A variety of adapted solutions have been developed, among others high-content / low-skills books, that are especially made for people with reading disabilities such as dyslexia. In Norway, an organization called Books for everyone produces a variety of adapted books for different user groups, including books with easy language and a particular typography with the purpose of making books accessible for people with reading impairments. In some of these books, sentences are actively split over several lines, which has resulted in a layout with quite short line lengths. These books have a layout

that differs from "regular books", and consequently may look "adapted". Such a practise is the starting point for the interview data presented in this paper.

People with dyslexia are commonly reported to experience low self-esteem [8], which is often a result of negative experiences in school- or work-related settings [9]. In this study we investigate the attitudes among dyslexic users towards adapted products, with the aim of exploring whether such solutions are purposeful or regarded as stigmatising. These findings have implications for researchers and practitioners working with dyslexic users in general, and adapted texts in particular.

The research questions that form the basis for this paper is: *What are the attitudes among people with dyslexia towards adapted texts?* The motivation behind this study is to better understand how to accommodate the needs of dyslexic users, while at the same time maintaining a respectful and purposeful approach when designing inclusive user interfaces or other services or products.

2   Background

Previous studies have addressed the needs of dyslexic users in HCI-related contexts, with the aim to improve accessibility. Such studies have typically either investigated a potentially problematic task, for instance [6, 10] or suggested or evaluated guidelines, for example [11]. Several researchers have investigated how to present readable text for dyslexic users. Most of these studies have focused on digital texts and devices, with a limited focus on printed books. One of the reasons for this perspective may be that it has been suggested that digital materials are most suitable for dyslexic users [12].

Rello and Baeza-Yates [13] claim that the presentation of text is especially important for people with dyslexia. For instance, Rello and Baeza-Yates [13] concluded that the font styles sans serif, monospaces and roman font improved performance during screen reading. In contrast, proportional fonts, serif and italics affected reading performance negatively. O'Brien, Mansfield and Legge [14] found that larger fonts might increase reading speed of dyslexic people. This finding was in accordance with Rello, Pielot, Marcos and Carlini [15], who reported that font size has a significant impact on the understandability and readability of a screen text, suggesting using 18-point font. In contrast, British Dyslexia Association [16] recommends 12-14 point, but emphasises that some dyslexics may require even bigger font.

Letter spacing has also been addressed, and according to Rello, Pielot, Marcos and Carlini [15], line spacing has no effect on readability for dyslexics when reading on-screen texts. However, letter spacing seems to be important. For instance, Zorzi et al. [17] reported that extra-large letter spacing benefited dyslexic readers, a finding which is in accordance with Marinus et al. [18].

Regarding line lengths, there is also an emphasis on digital texts, and the results in previous are so far contradictory. Schneps et al. [12] studied e-readers in a PAD and POD condition and found that it was most efficient to read on small digital devices such as PODs. The PAD condition displayed on average 67.2 characters per line, while the POD condition had 12.7 characters. Schneps et al. [12] concluded that shorter lines might be beneficial. This finding is in contrast to the guidelines from British Dyslexia

Association [16], which recommends 60-70 characters per line. Moreover, Rello and Baeza-Yates [20] also investigated column widths in digital texts and found that these had no significant effect on the readability for dyslexics, who expressed no preferences regarding line lengths. In contrast, control (non-dyslexic) users found line lengths of 44 characters to be most readable. Further, Rello and Baeza-Yates [20] reported that some of the dyslexic users actually preferred the wide columns because the overall impression of the text was that it seemed shorter and was consequently more motivating to read. This study suggests that layout may affect the motivation for a person to read, and that such design may be particularly important for dyslexic readers.

In a review of accessible typology for dyslexic users, Jackson [21] reported that most of this research has been conducted on participants under 18 and often for younger children and emphasises the need to investigate these issues in the adult dyslexic population as well.

Previous attempts to make products and services for users with impairments were within the context of accessible design, where adaptation for users "with special needs" was quite common [22]. However, this approach is now increasingly being replaced by the universal design philosophy. The purpose of universal design is to develop products or services that are applicable by all people, despite differences in age, gender, cultural background or functional levels [23]. The objective of universal design is to design one solution suitable for everyone, thus removing the need for especially adapted solutions for particular user groups [22], such as dyslexics.

