



GÖTEBORGS
UNIVERSITET

Reading in English as a Second Language with Developmental Dyslexia

A literature review

Marianna Pawlak

Ämneslärarprogrammet



Degree essay: 15 hp
Course: LGEN1G
Level: Undergraduate
Term/year: HT/2016
Supervisor: Anne Dragemark Oscarson
Examiner: Pia Köhlmyr
Code: HT16---1160---016---LGEN1G

Keywords: [Developmental Dyslexia, Reading, ESL, L2](#)

Abstract

This review presents recent research in the field of the language-based disorder dyslexia and its implications in reading in a second language (L2), with focus on the English language. It first gives a definition and mapping of the disorder followed by a theoretical background illustrating reading theories and models. This paper draws upon recent linguistic and biological studies concerning various aspects of dyslexia and reading in L2. The research question is: What does recent research, in the field of developmental dyslectics, show about acquiring reading skills in English as a second or foreign language? By using quantitative research approach, reading studies and articles, it was found that reading in English as a second or foreign language is a difficult task for dyslectic students, regardless of their native language, due to the English opaque orthography. Additionally, it was also found that very little research has been conducted within this field. This review will highlight the prominent and relevant research giving an insight to what the little research within this field displays.

Table of Contents

Table of Contents	1
1 Introduction and terminology	3
1.1 Introduction.....	3
1.2 Definitions	3
1.2.1 Defining Dyslexia	4
1.2.2 Other terminology	5
2 Theoretical background.....	6
2.1 Reading theories	6
2.1.1 Aspects of reading.....	6
2.1.2 Dual-route models of reading	7
2.1.3 The simple view of reading model.....	7
2.1.4 Other models.....	9
3 Methodology	10
4 Literature review.....	11
4.1 Dyslexia and reading in a first language.....	11
4.1.1 Reading	11
4.1.2 Reading with dyslexia.....	12
4.2 Dyslexia and reading in a second language	14
4.2.1 Reading in L2.....	14
4.2.2 Reading with dyslexia in L2	15
4.3 Methodological considerations	18
5 Discussion.....	18
6 Summary and conclusion	21

6.1	Summary.....	21
6.1.1	Summary of background.....	21
6.1.2	Summary of studies.....	21
6.2	Conclusion & Further research	22
	Reference list.....	24

1 Introduction and terminology

1.1 Introduction

Being plurilingual in a multilingual society is a significant asset and has become of vital importance. Multilingualism has developed into an educational, social and personal necessity in order to reach a desired position on the professional field as well as a certain desired social status. Literacy skills, especially reading, play a groundbreaking role in language learning and therefore professional development. Because of that vital role, there have been, and still are, ongoing intensive investigations regarding various reading and writing/spelling disorders such as dyslexia.

The ability to read and write is fundamental in any language and it is a time-consuming activity. Learning a second, additional or foreign language sometimes requires acquiring a new alphabet and accumulating new knowledge about the grapheme-morpheme relation, especially when it comes to English. If a student, in addition to learning English, also has literacy difficulties, such as reading or writing, it often results in additional problematic obstacles.

Dyslexia, in terms of language disorders, is one of the most researched areas which has had an impact on schools globally. It has encouraged them to be more aware and to create a more dyslexia friendly environment. Because of the many varieties of symptoms and implications of dyslexia it is important to educate teachers in order to better educate and assist dyslectic students and facilitate their language learning. It is also necessary to understand the diversity of the disorder, the varieties across languages and among individuals as well as to acquire knowledge about various teaching- and learning strategies in order to support students with reading and writing/spelling impairments. The findings might, in addition, help regular non-dyslectic students to better and more easily acquire second and foreign languages. This review focuses on “specific reading disorders” (Nijakowska, 2010, p 2) including surface and phonological developmental dyslexia answering the question: What does recent research show in the field of developmental dyslectics acquiring reading skills in English as a second or foreign language?

1.2 Definitions

Below, the section is divided into two subheadings; the first identifying dyslexia and the other one illustrating other relevant terminology for this review.

1.2.1 Defining Dyslexia

There are several different definitions of dyslexia due to its complexity, diverse symptoms and broad variety across languages and among individuals. The first definition came about in 1968 by The WFN (World Federation of Neurology) adducing it as

[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.

(Kelly & Phillips, 2011, p.8)

More recently the British Dyslexia Association (BDA) manifested it as

a specific learning difficulty which mainly affects the development of literary and language related skills [...] [and] is characterized by difficulties with phonological processing [...] and the automatic development of skills that may not match up to an individual's other cognitive abilities. (Kelly & Phillips, 2011, p. 8)

In simpler words, dyslexia deals with the processing and understanding of words and, in extension, with language; having developmental dyslexia therefore usually makes it more difficult to learn. The symptoms vary between individuals and the overall impairment does not affect the overall intelligence. Dyslexia primary concerns the aspect of reading but also affects writing, spelling and in some rare cases even speaking and hearing.

Dyslexia is a complex cognitive language focused disorder and can be divided into two general strands of research namely “acquired and developmental dyslexia“(Nijakowska, 2010, p. 2). Acquired connotes dyslexia being caused later in life by, for example, a blow in the head (biological cause) whereas developmental dyslexia concerns pedagogical causes being present from early childhood. Some researchers suggest an additional aspect or a third strand, expressively a behavioral one dealing with learning obstacles caused by “social and cultural factors” (Kelly & Phillips, 2011, p. 21) or experienced emotional trauma.

In addition, developmental dyslexia, which this review will focus on, can be further divided into sub-branches. The distinctions first range from general to specific or restricted and are then further divided into subcategories depending on what literacy skill they affect

and vary depending on classification codes. There is also a distinction between developmental surface dyslexia and developmental phonological dyslexia. Surface dyslexia concerns weakness in reading irregular words, whereas developmental phonological dyslexia in contrast, concerns weakness in reading non-words but has a normal skill reading regular and irregular words.

