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# Facilitating positive L1 transfer through explicit spelling instruction for EFL learners with dyslexia: an intervention study

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## ABSTRACT

There is growing evidence that dyslexia may involve difficulty with implicit learning, which may hinder learners with dyslexia to acquire spelling skills in a foreign language through implicit instruction. Paradoxically, this is exactly how Dutch students with dyslexia learn English spelling at school. This research aims to determine if implementing explicit spelling instruction, based on a direct comparison between L1 Dutch and L2 English spelling, facilitates the development of spelling skills of dyslexic learners in English as a Foreign Language. The participants were 40 Dutch-speaking secondary-school students independently diagnosed with dyslexia (age 12–14). Twenty participants attended their regular English lessons (comparison group), whereas 20 other participants received explicit contrastive spelling instruction once a week for eight weeks (intervention group). The results reveal that during the eight weeks of the intervention spelling skills of the intervention group developed faster than those of the control group, and they remained at the same level five weeks after the intervention. These findings suggest that even a relatively short intervention based on explicit instruction of spelling rules and cross-linguistic comparisons has a facilitative effect on the development of spelling skills of students with dyslexia in a foreign language.

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Dyslexia; English as Foreign Language; explicit teaching; cross-linguistic awareness; intervention

## Introduction

The technological developments of the 21<sup>st</sup> century have enabled people to interact with others from across the world. English is often used as a lingua franca to facilitate this communication. The ability to speak and understand the English language has thus become an important skill in modern society. In the Dutch education system, English is taught as a standard foreign language and is one of three core subjects in secondary education due to its growing importance. The national attainment targets for English education are focused on the four main skills, namely reading, writing, listening and speaking, while less attention is paid to spelling instruction. L1 Dutch spelling is taught explicitly in primary education, where children learn spelling rules and develop their metalinguistic knowledge. In contrast, L2 English spelling is not taught explicitly; rather students are expected to detect regularities

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simply through exposure to written texts. Written corrective feedback may include correction of spelling errors, but metalinguistic explanations of the correct rules are generally not provided. Crucially, such implicit learning may be problematic to language learners who have deficits in procedural memory. Procedural learning involves unconscious detection of statistical regularities and supports the acquisition of rule-based aspects of language (regular morphology, syntax, spelling, some aspects of phonology) (Ullman, 2001). There is growing evidence that both developmental dyslexia and developmental language disorder (DLD) may involve difficulty with implicit/procedural learning (see recent meta-analyses in Lammertink et al., 2017 and Van Witteloostuijn et al., 2017). This means that these vulnerable learners may have difficulty acquiring L2 spelling under implicit learning conditions.

For this paper, the focus lies on Dutch students with dyslexia. Dyslexia is a learning disability that is characterised by poor spelling and decoding abilities despite normal IQ and educational opportunities (Lyon et al., 2003). Considering spelling, the phonological elements of spoken language often do not exactly correlate to the orthographic elements of written text (Lundberg, 2002). Thus, language learners must become aware of the phonemes that make the basic building blocks of a language, because they cannot rely on a literal translation of the phonological elements. Children with dyslexia often struggle to acquire this knowledge and it hinders their language development regarding reading and spelling (Lundberg, 2002).

Joanisse et al. (2000) showed that the participants with dyslexia had the same level of language skills as typically developing children from a younger age group. Such delays have also been found in foreign language learning by children with dyslexia (Crombie, 1997, 2000). For example, Helland and Kaasa (2005) found a significant difference between the performance of students with and without dyslexia in multiple L2 tasks. They suggest that the poor L2 skills of dyslexic language learners could be due to the poor development of the automated skills in the L1, in the sense that there is little basis in the L1 skills that could be transferred onto the learning of the L2 (Helland & Kaasa, 2005). Alternatively, it is possible that the disorder directly affects the mechanisms of L1 transfer making it less available to learners with dyslexia (Łockiewicz & Jaskulska, 2016; Schneider & Evers, 2009).

This paper aims to determine whether the use of explicit spelling instruction highlighting L1-L2 similarities and differences has a positive effect on the spelling performance of L2 learners with dyslexia.