One example of accessibility in practice is the high content / low skills-books produced by Books for Everyone with short line lengths. The purpose behind these books is to make reading more accessible and less demanding for people with reading difficulties. Such books were therefore used as a starting point for a reading experiment and the qualitative interviews with adults with dyslexia presented in this paper.

The need to not feel different may be closely related to low self-esteem, which is reported to be a key issue in people with dyslexia, both adults and children [8, 24-25], and especially among females [26].

Adaptation in general and adapted books in particular are topics that are rarely addressed in the research literature. In a study of children with dyslexia, Thiessen and Dyson [27] found that dyslexics preferred books that resembled books that their peers were reading over books that were considered easier to read by typographic convention. However, little is known about the attitudes among adult dyslexics towards adaptations.

3   Method

This study was a within-subjects design, with no control group. The participants were 20 adults with dyslexia, recruited through social media and the organisations Dyslexia Norway and Books for Everyone. A total of 11 participants were female (55 %), while 9 were male (45 %). Average age was 26.2 years, with the youngest participant being 18 years and the oldest 40 years. The following inclusion criteria was applied; the participants needed to be above 18 years, have a dyslexia diagnosis, and not wear glasses,

since these would interfere with the eye-tracking glasses used in the reading experiments. A total of 22 participants conducted the tests, but two were excluded due to too high scores on the dyslexia screening test, indicating too proficient reading skills.

3.1 Procedure

The session started with providing general information about the study, signing of consent forms and registering participant data before several tests were conducted (Fig. 1).
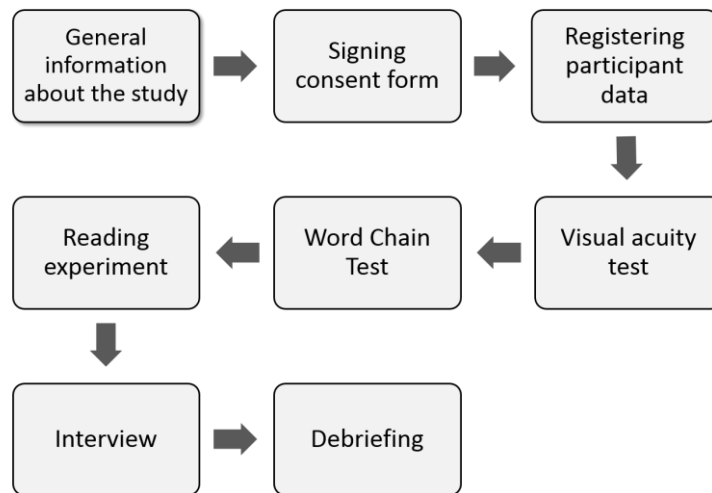

Fig. 1. Experimental procedure

Each participant was screened for dyslexia. A Norwegian Word Chain Test [28] was applied, which is a commonly used test for such purposes, and has been applied in other studies for example [29-31]. In this test, a low score is regarded as indicative of dyslexia, and adults who score below 43 points are recommended to conduct further diagnostic tests. Using this screening removed the need for access to sensitive medical diagnostic papers, while at the same time confirming the diagnosis and providing more details on the severity of the dyslexia in each participant.

A Landolt C visual acuity test was applied with a distance of 40 cm for short vision according to the European standard [32], to ensure that reduced or blurred vision would not affect the results of the reading tasks. The participants had at least a visual acuity of 0.8 with both eyes open, results that are in accordance with the limits of normal visual acuity [33]. A short interview was also conducted before the actual reading experiment started.

The participants were asked to read 12 different texts from three books, four from each book. Each text was only read once and presented in one of four different layouts (Fig. 2). The participants were presented with the different books and conditions in a randomised order. Participants were given one of 6 premade folders, where all the books were presented in different orders, and with a variation of which pages that were

presented in each condition. The texts were inputted in a hard folder, to resemble the feeling of holding and reading a physical book as closely as possible.