1.2.2 Other terminology

As very little research is made in the field of dyslexia and acquisition of additional languages, *English as a foreign language* (EFL), *English as a second language* (ESL) and *English as an additional language* (EAL) will be used as synonyms. Furthermore, in studies within the biological and psychological field *interlanguage* is often referred to as *long term memory*, *phonological loop* or *internal orthographic lexicon*, thus those terms will also be used as synonyms.

There are two separate theories looking into reading: *the dual-route model* and *the simple view of reading model*. The *dual-route model* (DR model) is a reading theory suggesting that there are two parallel ongoing processes. The first process is lexical where interlanguage is used to recognize words. The second process is non-lexical or sub-lexical, where words are sounded out; where enunciation is used. The *simple view of reading model*, on the other hand, displays that decoding and language comprehension are two equally important components in terms of reading skills. In the section *reading theories* below, these two models are more thoroughly explained.

The *parallel distributed processing model* (PDP model) is a working memory model which hypothesizes that information processed reaches all parts of the memory at once in contrast to most other theories that suggest that information goes through first sensory memory, then short term memory and is finally stored in long term memory.

Linguistic Coding difference hypothesis (LCDH) suggest that second/foreign/additional language skills are built or added on already existing native language skills.

Furthermore, words considered to be regular are those where the grapheme-phone conversion is transparent; the word is pronounced as it is written. In contrast, irregular words do not have a transparent conversion; they are read differently than they spelled/written and non-words are made up or fictional words but whose pronunciation can be deducted using linguistic and grammatical rules within a language.

Finally, to facilitate reading, *phonemic awareness* and *phonological awareness* will be used as synonyms and abbreviated PA.

2 Theoretical background

In order to understand the complexity behind reading with dyslexia in any language, one first has to understand what reading entails and be familiar with existing theories; therefore they are briefly presented below.

2.1 Reading theories

2.1.1 Aspects of reading

Reading can be measured and understood in and through many various aspects. It is primarily a mental information-process system that transfers print to speech and/or meaning. In simpler words, one has to distinguish between the process of actual reading print and actual comprehension of print. It is generally assumed that learning to read is facilitated if done so in a first language (L1).

After several years of research, The National Reading Panel Report manifests that there are six primary components in terms of reading:

- *Phonics*; grapheme-phoneme conversion; how letters sound/are pronounced.
- *Phonemic awareness*; similar to phonics but deals with the understanding of words being created from phonemes.
- *Vocabulary*; in order to read words we have to know words.
- *Fluency*; reading with speed, accuracy and expression.
- *Guided oral reading*; guidance from skilled readers.
- *Comprehension*; understanding what is read.

The six points, defined above, together create the skill of reading. If one of the parts is impaired in any way or for any reason, it can create obstacles in acquiring the reading skill properly.

2.1.2 Dual-route models of reading

There are two different dual-route models; dual-route theory of reading aloud and dual-route theory of reading comprehension. The first one deals with the process of phonological expression of written text whereas the latter concerns actual mental comprehension of the written text. Both of the dual routes models illustrate reading as a dual-route process, expressing that two separate yet cooperative systems are present. The dual-route model of reading aloud displays two various ways of decoding words; two different ways of reading, namely the lexical and non-lexical (or sub-lexical) route.

The lexical route refers to an ‘internal orthographic lexicon’ or interlanguage containing familiar and processed words. The words stored are accessed directly through vision and are well known in terms of spelling and connected, memorized, together with a sound and exclude phonological mediation. Simply put, when a familiar word is seen it is recognized and one is able to pronounce it without having to enunciate; sound it out (see Lundström, 2004).

The non-lexical (sub-lexical) route, in contrast, is indirect and sounds are not connected to spelling; there is no internal comprehension beforehand of how the word is supposed to be pronounced. Instead the word is divided into its constituent parts, namely graphemes and phonemes, and then the processes of grapheme to phoneme conversion are present. The conversion relies on prior knowledge of how letters are pronounced. Simply put, words are enunciated and not fluently spoken. In addition, the grapheme to phoneme conversion process must be acquired in order for the sub-lexical route to function; one has to have the knowledge of how individual letters are pronounced.

This model, or these models, suggests a reason behind why developmental dyslectics show difficulties attaining a normal level of reading skill(s). According to dual-route model of reading aloud, dyslectics might have problems developing one or both of these routes thus creating difficulties in reading regular words, irregular words and non-words. This is a consequence if the lexical and /or sub-lexical route(s) have been affected or not been properly developed (Coltheart, 2005).

2.1.3 The simple view of reading model

The simple view of reading hypothesis was firstly presented by Gough and Tunmer in 1986. The model displays that the combination of decoding skills and language comprehension abilities can facilitate the prediction of reading comprehension. The model claims that both

skills are necessary to produce accurate reading. The simple view of reading hypothesis is often illustrated with a formula, namely, decoding times language comprehension equals reading comprehension:

$$\text{Decoding (D)} \times \text{Language Comprehension (LC)} = \text{Reading Comprehension (RC)}$$

It is at times also explained as a quadrant (see Diagram 1) illustrating that there are four possible options when it comes to reading:

1. Good language comprehension and word recognition,
2. Poor language comprehension and word recognition,
3. Good language comprehension and poor word recognition,
4. Poor language comprehension and good word recognition.

In agreement with the model, both language comprehension and word recognition have to be good in order to be able to read.