## **Theoretical framework**

### ***Procedural learning disadvantage***

In the literature, there is no conformity on the cause of dyslexia (Vellutino et al., 2004). One recent approach claims that reading and spelling difficulties in dyslexia are at least partly due to procedural learning deficits (Nicolson et al., 2010; Nicolson & Fawcett, 2007). The Procedural Deficit Hypothesis is based on the assumption that the procedural memory system is impaired in dyslexia, whereas the declarative memory system is intact. The declarative memory system allows people to store episodic and semantic information as explicit knowledge of facts and other data. In language, the declarative system is thought to provide the foundation of semantic knowledge, which is critical for lexical memory and explicit knowledge of grammar and spelling rules. This information can be learned even after a single

exposure and is easily recollected when needed (Morgan-Short et al., 2014; Ullman, 2016). The procedural memory system permits the acquisition of certain skills or knowledge that guides performance. This knowledge is implicit and thus not accessible as explicit information in the memory system. The functionality of the system can be characterised as organizing the learning and processing of context-dependent stimulus responses in rule-like relations (Ullman, 2001, 2004; Ullman & Pierpont, 2005). Procedural learning is a gradual process that occurs during multiple presentations of stimuli and responses. The procedural system plays a role in the implicit knowledge of rule-based aspects of language, such as morpho-syntactic rules, but it has also been related to recognizing regularities in phonology and spelling.

A number of studies have provided evidence that learners with dyslexia may have a procedural learning disadvantage. These studies have commonly used either Serial Reaction Time (SRT) tasks (e.g. Vicari et al., 2003) or Artificial Grammar Learning (AGL) tasks (e.g. Pavlidou & Williams, 2014). Lum et al. (2013) conducted a meta-analysis of fourteen studies using SRT tasks and Van Witteloostuijn et al. (2017) report the results of a meta-analysis of thirteen studies of implicit visual AGL. The results of both meta-analyses demonstrated that non-dyslexic participants, on average, performed better than those with dyslexia, suggesting an implicit/procedural learning deficit in individuals with dyslexia. At the same time, there have also been studies that found no differences in the quality of procedural learning between individuals with and without dyslexia, especially if groups were matched for reading ability and received sufficient time for learning (e.g. Inácio et al., 2018; Van Witteloostuijn et al., 2019; West et al., 2019).

It is beyond the scope of this paper to address the theoretical controversy regarding the causes of dyslexia. We do not aim to verify the presence (or the extent) of implicit learning deficits in learners with dyslexia or to determine whether such deficits are cause or consequence of reading/spelling difficulties.

### ***Implicit vs. explicit instruction***

The effectiveness of explicit vs. implicit instruction has been a topic of debate for decades. Most of this research has focused on grammar teaching in a second or foreign language. Implicit learning is characterised by lack of awareness when learning a structure (DeKeyser, 2003). Through implicit instruction students are provided with the input containing correct structures, but they are not explicitly told what the rule behind them entails. In contrast, explicit instruction is based on direct explanation of rules by the teacher. In an explicit lesson, the teacher provides the rule and students must learn to apply it (deductive approach). Alternatively, students are provided with the linguistic material and encouraged to find the regularity/rule themselves (inductive approach). Explicit (grammar) instruction is generally found to be more effective than implicit instruction, especially when it comes to accuracy measures (De Graaff & Housen, 2009; Norris & Ortega, 2000; Spada & Tomita, 2010). However, implicit grammar instruction may lead to more positive results pertaining to fluency, complexity and functional adequacy (Piggott, 2019).

Explicit instruction of spelling rules has also received quite some attention in the literature, but largely in the context of L1 instruction. For instance, Berninger et al. (2008) report the results of an intervention study that provided students with dyslexia with explicit spelling instruction in L1 English and conclude that students with dyslexia benefit from an explicit

phonological, orthographic and morphological treatment. Kemper et al. (2012) compared the effectiveness of explicit and implicit spelling instruction to Dutch-speaking primary-school pupils with and without spelling disabilities. The results revealed that explicit instruction was superior in both groups. Relatedly, based on a literature study, Braams (2019) concludes that explicit instruction is more effective than implicit instruction for both good and poor spellers, but it should be used in tandem with activities in which children actively practice spelling and reflect on their strengths and weaknesses. Graham and Santangelo (2014) present the results of a meta-analysis of 53 studies, most of them focusing on teaching L1 English spelling. Eighty-seven percent of the studies demonstrated the advantage of explicit spelling instruction, compared to more implicit approaches. The positive effects of explicit instruction were durable and held for both good and poor spellers. Explicit spelling instruction also had positive influence on the development of reading, phonological awareness and spelling in context.