The reading session was immediately followed by an interview regarding what characteristics of a text they considered most important in terms of readability. Moreover, participants were showed excerpts from the adapted books they had read in the different conditions and asked about their attitudes towards such texts in particular and adaptations in general. They were also asked to rank the different conditions from 1-4, where 1 was the most favoured format and 4 the least preferred layout. The participants were given a gift card of 500 NOK after completing the session.

The project was approved and ethically screened by Norwegian Centre for Research Data. At the beginning of the session, all participants signed consent forms, and were informed that they could withdraw from the study at any time without any negative consequences. No participants were related to the researchers.

3.2 Materials

Three adapted books in Norwegian (Table 1) were used as a starting point for the reading experiment. The adapted books were formatted with sentences that were broken over several lines, with the motivation to reduce the line lengths.

Table 1. Adapted books included in the study.

Author(s)	Title [Translated title]	Year
E. Lindkvist	Ditt røde hår, Unn [Your red hair, Unn]	2013
H. Hagerup & K. Roskifte	Barnet mitt [My child]	2015
V. Salinas	Og [And]	2016

During the reading experiments, participants were given four texts from each book. The pages were given in an unedited, original form (with typically short line lengths), and conditions with 40, 60 and 80 characters per line, including white space (see Fig. 2). No words were split, and all the texts from each book had the same amount of words on each page. The texts were printed on a pearl white, 130-gram paper, in Arial font size 14 points, and with a left-justified text and ragged right edge.

Adapted version:

Jeg lager spinatpai og en gresk salat
ved siden av. Jeg har kjøpt fetaost
og oliven. Jeg har bakt brød også.
Urtebrød.
Klokka fem er alt klart.
Hun kommer sikkert litt over fem.
Kvart over fem er jeg utålmodig.
Og sulten.
Halv seks ringer jeg uten å få svar.
Kvart på seks spiser jeg.
Det smaker ikke så godt som jeg hadde trodd.

L40:

Jeg lager spinatpai og en gresk salat ved
siden av. Jeg har kjøpt fetaost og oliven.
Jeg har bakt brød også. Urtebrød. Klokka
fem er alt klart. Hun kommer sikkert litt
over fem. Kvart over fem er jeg utålmodig.
Og sulten. Halv seks ringer jeg uten å
få svar. Kvart på seks spiser jeg. Det
smaker ikke så godt som jeg hadde trodd.

L60:

Jeg lager spinatpai og en gresk salat ved siden av. Jeg har
kjøpt fetaost og oliven. Jeg har bakt brød også. Urtebrød.
Klokka fem er alt klart. Hun kommer sikkert litt over fem.
Kvart over fem er jeg utålmodig. Og sulten. Halv seks ringer
jeg uten å få svar. Kvart på seks spiser jeg. Det smaker ikke
så godt som jeg hadde trodd.

L80:

Jeg lager spinatpai og en gresk salat ved siden av. Jeg har kjøpt fetaost og oliven.
Jeg har bakt brød også. Urtebrød. Klokka fem er alt klart. Hun kommer sikkert litt
over fem. Kvart over fem er jeg utålmodig. Og sulten. Halv seks ringer jeg uten å
få svar. Kvart på seks spiser jeg. Det smaker ikke så godt som jeg hadde trodd.

Fig. 2. Page 17 from Lindkvist (2013) in the four different formats. Reproduced with permission by author and publisher.

4 Results

Each participant was asked to rank the four different formats according to their personal preferences. Each participant hence gave the score 1-4 to each of the formats; 1 indicating their favourite, and 4 if it was the least favourable format.