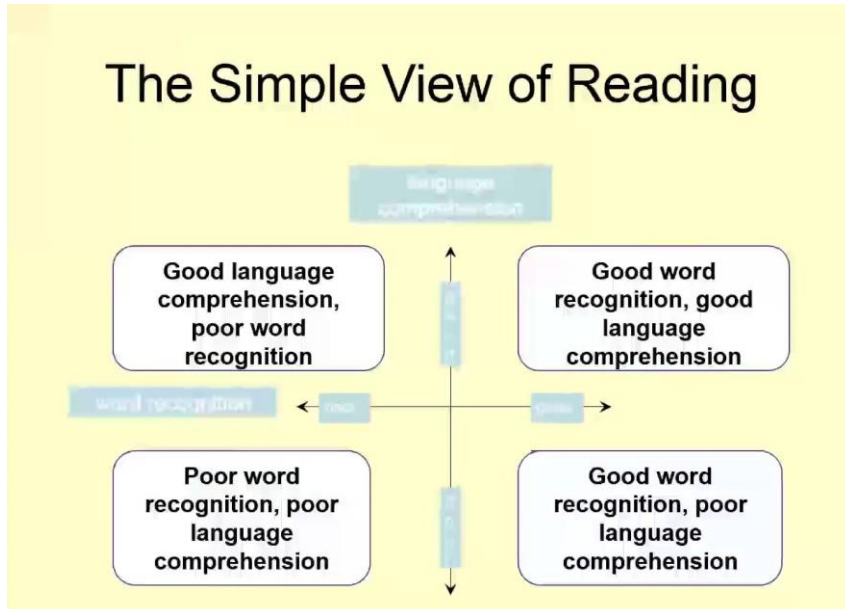


Diagram 1: Gough and Tunmer's Reading Model

Decoding means recognizing and pronouncing words, namely the grapheme to phoneme conversion, whereas language comprehension refers to understanding the language. Gough

and Tunmer (1986) stated that it is the combination of those two skills that leads to the ability to read and to interpret at both a sentence and discourse level. This model can be useful for explaining reading difficulties for dyslectics whilst it reflects that progress along the decoding dimension does not mean making progress in language comprehension and vice versa. The model also recognizes that it is possible to have differing strengths and difficulties in one or both of the dimensions which in turn affects the outcome, the reading comprehension.

According to this model, dyslectics, who often have strong language comprehension but weak word recognition, are found in the top left quadrant.

2.1.4 Other models

There are many more reading theories, models and approaches such as

- connectionist approaches
- non-connectionist approaches
- parallel distributed processing models
- Improved simple view of reading models
- improved and extended dual route models

These theories and models are not included in this review, although important, they are not relevant to the field and topic chosen. They will not be explained but are mentioned since they frequently occur in some of the studies included.

3 Methodology

The topic of dyslexia was chosen and the search combined the field of reading and the field of second language acquisition. The literature was searched using key words such as dyslexia, dyslexia and SLL, dyslexia and EFL, dyslexia and reading theory, dyslexia and reading in L2/English, using search engines such as ERIC and Supersearch (supersök). Various books, articles and studies were reviewed qualitatively and quantitatively in respective fields. The primary sources of this review are studies regarding the language disorder developmental dyslexia and reading in a second language with focus on English. The secondary sources of this review are literature, articles and studies dealing with dyslexia, reading theories and second language acquisition theories.

4 Literature review

First, in this section, dyslexia and reading in a first language is portrayed and divided into 2 parts; reading and reading with dyslexia. Second, dyslexia and reading in a second language is illustrated and divided into 2 parts; reading in L2 respectively reading with dyslexia in L2. This is followed by methodological considerations.

4.1 Dyslexia and reading in a first language

There are very few studies regarding dyslexia and reading in L2, therefore it is relevant to include studies within the field of dyslexia and reading in L1. In order to clarify and simplify, the studies have been divided into appropriate subcategories with the following subheadings: Reading and reading with dyslexia.

4.1.1 Reading

Most of the research available has included English speaking participants and “has focused on the relationship between dyslexia and poor phonological awareness” (Smythe & Everatt, 2000, p. 13). As aforesaid, dyslexia deals with the linguistic aspect and affects literacy. It “concerns the [skill] of reading [...] which evidently [...] [is] dynamic, complex and [...] grounded in the awareness of the relationship between print and spoken word” (Nijakowska, 2010, p. 10). The reading skill can be divided into two separate abilities. The first ability being able to decode printed symbols, expressively to translate graphemes into phonemes and form words, and the second ability being able to understand the words formed (Kelly & Phillips, 2011, p. 55).

In a relatively recent article, Coltheart, Curtis, Atkins & Haller (1993) made a comparison between the DR model and the PDP model suggesting that the latter does not cover all six basic understandings of reading suggested by The National Reading Panel Report, but only one, expressively Phonics. The authors further also emphasize that the PDP model cannot give account for non-words and new words, and they therefore disregard the PDP model as explanatory and plausible in terms of reading. In contrast, the researchers emphasize on numerous other studies supporting the DR model whilst it covers all six understandings of reading and can give account for non- and new words (Coltheart, Curtis, Atkins & Haller, 1993). One such supporting study, conducted by Coltheart & Rastle (1994), examined the regularity effect on reading aloud of irregular low-frequency exception words in

English. Forty-three participants were exposed to ninety-six irregular target words chosen from the Medical Research Council Psycholinguistic Database. The subjects were to read these words aloud from a computer screen and the experimenters recorded the mispronunciations by hand and the time of response was measured by a computer. The words were not given in the same order to the participants and they were all given ten practice trials. The results of the study show that “the size of regularity effect on word naming latency [...] [decreases] monotonically” (Coltheart & Rastle, 1994. p, 1208) rather than being independent as predicted by the PDP model, thus giving evidence for the DR model. In other words, the length of words had an impact on reading. When longer unfamiliar words were presented the mispronunciation was more frequent; the subjects turned to sounding out the segments, indicating sub-lexical route. Simply put, when the participants were given longer words to read they started enunciating the words and failed to read them fluently.