Relatively little attention in the literature has been given to the effectiveness of explicit spelling instruction in L2 learning. In one such study, Pérez Cañado (2006) implemented an explicit spelling intervention to Spanish learners of English as a Foreign Language (EFL) in primary school. The intervention group received 15–20 minutes of explicit spelling instruction per class, twice a week, over the course of one academic year. The control group received the same number of EFL instruction hours, but without explicit spelling instruction. The intervention had a positive effect on the development of EFL spelling skills, as evidenced by the steeper growth of the intervention group.

Students having difficulty with implicit learning are likely to benefit from explicit instruction even more than their typically-developing peers. Explicit instruction may neutralise individual differences in language aptitude (Erlam, 2005) and procedural memory (Tagarelli et al., 2016) by drawing learners' attention to regularities that may otherwise go unnoticed in the input. Metalinguistic (explicit) grammar interventions proved effective for remedying and enhancing L1 development of children with DLD (Ravid & Hora, 2009; Zwitserlood et al., 2015). Explicit instruction should be even more important in the EFL context where the negative effects of the procedural learning disadvantage are aggravated by limited (classroom) exposure to the target language. This prediction is supported by the results of an intervention study reported by Nijakowska (2010). In this study, the researcher taught EFL spelling rules to a group of Polish-speaking secondary-school students with dyslexia in 90-minute sessions that were held once a week over a period of six months. The intervention was based on the principles of the direct multisensory approach. Two control groups were involved in this study – a control group of students with dyslexia and a control group of students with typical language development. The performance of the intervention group on the spelling test and reading test significantly improved from pre-test to immediate post-test. Their performance on a delayed post-test, administered two weeks after the immediate post-test, did not differ from the results of the immediate post-test. In contrast, there was no significant growth in the performance of the dyslexic control group. The performance of the typically-developing control group did improve, but only in spelling and to a lesser extent than in the intervention group. These results show that children without learning disabilities are able to develop their spelling skills in a foreign language even without explicit spelling instruction (albeit to a lesser extent than the explicitly taught group), but learners with dyslexia may need support from direct spelling instruction in order to develop their spelling skills.

These studies suggest that explicit instruction of English spelling can be a promising way of helping EFL learners with dyslexia. This said, it is also important that foreign language teachers make use of the spelling skills that the learners have already acquired in their L1. In other words, positive L1 transfer also deserves explicit attention in a language classroom.

### ***L1 transfer in developmental dyslexia***

The assumption that L2 use should be maximised in foreign-language classrooms and L1 use should be avoided has dominated classroom practices for decades. However, this premise disregards research findings suggesting that L1 can be a friend rather than a foe, 'a building block for the second language providing a scaffold for its development' (Wigglesworth, 2002: 19). Cummins (1979) proposed the Linguistic Interdependence Hypothesis positing that the 'development of competence in an L2 is partially a function of the type of competence already developed in L1 at the time when intensive exposure to the L2 begins' (p. 222). In a similar vein, Sparks and Ganschow (1993) proposed the Linguistic Coding Differences Hypothesis, which posits that the learning of both L1 and L2 is based on underlying language learning mechanisms that are similar. For example, L1 reading skills provide a foundation for learning to read in a foreign language (FL) (Van de Ven et al., 2018).

This said, if L1 is used in a FL classroom, it is usually for disciplining, establishing social relationships and/or explaining grammar (Littlewood & Yu, 2011), but rarely for raising learners' cross-linguistic awareness (Horst et al., 2010) or reinforcing positive cross-language transfer (Cummins, 2008). Children are expected to notice L1-L2 similarities themselves. Even though there is ample evidence that L1 and L2 proficiency are positively correlated in children with typical language development (e.g. Siu & Ho, 2015; Sparks, 2016; Sparks et al., 2009; Van de Ven et al., 2018; Zeguers et al., 2018), there is also recent evidence suggesting that learners rarely engage in explicit comparisons of L1 and L2 (Bell et al., 2020), and they are often unaware of crucial cross-linguistic differences (Ammar et al., 2010). Therefore, it has been suggested that L2 teachers should use contrastive pedagogical approaches explicitly comparing L1 and L2 grammar (Bell et al., 2020; Lightbown & Spada, 2000; McManus, 2019).

When it comes to children with language disorders, there is some evidence that these vulnerable learners may need even more support in using their L1 knowledge in L2 acquisition. A few studies have addressed this issue in the context of L2 acquisition by children with DLD and suggested that positive transfer may be less available to these children than to peers with typical language development (Blom & Paradis, 2015; Ebert et al., 2014; Tribushinina et al., 2020). For dyslexia, a transfer of deficits underlying reading and spelling difficulties has been reported (Chung & Ho, 2010; Morfidi et al., 2007), but relatively little is known about positive transfer (Morfidi et al., 2007; Van Viersen et al., 2017).