The wider formats (L60 and L80) were significantly more popular than the narrower formats (L40 and the adapted format). As many as 18 out of 20 listed one of the widest formats as their favourite (See Fig. 3).
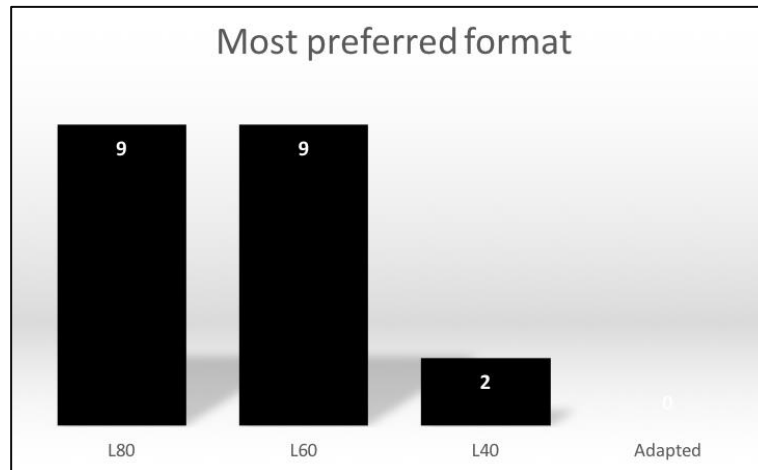
Fig. 3. Preferred format, in number of participants.

Only 2 participants preferred the shorter format (L40), and nobody listed the adapted format as their favourite. A total of 12 participants regarded the original, adapted format as their least favourable reading format (Fig. 4).
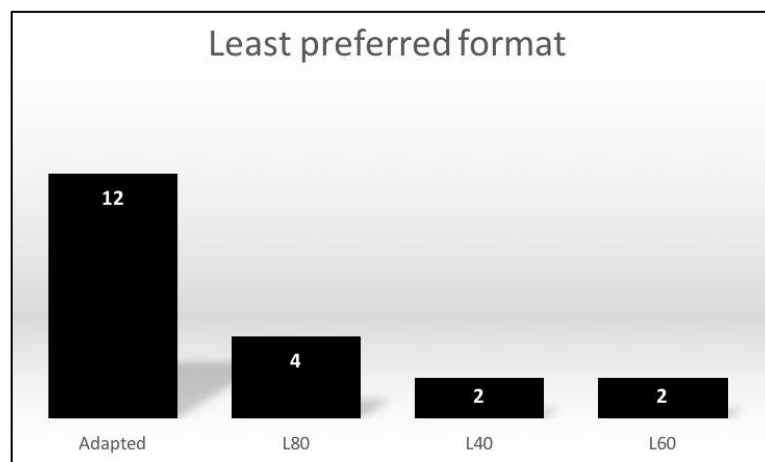

Fig. 4. Least favoured format, in number of participants.

We also computed the average ranking of each format (Fig. 5). The two wider formats, L80 and L60, scored 1.8 (std=1.10) and 1.95 (std=1.00), respectively, indicating that these two were the most favourable formats overall. The original adapted format scored the lowest overall, with an average rank of 3.3 (std=0.60).
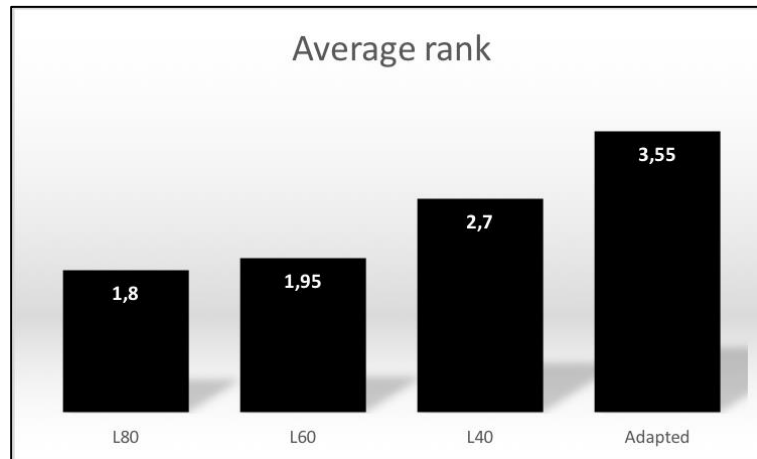
Fig. 5. Average ranking of each format.

5 Discussion

Our results indicate that the adapted format, which often means that longer sentences are split over several lines, are less favoured by dyslexics, compared to formats with longer lines. There seems to be a strong linkage between preferred format and the reading strategy applied.