Coltheart has alone, as well as together with others, conducted a handful of similar studies (eg. Coltheart, 2006; Coltheart, Rastle, Perry & Langdon, 2001) where the results concur with the DR model and disregards other models such as the simple view of reading model and the PDP model. In addition, there are no studies available supporting the PDP model that have not been disproved or discredited, but there are a few studies available supporting the simple view of reading approach.

4.1.2 Reading with dyslexia

Reading with dyslexia often includes literacy difficulties due to decoding and processing written text. According to the DR model, dyslectics use either the lexical route (internal lexicon) or sub-lexical route (enunciating) depending on what the diagnosis.

In a study by Luca, Borelli, Judica, Spinelli & Zoccolotti (2002) the eye movements in developmental dyslectics were recorded during word and text readings. twelve participants, eleven females and one male, between the ages of eleven and sixteen, were asked to read first, a text out loud for four minutes, and later, twenty one letters in their native language; Italian. The same was asked to be done by a control group of ten participants, genders not specified. The eye movements were recorded by an infrared pupil reflection system allowing measurements of movements of the eyes, both horizontally and vertically, occurring. The results gathered illustrated that “the ability to read graphemes was normal [...] [but] accuracy in word reading and, to a great extent, speed was dramatically affected “(Luca et al., 2002, p. 621). In addition, the recording exposed that the eye movements of the dyslectics, in contrast

to the control group, appeared to fragment longer words consisting of eight to ten letters into smaller segments, ranging between two and four segments. The findings are both consistent in terms of symptoms of the language disability of developmental dyslexia as well as with accordance with the DR model, suggesting an adaptation of the sub-lexical route when reading. In plain English, the results show that participants divided long words into segments and then enunciated the parts in order to be able to read the word out loud.

A similar study was made by Zoccolotti, Luca, Pace, Gasperini, Judica & Spinelli (2004) recording vocal reaction times instead of recording eye movements. There was one dyslectic test group and three control groups. All participants were between the ages of eight and nine. The four groups were asked to read out a text passage out loud with a time limit of four minutes and a relatively short passage without any time limits. In the first reading the participants were asked to read as much as they could in four minutes; in the second reading they were asked to read as fast as they could. The findings clearly show that the dyslectics “were severely impaired for speed and accuracy” (Zoccolotti et al., 2004, p. 371) compared to the three control groups. It appeared as if the subjects in the three control groups read the whole words, using their internal orthographic lexicon, while the dyslectics enunciated most of the words presented. These findings suggest that the participants in the control groups used a lexical route while the dyslectics used a sub-lexical route.

Both studies mentioned above, show speed and accuracy impairment among dyslectics but suggest a normal text comprehension in most of the cases. This further indicates the importance to distinguish between reading ability and reading comprehension. In addition, the results also show that the sub-lexical route is used in reading procedures due to the lack of developed lexical procedure. Development dyslectics in these two studies indicate the same type and level of reading as beginner learners of reading in any language.

Furthermore, 1981 Zifcak conducted a study investigating the correlation between reading and oral language. Forty-nine subjects between the ages of six and seven were, first, asked to spell a word that was read to them out loud, second, to repeat a word and indicate the numbers of segments by tapping a plastic hammer on a table. Zifcak found that the subjects that were successfully able to indicate the segments in words were also skilled readers, reinforcing that phonological awareness (PA) is strongly correlated to acquiring reading skills. In his findings it was also suggested that the results were neutral in terms of the participants’ personal qualities such as age, intelligence and gender. Simply put, the only difference between the skilled readers and poor readers in Zifcak’s study was their ability to recognize the amount of syllables (segments).

However, a different study by Berninger, Nielsen, Abbott, Wijsman & Raskind (2007) investigating gender differences in reading impairments, illustrate a difference in phonological awareness displaying reading impairments as gender-related thus contradicting the outcome from Zifcak's study. Results from yet another study by Mann (1986) pointed out that phonological awareness was closely related to reading experience which increased with age. All three of the studies, Zifcak, Berninger et al. and Mann, conclude that phonological awareness is closely related to learning how to read but disagree in terms of other factors such as age and gender.

4.2 Dyslexia and reading in a second language

As previously stated, there is only a handful of studies regarding dyslexia and reading in L2 specifically, it is therefore relevant to include studies within the field of general reading in L2. Again, the studies have been divided into appropriate subcategories with the following subheadings: reading in L2 and reading with dyslexia in L2.

4.2.1 Reading in L2

As mentioned above, there is a strong correlation between phonological awareness (PA) and acquiring adequate reading skills in a native language. In 2011, Dellicarpini conducted a study involving twenty-six adult ESL students with Spanish as their L1 to investigate if the correlation between PA and reading skills was applicable to L2 reading as well. Participants were asked to complete a series of tasks including segmentation, isolation, deletion, substitution and decoding of words and letters in their L2, English. The decoding of words, reading them out loud, was one of the biggest obstacles for the participants. When the subjects were unable to segment certain words the pronunciation was wrong thus strongly indicating "a high level of correlation between PA and decoding ability" (Dellicarpini, 2001, p. 252). The overall results provide evidence that reading skills are strongly correlated with phonetic awareness in L1 as well as in L2.

To further emphasize the relations between L1 and L2 reading skills, it is relevant to take look at a study conducted by Kim (2012) who investigated the correlation between L1 literacy and L2 reading fluency- and word reading. One hundred-fifty Spanish speaking girls in the first grade were asked to complete six tasks regarding reading silently and out loud. The results were recorded by a computer and in two cases the results were assessed manually. Based on the simple view of reading model Kim theorized that "reading fluency captures two

important ingredients for reading comprehension – word reading automaticity and oral language comprehension” (Kim, 2012, p. 691). The findings disclose that the oral skills in L2 were in fact directly in relation to L2 reading. The L2 reading skills were also strongly influenced by L1 literacy skills. Subjects used literacy knowledge from their L1, such as vocabulary, pronunciation and grammar rules and PA to try to solve the various tasks. The findings from Kim’s study suggest that the participants linguistic transfer when trying to complete the tasks. Based on these findings, there is a possibility that there is a link between L1 and L2 in terms of reading and that findings in the field of L1 and dyslexia might be applicable in L2 reading and dyslexia.