On the one hand, there seems to be (limited) evidence that positive L1 transfer can occur in students with dyslexia. For example, Morfidi et al. (2007) showed that speeded word reading in L1 Dutch predicts speeded word reading in EFL, even when controlled for age and vocabulary size. Van Viersen et al., (2017) report that gifted students with dyslexia outperform averagely intelligent learners with dyslexia on EFL measures, even when L1 orthographic knowledge is controlled for. This finding suggests that positive transfer of literacy skills is possible for students with dyslexia when their skill set is more enhanced.

On the other hand, Łockiewicz and Jaskulska (2016) report fewer correlations and lower correlations between reading skills in L1 Polish and L2 English in a sample of learners with dyslexia compared to typically-developing peers, which may suggest that transfer of reading and spelling skills is impeded in dyslexia. In a similar vein, Schneider and Evers (2009) argue that positive L1 transfer is less available to at-risk L2 learners: 'Learners who have difficulties acquiring an L2 need explicit instruction in how to make cross-linguistic comparisons' (p. 58).

A possible reason for the obstruction of positive L1 transfer can be linked to deficits in procedural knowledge. Cassar et al. (2005) found that children with dyslexia attempt to compensate for their phonological deficits by learning certain possible and impossible patterns through declarative memory. If knowledge of L1 spelling is largely instance-based rather than rule-based (Kemper et al., 2012), transfer of rules/patterns to an L2 becomes problematic. Therefore, these students could benefit not just from explicit spelling instruction, but more specifically from explicit instruction highlighting similarities and differences between L1 and EFL.

Examples of such teaching methodologies are scarce and mainly limited to grammar teaching (Kupferborg & Olshtain, 1996; Lucas, 2020; McManus, 2019; McManus & Marsden, 2017, 2018). Helman (2004) makes some suggestions regarding how the English sound system should be taught to typically-developing children from Spanish-speaking homes in the U.S. It is proposed that common/similar sounds should be taught first, followed by different and L2 unique sounds. In this approach, cross-linguistic differences and typical errors made by Spanish learners of English are explicitly discussed in the L2 classroom. Similar approaches, also developed for L2 learners of English in the U.S., are described by Pollard-Durodola and Simmons (2009) and Schneider and Evers (2009).

## The present study

The main research question addressed in this study is whether learners with dyslexia benefit from a contrastive (cross-linguistic) explicit approach to teaching EFL spelling. In order to answer this question, we conducted an intervention study with L1 Dutch EFL learners with dyslexia. Explicit contrastive teaching methods, such as the ones proposed by Helman (2004), Pollard-Durodola and Simmons (2009), and Schneider and Evers (2009), are rarely used in teaching EFL spelling in the Netherlands. Dutch EFL learners are generally expected to pick up on spelling regularities through exposure to written texts and writing practice, i.e. implicitly. Based on prior research on the effectiveness of explicit spelling instruction (Nijakowska, 2010; Pérez Cañado, 2006) and on the slowly emerging evidence that L1 transfer may be less available to EFL learners with language disorders (Łockiewicz & Jaskulska, 2016; Tribushinina et al., 2020), we hypothesised that Dutch students (with dyslexia) would benefit from a teaching approach in which their metalinguistic knowledge of L1 spelling rules is activated and consolidated prior to introducing a similar rule in the L2. Such positive transfer could be particularly beneficial in this language combination, since Dutch orthography is characterised by low complexity, whereas English orthography is less transparent and more complex (Seymour et al., 2003). Comparing the L1 with the L2 may raise students' cross-linguistic awareness and provide an overview of spelling as a logical system (Brooks, 2015; Eide, 2012; Ulicheva et al., 2020; Bowers & Bowers, 2017). Combining this element with explicit instruction could improve the learners' spelling abilities and provide the extra support needed.

The teaching approach proposed here was inspired by the method ‘Begrijpend Spellen in het Engels’ (Spelling Comprehension in English) developed by the third author of this paper in her clinical practice as an educational psychologist and dyslexia coach. The third author has successfully used her method for many years (Karman, 1995–2019) in one-to-one therapy for students with dyslexia in the age range between 10 and 14 years. The present study has implemented a similar approach in a regular classroom setting. We compared the development of spelling skills in learners with dyslexia receiving traditional EFL instruction (control group) and a similar group receiving short weekly sessions devoted specifically to English spelling rules in comparison to their L1 Dutch counterparts (intervention group).