Several participants disliking the adapted format, explained how the short lines disrupted their reading. A few participants mentioned how they used a reading strategy searching for the end of the sentence, and then going back to analyse the content of the sentence further, before reading the remaining text: "*I have to see the whole sentence before I understand it. Then I can go back to the rest of the text. It is much more work to go back in a split-up text, because then I lose the overview.*" Consequently, if a sentence was broken over several lines, the reading process was perceived as more difficult.

Many participants mentioned how skipping between lines made them confused and ruined the flow of their reading because they lost track of where they were in the text. For instance, one participant said that "*it would be easier to read if the lines were longer. Now I have to navigate to the next line often, losing where I was, and have to read the whole paragraph again.*" A wider format will be less likely to split a sentence over more than one or two lines and will hence make the reading process less confusing. One participant mentioned using a paper sheet to aid her in the reading, where she took a pause at the end of each sentence. This strategy was also difficult with many split sentences, implying that adapted books may interfere with the coping strategies of readers with dyslexia. This is an issue that needs to be investigated further.

The two most popular formats (L60 and L80), also received mixed feedback. Some participants disliked the widest format (L80), stating that the lines were too long and felt a bit overwhelming. Others liked how it made the overall block of text shorter, and

in that respect, less overwhelming, which is in accordance with Rello and Baeza-Yates [20]. In addition, one participant specifically expressed how she felt more challenged by the wider format, giving her a sense of mastering reading. In her case, more challenging texts seem to be positive for her reading experience.

While the original and L40 were quite similar with respect to score in the 'most liked' category, the difference is surprisingly large with respect to be the least liked. Only 2 out of 20 listed L40 as their least favourable (Fig. 4). It seems like the adapted format is more provoking, and several participants commented on how the adapted format gave them associations to children's books or primary school books and gave them less interest in reading them. The comments about "feeling stupid" and "associations of children's books" support this claim.

Many of the dyslexic users expressed a general scepticism towards adaptation in general and stated that they "felt stupid" when presented with material targeted at dyslexics. For instance, one participant stated the following "*It should not be obvious that this book is made for someone with dyslexia. You shouldn't have to feel different*". Many participants also commented that it made them feel like they had to use the "elementary school version". One participant said, "*If they try to stupefy the text too much, it doesn't encourage to reading*".

A number of participants also stated that they would actually rather struggle with a difficult text than utilise the adapted versions, which is in accordance with Thiessen and Dyson [27]. "*It is nice with space between the lines, but not so adapted that one feels stupid*". The main conclusion regarding the attitudes towards adaptations was that it does not seem purposeful to use such an approach for this user group, who already are very conscious about "being different" and seem to perceive adapted products as stigmatising.

Participants enjoying the adapted format, explained how they liked what the format did to the text, making it more lyrical ("*like a poem*"). It was also commented on how the adapted format sometimes made text-dialogue more apparent, making the text easier to read. However, the short line lengths also felt confusing regarding genre: "*In one of the conditions I first thought I was reading a poem*". Another stated that "*I get a very poem-like feeling of the adapted text. I do not like reading that (...) it affects my reading flow*". Consequently, there may be other more purposeful strategies than reducing line lengths when developing books that are easily read by dyslexic users. However, this issue needs to be investigated further.

6   Conclusion

The findings reported in this paper are mainly focused on the reading experience as perceived by the dyslexics, and not on their actual reading performance. Two main issues are apparent in this study; namely confusion in the reading process and low self-esteem as results of the adapted reading format.

Several participants reported a reading strategy involving looking for the end of a sentence. The shorter formats meant often having to skip vertically across several lines, probably imposing more cognitive strain on the participants. Consequently, it is highly

likely that shorter line lengths do not necessarily facilitate reading for users with dyslexia. Further, it seems very important to not develop products that feel adapted, but rather make books that may be more easily read by a variety of users, thus removing the feeling of "being stupid" and being stigmatised.

The findings of this study have implications for the development of different products and services directed at dyslexic users and may be transferred to areas such as user interfaces and various other ICT-based solutions targeted at dyslexic users. We argue against especially adapted solutions, and rather recommend the universal design paradigm. Further, the lack of consistency in this user group makes it difficult to develop guidelines and suggest that investing resources on developing a higher level of user control is probably more beneficial for this user group.

Acknowledgements

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