4.2.2 Reading with dyslexia in L2

An interesting, yet little known fact among teachers, is that dyslexia differs across languages and is therefore looked upon and investigated from a local context and language. The difference lies in mainly two aspects; estimation of dyslectic individuals in a language and the level of severity of the disorder which depends on the language’s transparency and logographic system (Smythe & Everatt, 2000).

Despite that general knowledge often connotes dyslexia with some sort of writing impairment there is very little coverage in that field; whereas there is a lot of coverage when it comes to dyslexia and reading. Furthermore, it was not until the late nineties that the fields of dyslexia and bilingualism, including EFL and ESL, started a more in-depth cooperation (Peer & Gavin, 2000). The popular target for “the recent research has been the orthographic structure of the language” (Lundberg, 2002, p. 165) based on the assumption that transparent orthographies are more easily acquired and read compared to deep ones (opaque). It is theorized that there is a higher number of dyslectics in a language if the language is opaque. Differently phrased, it is hypothesized that an easy language where the spelling of words is similar to the pronunciation of words has a lower number of dyslectic individuals.

Until the present day, very little research has been conducted combining the field of reading with dyslexia in English as an L2. The most recent research concerning dyslectics and reading in English as L2 was conducted by Łockiewicz & Jaskuulska (2016). The study was a part of a larger project and included a group of forty-eight students with dyslexia and a control group consisting of fifty students without dyslexia. It consisted of two parts; one 50 minute group task where the participants were asked to answer a questionnaire, and one 25 minute individual task where they were asked to read words and non-words. The results

indicated that the dyslectic students had a weaker vocabulary, that were less accurate in reading words and that they overall read slower. The findings from this particular study concur with what has been hypothesized so far; expressively that students with dyslexia are, first, far less sufficient readers in English as an L2 compared to their L1, second, far less sufficient readers in English as an L2 compared to their peers without dyslexia. Furthermore, the researchers found that all of the participants, both dyslectic and non-dyslectic “read out all letters, following the regularity of Polish rules“ (Łockiewicz & Jaskuulska, 2016, p. 6), namely their L1. This suggests, as previously theorized, that L1 literacy skills are used in L2 reading not only by regular readers but by dyslectic readers as well. To explain, the Polish regularity rules state that all letters should always be pronounced with a few exceptions of when two graphemes together constitute a phoneme, such as cz, (Ch-sound), sz (sh-sound) or rz (z-sound). The participants in Łockiewicz & Jaskuulska’s study pronounced all letters when reading in English hence illustrating a presence of transfer of linguistic reading rules; language transfer providing evidence for LCD hypothesis. Moreover, Łockiewicz & Jaskuulska also observed that “the faster and more accurately [the] participants read in Polish (L1) the faster and more accurately they read in English (L2)” (Łockiewicz & Jaskuulska, 2016, p. 7) providing additional support to the LCD hypothesis.

Another, slightly remote but relevant, study is a comparison between the German and the English language in terms of the impact of orthographic consistency on dyslexia. The study investigates if there is a difference in reading among dyslectics in different languages and if the language difficulty in terms of phoneme to grapheme conversion makes a difference. Landerl, Wimmer and Frith (1997) compared reading skills between English and German speaking dyslectic children. Each dyslectic group was compared to two control groups, making it three groups in total in each language. The students were between the ages of ten and twelve. Participants were asked to look at various words and then press a button when knowing how to pronounce the word after which the word disappeared from the computer screen and time elapsed was measured. The findings concur with some of the previous theories. Firstly, the English dyslectic group had far worse results indicating that opaque language does in fact cause greater difficulty in reading for dyslectics. Secondly, the study shows that the major overall difference between the English and German groups, not only dyslectics, regarding errors for rare and non-words which “may be triggered by the key orthographic feature [...] consistency of grapheme-phoneme relations [...]” (Landerl et al., 1997, p. 328), thus illustrating the importance of PA.

Furthermore, another study by Oren & Breznitz (2004) did something similar to that by Landerl et al. Oren & Breznitz (2004) compared reading processes in L1 and L2 among dyslectics and regular bilinguals where L1 was Hebrew and L2 was English. They recorded brain activity during word reading of twenty-five dyslectics and twenty-five non-dyslectics between the ages of twenty-three and thirty; notable is the fact that all of the participants were male. The recordings showed significant differences between participants in terms of “memory, phonological, and speed of information processing tests” (Oren & Breznitz, 2004, p. 138) where the dyslectic group had decidedly lower scores. The results show that dyslectics had difficulties in reading in both languages, but that the L2 displayed the biggest obstacles. Also, the researchers in this study suggest that the poor achievement in L2 reading might be caused by the “irregular nature of English orthography” (Oren & Breznitz, 2004, p. 146) giving evidence for the LCD hypothesis as well as the DR-model in terms of a weak internal lexicon caused by undeveloped or defect lexical route.

In addition, to test the theory if English is more difficult to read in compared to transparent languages for dyslectics, Ziegler, Perry, Ma-Wyatt, Ladner & Schulte-Körne conducted a study in 2003 investigating if developmental dyslexia is language specific or universal. They used two dyslectic groups, one consisting of thirty English speaking subjects and one with nineteen German speaking subjects all between the ages of nine and thirteen and two control groups in each language. The participants were asked to read words and non-words aloud. The results are questionable; although the English speaking dyslectics made more errors, compared to the German dyslectics; the researchers explain this by stating that the English language leaves more room for mistakes. They suggest that the English language gives more opportunities for making errors in general, not only for dyslectics. However, the results do suggest a sub-lexical route among dyslectics in both groups. It also illustrates that dyslexia as a language disorder is universal but that the symptoms vary; not necessarily due to language structure although it is not excluded.