## Methodology

### Participants

The participants were 40 native speakers of Dutch independently diagnosed with dyslexia (age range 12–14). All participants came from the same school in the Utrecht area and learned English as part of the standard curriculum. They were in the first two grades of secondary education: There were 17 7<sup>th</sup> graders (10 females) and 22 8<sup>th</sup> graders (13 females). One participant was eventually excluded from this study due to absence during multiple intervention sessions. All participants had persistent reading and/or spelling deficits (scores up to the 10th percentile on three consecutive measurements) despite normal intelligence and in the absence of sensory acuity deficits and neurological impairments. For privacy reasons we were not granted access to the diagnostic results.

Primary schools in the Netherlands use tests developed by national testing institutes to gain insight into a pupil’s skills (reading comprehension, spelling, mathematics) and general scholastic aptitude. Based on the results of these tests and recommendations from primary-school teachers, students proceed to secondary education in one of the three educational streams – VWO (pre-university track), HAVO (senior general secondary education), or VMBO (vocationally-orientated level focused on practical knowledge). All participants of this study were at VMBO level. Compared to the upper educational levels, this track includes more students with learning disabilities (Van de Ven et al., 2018). The final recommended EFL competency levels for this educational track are A1 for writing and A2 for reading, listening and speaking (based on the Common European Framework of Reference). The A1 writing level captures the ability to write simple isolated phrases and sentences (e.g. can write numbers, dates and personal details on a hotel registration form). Regarding spelling, this level is restricted to the ability to overwrite familiar words and short sentences.

The school where the intervention was conducted has a specific vision in mind, which involves that the students should learn through individual discovery and curiosity, and teachers should function as supporters of the individual learning process. This vision is translated into practice through its unusual system. Students and teachers are divided into teams in accordance to grade and educational level. Each team has their own specific domain in which they work and receive their education. The domains consist of mostly open space where the students work individually or in groups. There are two closed classrooms for instruction. The amount of instruction each week depends on the specific subject. Students receive one instruction hour and one domain hour for English each week. The domain hour is spent working individually or in groups. This study was conducted during

the domain hours of English classes, so the standard English instruction would not be interrupted.

The participants for the intervention were randomly selected within categories of gender and grade. Half of the 7<sup>th</sup> graders and half of the 8<sup>th</sup> graders were randomly assigned to the intervention group ( $n=19$ , 9 female). These participants received an explicit contrastive spelling lesson each week. The other half formed a control group ( $n=20$ , 14 female). These students only participated in the pre- and post-tests and their regular English lessons. Time-on-task was kept equal between the two groups, so that eventual differences in performance could not be attributed to enhanced exposure to English at school.

## **Intervention**

The intervention consisted of eight 20-minute lessons. The lessons were taught by the second author, a certified English teacher. Every lesson followed the same structure:

### **1. Introduction**

Every lesson started with simple assignments to activate the previous knowledge of the students, for example, a short game of memory to name the singular and plural forms of animals in week 1. After lesson 1, this time was also used to discuss the materials of previous weeks to repeat the spelling rules. The students were given handouts. Each handout started with a table comparing the corresponding rule in L1 Dutch (left column) and L2 English (right column). The table was followed by several exercises.

### **2. Instruction on main rule in L1 and L2**

The explicit instruction first discussed the spelling rule in Dutch. Some of the rules were available to the students in the explicit form, as spelling rules learnt in from primary education. Other rules could be deduced by reflecting on the students' implicit knowledge of Dutch spelling. After that, the target L2 rule was introduced and the L1 rule was explicitly linked to the L2 counterpart.

### **3. Individual assignment and discussion**

The students worked on the individual assignment on their worksheet and discussed their answers in class. The individual assignments guaranteed that all students were participating and actively thinking for themselves (cf. Braams, 2019). The group discussion allowed for multiple repetitions of the rules and ensured that all students knew the correct answers. During the discussion, the students were asked why they spelled the words a specific way to ensure that they were aware of the spelling rules.

The rules targeted in the intervention were (in the order of the presentation) spelling of plural forms, ending a word with a [v] sound, *c* pronounced as [s] or [k], long and short vowels, silent letters, *ei* vs. *ie*, ending a word with *-t* or *-d*, and ending a word with *-tion*, *cion* and *-sion*.