In similarity, Beaton & Davies (2007) investigated semantic errors in *acquired dyslexia*. They tried to explore if orthographic depth /transparency in a language really made a difference. In short, the three participants taking part in the study were asked to read words out loud in English and Welsh while brain activity was measured and recorded. The results show that “there were not more semantic errors made by [the] patients in reading in English than in reading the corresponding Welsh words” (Beaton & Davies, 2007, p. 319). Because the major difference between acquired and developmental dyslexia is when the symptoms occur and not the symptoms themselves, it can be suggested that the results from this study

are applicable to developmental dyslexia as well. The study showed that there is no difference between reading between an opaque and transparent language in acquired dyslectics, thus going against the major theories by, for example, Smythe & Everatt (2000), and the other few studies conducted. However, it is not suggested in the study if Welsh was a random language or an L2 and can therefore be questionable. In addition, there is no similar study made with developmental dyslectics.

4.3 Methodological considerations

The vast majority of studies, more than 60%, within the field of dyslexia have been conducted in English and with English native speakers. Most of those studies investigate the reading process and vocabulary abilities among dyslectic; very few explore reading alone in L2, and far less reading in English as an L2. The handful of studies regarding dyslexia and reading in English as an L2 are not necessary universally applicable whilst the ages, L1's and genders among the participants vary tremendously and so does the methodology regarding the conducts of the studies.

Other methodological considerations are that all of the studies mention individual differences among the participants but very few try to eliminate certain obvious factors such as keeping same age range. There are no lead studies within this field and therefore consequently the little research that is conducted are not coherent with each other but instead broadly spread.

5 Discussion

There are theories about reading, dyslexia and second language acquisition but not a theory that deals with all of the fields simultaneously. It was not until the late nineties that a deeper cooperation between the fields of dyslexia and second language acquisition occurred. The biggest difficulties in terms of the studies are similar to the ones with theories. Because of all the three fields being broad and very little research has been done covering all the fields, it has been somewhat of a struggle trying to choose relevant studies to include in this review.

The majority of the studies included disclose a connection between reading and processing of words. Regardless of theory of reading, it is impossible to disregard the importance of phoneme to grapheme conversion in order to adopt adequate reading skills. Developmental dyslectics display either surface or phonological dyslexia, suggesting an

inadequate memorization of linguistic skills in terms of word recognition, pronunciation and spelling. The results of the studies imply a list of things such as; the importance of phonological awareness in order to acquire reading skills, age and gender, as well as the influence of the L1 language. In terms of dyslexia, it is known to occur far more frequently among boys than girls in L1s', but there are no studies measuring the occurrence in L2s'.

Moreover, very few of the studies base their hypothesis on the same reading theory and therefore do not have the same focus. Many of the findings in the studies can be applicable to more than one model; the results simply indicate a certain hypothesis being correct, it does not necessarily dismiss or discredit any other hypothesis. In many, or even majority, of the studies certain things have been assumed, like for instance language transparency facilitating learning; out of all the studies read, only 2 studies were found questioning that assumption. Although there are certain theoretical indications of what can be assumed and excluded when investigating about dyslexia, L2 and reading, by transferring certain results from each field and from studies regarding L1, it does not give a stable foundation if those factors are not excluded through investigation.

Looking at the situation from a Swedish point of view, it makes it difficult to make use all of the theories and hypothesis. Most Swedish upper secondary schools include students with various L1s. If one is to continue among the lines that current research suggests, it means that English as a second language should be considered a difficult language to learn for developmental dyslectic due to its inconsistency in grapheme to phoneme conversion. It also means that each dyslectic student should not be examined through a unanimous test to assess the level and symptoms of the impairment, but that the test should be constructed after the students' native language; preferably there should be one text for each language type in regards to transparency. There is not a possibility creating such tests in Sweden taking into account all of the L1's being spoken in schools. Much more research must be done in order to help create an adequate plan of education in order to facilitate learning for dyslectics instead of just giving them more time during tests for example.

On the Swedish National Agency for Education's website there is relatively little information to find about the language disorder and the information provided is not necessarily up to date or in consensus in regards to symptoms and definitions provided by studies within this field. It is for example stated, according to own translation, that "[s]ome believe that [dyslexia] is a biological language disability while others argue that it is rather a trait or ability, much as some people are born with bad ball sense" (Skolverket 2016), there are no, or very little, research indicating dyslexia being anything else than an actual disorder.

The website does however recognize that “[t]he most common problem among people with dyslexia is the lack of phonological awareness” (Skolverket 2016).

The Swedish National Agency for Education suggests that students with the diagnosis of dyslexia should be given extra resources. These resources include specialized hard- and software, private tutoring and one-on-one sessions with teachers practicing reading out loud. It also illustrates, according to own translation, that “the implementation of the national tests sometimes have to be adapted for students with reading and writing impairments” (Skolverket 2016), which in practice usually means longer time for writing. But since dyslexia also regards reading it is suggestable that extra help in form of instructions and texts being read out loud should also be provided. However, such assistance implements difficulties if the nature of for example the national test is to examine reading skills. If looking and going with the findings of the research including the study, the Swedish National Agency for Education needs to revise both the information they provide as well as solutions and suggestions they have teaching dyslectics.

In a negative light, there is not much room for self-criticism in majority of the studies. Very few of the ones included in this review have a section for improvement or suggest that their findings might be indication of something else due to subjective analysis of data. Many of the researchers have chosen to display the low achievement results in reading in English amongst dyslectics in L2 as a consequence of the opaque nature of the English language. There has not been a consideration that the the low scores in English are occurring amongst the control groups as well. This might in general indicate that English is a difficult language to acquire in terms of reading skills and not only for dyslectics. In order to draw a conclusion about language transparency playing a vital role and not only being an affecting factor, more studies in line with Beaton & Davies study should be conducted.

Furthermore, because there is a consistency in developmental dyslexia occurring more frequently among males most studies focus on the male gender by including only or mostly male participants. Development dyslexia does not occur as frequently among girls but it does occur and it is therefore questionable if the findings from these diverse studies are applicable for both genders.

6 Summary and conclusion

For easier mapping purposes the summary and conclusion has been divided into summary of the theoretical background and summary of studies followed conclusion and further research.

6.1 Summary

6.1.1 Summary of background

Dyslexia is said to have many faces causing difficulties to provide an adequate clarification which can encompass everything that the language disorder dyslexia embodies. The simplest explanation would be that it is a language impairment causing difficulties to read and write due to decoding of words and memorization into long term memory. It does not however affect the overall intelligence or understanding in any way.

There are two prominent reading theories regarding dyslexia *The dual-route model* and *The simple view of reading model*. The dual-route model advocates two parallel routes of reading, namely sub-lexical and lexical route. The sub-lexical route is used to decode small segments of words or letters; it is often used by beginner readers and is recognized as ‘sounding out’ words (enunciating). *The simple view of reading model*, on the other hand, illustrates that word decoding (grapheme to phoneme conversion) together with language comprehension make up the skill of reading and reading comprehension.

6.1.2 Summary of studies

There is little research conducted within this field and therefore studies from the separate fields of ‘dyslexia and reading’ and ‘dyslexia and L2’ have been included.

The results from the studies in the field of dyslexia and reading concur that PA is an essential factor when acquiring the skill of reading, especially when going from sub-lexical reading to lexical reading. It is also illustrated that the process of reading is not the same as the process of comprehension; difficulties reading does not affect the understanding of the print in these cases. Both of the studies by Luca, Borelli, Judica, Spinelli & Zoccolotti (2002) and Zoccolotti, Luca, Pace, Gasperini, Judica & Spinelli (2004) suggest a sub-lexical dual route illustrating difficulties reading larger chunks of words but not singular letters or small segments.

When looking at the field of dyslexia and L2, most studies coincide with the LCD hypothesis, illustrating evidence of reading and vocabulary in L1 playing a major role on reading L2. The main study, by Łockiewicz & Jaskuulska (2016), proved that theories within the separate fields of dyslexia, reading and L1 are applicable to dyslexia and reading in L2. The findings showed that both L1 to L2 transfer is present and that developmental dyslectics are less sufficient readers in L2 English compared to both L1 and non-dyslectic peers. However, there is no evidence of language transparency being a crucial factor when learning to read in L2 making English difficult to acquire in terms of reading for, especially, dyslectics.

6.2 Conclusion & Further research

As the studies reviewed in this paper illustrate, the combined field of dyslexia, reading and L2 is rather unexplored in the present time. The complexity of developmental dyslexia creates obstacles when it comes to investigating its nature and impact on L2 reading. It is difficult to interpret certain results in regards to what factors might be affecting the outcomes. As clarified in aforesaid studies, the LCD hypothesis is very much current whereas the theory behind transparency in a language facilitating reading skills in an L2 cannot be confirmed or dismissed with evidential support from conducted studies at this point in time.

The conclusion that can be drawn is that there are some universal truths regarding developmental dyslexia and reading in English as a L2. Firstly, if a dyslectic has great difficulties reading in his/her L1 he/she will have even greater problems reading in L2, regardless of the L1 and L2 languages. The problems are caused by the fact that reading is closely correlated with vocabulary and vocabulary in L2 is, often but not always, weaker than in L1. Furthermore, if the L2 in fact is English this too will have a negative impact due to the opaque structure of the English language. The grapheme to phoneme correlations are difficult to grasp for any English learner, but even more so for individuals diagnosed with language impairments such as dyslexia. It is however vital to point out that English in particular does not create greater obstacles compared to other opaque languages; all and any opaque languages create the same difficulties. Secondly, it is important to understand that although dyslexia does not automatically correlate to reading comprehension, but reading ability, it can do so in the long run. If students read words incorrectly or read a word they do not understand it affects the comprehension of the text. It also suggests that new words will not be reinforced and registered in the phonological loop and therefore no or little progress will be done in both

reading and vocabulary acquisition. In other words, both the DR model and the simple view of reading hypothesis should be taken into consideration when teaching reading skills to developmental dyslectics in L2 whilst reading involves both ability and comprehension which in a larger perspective are closely correlated with vocabulary and other literacy skills. Thirdly, there must be an overall understanding that the symptoms do vary due to many biological and social factors. Some researchers claim that there is a difference between genders, some that there is not. There is however a consensus that younger dyslectic students are about 4 years behind compared to their peers in terms of reading skills whilst the progress from sub-lexical reading to lexical reading is never evident. This suggests that it is not only reading itself that should be in focus and practiced, but there should also be striving towards expanding the internal orthographic lexicon. There is evidence supporting that students with time and frequent exposure to rules and vocabulary learn to read these words without enunciating them; namely to use the lexical route and not the sub-lexical route.

It is evident that far more research must be conducted within all aspects such as L1, L2, age, gender, textualization, location and context. There is, as previously illustrated, very little research conducted where reading in English as an L2 is investigated; it would be of much relevance to replicate Łockiewicz & Jaskuulskas study with students with other L1 to get a cross-lingual comparison.