## **Test instrument**

In order to assess learning gains, we used the Orthographic Knowledge Test, which was developed specifically for Dutch school students in the lower grades of secondary education

(Schoonen et al., 2003). The test covers typical spelling problems experienced by Dutch learners of English, with a special focus on cases with no one-to-one correspondence between phonemes and graphemes. The test contains 89 items, of which 7 words were included in the intervention, i.e. 92% of the test items were not treated in the intervention. Dutch translations of the target words were provided in parentheses so that the children knew which words were meant. The test was divided into six parts:

- (1) Fill in one or two letters (15 items): e.g. *He likes e\_\_\_s.* (*g*)
- (2) Fill in one or two vowels, choosing from *a/e/i/o/u* (15 items): e.g. *He always eats br\_\_\_d.* (*brood*)
- (3) Fill in one or two consonants, choosing from *b/c/d/f/g/h/j/k/l/m/n/p/q/r/s/t/v/w/x/z* (15 items): e.g. *He has a terrible cou\_\_\_.* (*hoest*)
- (4) Fill in *ei, ie, ai* or *ia* (15 items): e.g. *He has \_\_\_ght cars* (*acht*).
- (5) Finish the word by producing a plural form (14 items): e.g. *watch – watch\_*
- (6) Fill in one, two or three letters choosing from the following vowels (*a/e/i/o/u*) and/or consonants (*b/c/d/f/g/h/j/k/l/m/n/p/q/r/s/t/v/w/x/z*) (14 items): e.g. *He is sick: he has a heada\_\_\_.* (*hoofdpijn*)

The test has been shown to correlate well with EFL writing scores obtained through free writing assignments ( $r = .85$ , Schoonen et al., 2003). The Cronbach's alpha coefficients for this test were .94 for 7<sup>th</sup> graders and .92 for 8<sup>th</sup> graders.

The performance of the participants on a spelling test was assessed three times in both the intervention and the control condition. The participants took the pre-test as an individual assignment prior to the intervention. An immediate post-test was conducted directly following the intervention. Five weeks later a delayed post-test was administered. Each correct answer was scored 1 point. The maximum number of correct responses was 89.

### **Data analysis**

This study implemented multilevel modelling. Multilevel models allow analysis of data with a nested structure and take into account that individuals that share the same environment (grade, class<sup>1</sup>) have more in common than those who do not (Hox et al., 2017). The participants of the present study were nested in different grades and classes. The 7<sup>th</sup> graders came from three different classes (7 from class A, 5 from class B and 5 from class C) and the 8<sup>th</sup> graders also came from three different classes (5 from class D, 10 from class E and 7 from class F). The participants in the control group represented all six classes, and the participants in the intervention group came from five different classes (all except C). Therefore, Participant, Grade and Class were included in the random part of the model.

The development of the intervention group was compared to that of the control group in a multilevel linear regression model, using the lme4 package in R (Bates et al., 2013). Condition (Intervention; Control), Time (Time 1, Time 2, Time 3), as well as interaction between Condition and Time were included as fixed effects. In order to answer our research question, we needed to test whether the development of spelling performance in the intervention group was steeper than in the control group and whether the performance at the immediate post-test (Time 2) was retained at the delayed post-test (Time 3). In order to answer these

questions, both fixed effects (Condition; Time) and the interaction (Condition\*Time) were added to the model at once. Participant, Grade and Class were taken as random factors.

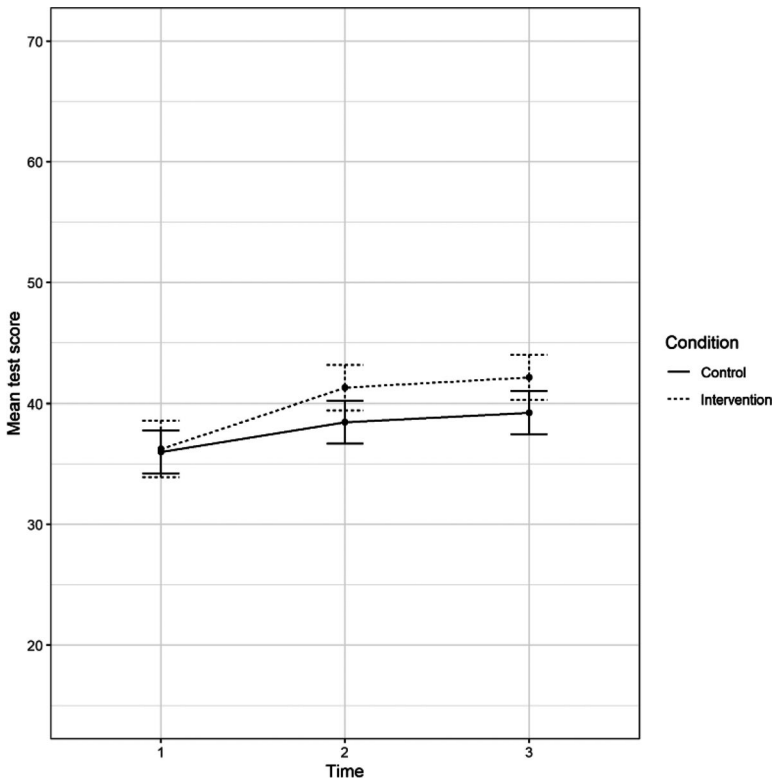
The performance of the control group at Time 2 was taken as a baseline. In this way, we could test (i) whether the control group showed improvement in performance during the intervention period (Time 1 vs. Time 2); (ii) whether the development during the intervention period differed between groups (i.e. if there was a significant interaction between Condition and Time), and (iii) whether the effects of the intervention were durable (Time 2 vs. Time 3).