Reference list

- Beaton, A.A., & Davies, N.W. (2007). Semantic errors in deep dyslexia: Does orthographic depth matter? *Cognitive Neuropsychology*, 24(3), 312-323.
- Berninger, V. W., Nielsen, K. H., Abbott, R.D., Wijsman, E., & Raskind, W. (2007). Gender differences in severity of writing and reading disabilities. *Journal of School Psychology*, 46, 151-172.
- Caravolas, M., Bruck, M., & Geneese, F. (2003). Similarities and differences between English – and French speaking poor spellers. In N. Goulandris (Ed.), *Dyslexia in Different languages: Cross-linguistic Comparisons* (pp.157-180). London: Whurr Publishers
- Coltheart, M. (2005). Modeling Reading: The Dual-Route Approach. In M. J. Snowling & C. Hulme (Eds.), *The science of reading: A handbook* (pp.6-23). Oxford: Blackwell
- Coltheart, M. (2006). Acquired dyslexias and the computational modeling of reading. *Cognitive Neuropsychology*, 23(1), 96-109.
- Colheart, M., Curtis, B., Atkins, P., & Haller, M. (1993). Models of Reading Aloud: Dual-Route and Parallel-Distributed Processing Approaches. *Psychological Review*, 100 (4), 589-608.
- Coltheart, M., & Rastle, K. (1994). Serial Processing in Reading Aloud: Evidence for Dual-Route Models of Reading. *Journal of Experimental Psychology: Human Perception and Performance*, 20 (6), 1197-1211.
- Coltheart, M., & Rastle, K., Perry, C., & Langdon, R. (2001). DRC: A dual Route Cascaded Model of Visual Word Recognition and Reading Aloud. *Psychological Review*, 108(1) 204-256.
- Dellicarpini, M. (2011). The role of phonemic awareness in early L2 reading for adult English language learners: Pedagogical implications. *Applied Linguistics Review*, 2, 241-264.
- Frost, E.D. (2000). Bilingualism or Dyslexia- Language Difference or Language Disorder? In L. Peer & G. Reid (Eds.), *Multilingualism, Literacy and Dyslexia- A Challenge for Educators* (pp.129-137). London: David Fulton Publishers Ltd.
- Ganschow, L., Schneider, E., & Evers, T. (2000). Difficulties of English as a Foreign Language (EFL) for students with Language-Learning Disabilities. In L. Peer & G. Reid (Eds.), *Multilingualism, Literacy and Dyslexia- A Challenge for Educators* (pp .182-191). London: David Fulton Publishers Ltd.
- Kelly, K., & Phillips, S. (2011). *Teaching Literacy to Learners with Dyslexia – multisensory approach*. London: Sage Publications

- Kim, Y. (2012). The relations among L1 (Spanish) literacy skills, L2 (English) language L2 text reading fluency, and L2 reading comprehension for Spanish-speaking ELL first grade students. *Learning and Individual Differences*, 22, 690-700.
- Klein, D., & Doctor, E.A.L. (2003). Patterns of developmental dyslexia in bilinguals. In N. Goulandris (Ed.), *Dyslexia in Different Languages: Cross-linguistic Comparison* (pp 112-136). London: Whurr Publishers
- Landerl, K., Wimmer, H., & Frith, U. (1997). The impact of orthographic consistency on dyslexia: A German-English comparison. *Cognition*, 63, 315-334.
- Luca, M. D., Borrelli, M., Judica, A., Spinelli, D., & Zoccolotti, P. (2002). Rapid Communication. Reading Words and Pseudowords: An Eye Movement Study of Developmental Dyslexia. *Brain and Language*, 80, 617-626.
- Lundström, L. (2004). *Reading Difficulties and the Twofold Character of Language – How to Understand Dyslexia*. Stockholm: Elanders Gotab
- Łockiewicz, M., & Jaskuulskaa, M. (2016 online). Difficulties of Polish students with dyslexia in reading and spelling in English as L2. *Learning and Individual Differences*.
- Mann, V.A. (1986). Phonological awareness: the role of reading experience. *Cognition*, 24, 65-92.
- Nijakowska, J. (2010). *Dyslexia in the Foreign Language Classroom*. Dublin Ireland: Trinity College
- Olofsson, Å. (2003). The dyslexic reader and the Swedish language. In N. Goulandris (Ed.), *Dyslexia in Different languages: Cross-linguistic Comparisons* (pp.137-156). London: Whurr Publishers
- Oren, R., & Breznitz, Z. (2004). Reading processes in L1 and L2 among dyslexic as compared to regular bilingual readers: behavioral and electrophysiological evidence. *Journal of Neurolinguistics*, 18, 127-151.
- Peer, L., & Reid, G. (2000). Multilingualism, Literacy and Dyslexia: A Challenge for Educators. In L. Peer & G. Reid (Eds.), *Multilingualism, Literacy and Dyslexia- A Challenge for Educators* (pp .1-11). London: David Fulton Publishers Ltd.
- Smythe, I., Everatt, J. (2000). Dyslexia Diagnosis in Different Languages. In L. Peer & G. Reid (Eds.), *Multilingualism, Literacy and Dyslexia- A Challenge for Educators* (pp .12-21). London: David Fulton Publishers Ltd.
- Skolverket (2016). Hur stöttar man elever med dyslexi och andra läs- och skrivsvårigheter?

Forskning för skolan. Retrieved from

<http://www.skolverket.se/skolutveckling/forskning/amnen-omraden/spraklig-kompetens/tema-las-och-skrivinlarning/hur-stottar-man-elever-med-dyslexi-och-andra-las-och-skrivsvarigheter-1.157474>

Ziegler, J. C., Perry, C., Ma-Wyatt, A., Ladner, D., & Schulte- Körne, G. (2003).

Developmental dyslexia in different languages: Language specific or universal?

Journal of Experimental Child Psychology, 86, 169-193.

Zifcak, M. (1981). Phonological Awareness and Reading Acquisition. *Contemporary*

Educational Psychology, 6, 117-126.

Zoccolotti, P., Luca, M. D., Pace, E. D., Gasperini, F., Judica, A., & Spinelli, D. (2004). Word

length effect in early reading and in developmental dyslexia. *Brain and Language*, 93,

369-373.