## Results

The descriptive statistics are presented in Table 1. There were no differences between groups at Time 1, i.e. prior to the intervention ( $\beta = -0.11$ ,  $SE = 3.03$ ,  $t = -0.04$ ,  $p = .97$ ).

**Table 1.** Mean spelling scores, by Group and Time.

	Intervention group		Control group	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Time 1 (pre-test)	36.3	10.7	36.0	8.0
Time 2 (immediate post-test)	42.8	10.9	38.5	10.2
Time 3 (delayed post-test)	43.7	11.7	39.3	8.5



**Figure 1.** Estimated mean test score, by Condition and Time (Time 1 = pre-test; Time 2 = immediate post-test; Time 3 = delayed post-test).

Figure 1 shows the development of performance of the two groups across three measurements. Model coefficients are presented in Table 2 (the performance of the control group at Time 2 is taken as a baseline).

Parameter 2 in Table 2 shows that there was a significant growth in the control group between Time 1 and Time 2, as the performance of the control group at Time 1 was significantly lower than at Time 2 (baseline), as evidenced by the negative estimate ( $\beta = -2.45$ ). However, the growth was stronger in the intervention group, as evidenced by the significant interaction between Condition (Intervention) and Time 1 (parameter 3). Parameter 4 shows that the performance of the control group on the delayed post-test (Time 3) was not significantly different from their performance on the immediate post-test (Time 2). Finally, parameter 5 reveals that this relationship (lack of change between Time 2 and Time 3) was not different in the intervention group, as evidenced by the lack of significant interaction between Condition (Intervention) and Time 3.

In summary, the performance of both groups improved during the intervention period, but the intervention group demonstrated a steeper growth. Both groups retained their immediate post-test scores, and no change took place between the two post-tests. Hence, the intervention group retained their advantage (gained during the intervention) five weeks after the intervention.

## Discussion

This study set out to determine whether explicit spelling instruction facilitating positive L1 transfer would enhance the development of L2 spelling skills in EFL learners with dyslexia. The results have demonstrated that the spelling skills of the intervention group underwent a steeper development during the eight weeks of the intervention, compared to the control group of students who attended their regular English classes and did not receive explicit spelling instruction. And, importantly, the intervention group retained their advantage five weeks after the intervention. These results replicate earlier findings demonstrating that explicit spelling instruction in an L2 enhances spelling skills of EFL learners with dyslexia (Nijakowska, 2010). The present findings further reveal that even a shorter intervention (8 weeks rather than 6 months as in Nijakowska's study) might be effective.

Importantly, 82 of the 89 test items were not included in the intervention. We may therefore conclude that the students in the intervention group not only learned specific words, but also generalised the spelling rules to new instances. The finding that the intervention resulted in rule-based learning is particularly important in the context of dyslexia. Children with dyslexia have been shown to have difficulty with implicit learning (Lum et al., 2013; Van

**Table 2.** Coefficients of the comparisons between groups.

	<i>B</i>	<i>SE</i>	<i>df</i>	<i>t</i> value	<i>p</i> value
1. (Intercept)	38.27	2.67	2.37	14.37	.002
<b>Time 1 vs. Time 2</b>					
2. Time 1	-2.45	1.19	74.00	-2.06	.043
3. Time1*Intervention	-4.13	1.70	74.00	-2.43	.018
<b>Time 2 vs. Time 3</b>					
4. Time 3	0.80	1.19	74.00	0.67	.503
5. Time3*Intervention	0.04	1.70	74.00	0.03	.980

Witteloostuijn et al., 2017) and over-rely on instance-based spelling strategies in the development of L1 (Kemper et al., 2012). If children do not recognise spelling patterns of their L1 in which they usually receive a lot of exposure to written texts, they are even less likely to succeed in implicit rule-based learning of the L2 spelling because students would usually have far less exposure to print in the L2 compared to their mother tongue. Furthermore, instance-based knowledge of L1 spelling makes positive cross-language transfer particularly problematic. For instance, there are a lot of similarities between the spelling systems of Dutch and English, but such similarities are more useful at the level of abstract rules rather than individual words (cognates).

A novel aspect of our intervention is that it was not only explicit, but also contrastive in the sense that cross-linguistic comparisons were central to each lesson. Based on the current results we cannot separate the effects of explicit rule instruction as such and the effects of cross-linguistic comparisons. In principle it is possible that explicit rule instruction alone would have been sufficient (Nijakowska, 2010). However, given the growing body of research showing that students with language disorders may have difficulty spontaneously using their L1 knowledge in learning an L2 (e.g. Blom & Paradis, 2015; Ebert et al., 2014; Łockiewicz & Jaskulska, 2016; Tribushinina et al., 2020), it seems likely that both aspects of our method (explicitness and raising cross-linguistic awareness) have contributed to the positive results. Our findings converge with recent research demonstrating that pedagogical approaches relying on cross-linguistic comparisons and activating learner's entire linguistic repertoire enhance metalinguistic awareness and lead to greater learning gains in an L2 (Kupferborg & Olshtain, 1996; Leonet et al., 2020; Lucas, 2020; McManus, 2019; McManus & Marsden, 2017, 2018). Whereas these prior studies have focused on the development of L2 grammar, our research demonstrates that cross-linguistic approaches are also effective in teaching L2 spelling.

Explicit cross-linguistic connections can facilitate L2 development in several different ways. Firstly, cross-linguistic spelling instruction is likely to contribute to the development of morphological and phonological awareness through drawing learners' attention to morphemes (e.g. Dutch and English plural suffixes in our intervention) and to sounds (e.g. final devoicing in Dutch vs. lack of final devoicing in English). Both morphological and phonological awareness have been shown to be predictors of L2 spelling performance (Elbro & Arnbak, 1996; Ke & Xiao, 2015; Van der Leij & Morfidi, 2006; Vellutino et al., 2004).

Secondly, cross-linguistic interventions are likely to facilitate positive transfer by activating L1 features that are similar to their L2 counterparts. For example, the participants of our intervention first discussed the L1 Dutch spelling rule that the [s] sound is spelt *c* before *e*, *i* and *ij* and then extended it to the identical rule in English. Another similarity between English and Dutch discussed in the course of the intervention is that words ending in the [v] sound cannot end in *v*. Although the rule is common to both languages, English and Dutch differ in the ways they solve the final [v] problem. In Dutch the final *v* becomes *f* (e.g. *wij schrijven* 'we write' vs. *ik schrijf* 'I write'), whereas in English a silent *e* must be added (e.g. *nerve*, *detective*).

Thirdly, systematic cross-language comparisons preempt negative transfer by showing learners what *cannot* be done in the L2. For example, one of our lessons targeted a common negative transfer error made by Dutch learners of English, which involves using the Dutch spelling rule for producing English plurals (e.g. *hobby's*, *baby's*, *pony's*). Students should be made aware of such subtle differences that may go unnoticed in the input, especially when

it comes to students with dyslexia. Prior research shows that L2 learners are likely to accept both correct L2 structures and incorrect structures resulting from negative L1 transfer (Lightbown & Spada, 2000; Zufferey et al., 2015). Furthermore, L2 learners have been reported to have poor awareness of the differences between L1 and L2 (Ammar et al., 2010; O'Brien, 2019) and rarely make cross-linguistic comparisons without explicit guidance from the teacher (Bell et al., 2020). Therefore, it is crucial to employ pedagogical approaches in which students are actively encouraged to compare their languages and in this way develop a habit of drawing on their L1 knowledge in learning the L2.

Interestingly, the performance of the control group also improved over the eight weeks of the intervention, which indicates that it is not impossible to learn L2 spelling implicitly, even for students with dyslexia. However, the fact that the improvement in the intervention group was stronger clearly shows that spelling development of L2 learners with dyslexia can be successfully supported and accelerated through a relatively short intervention. The finding that the dyslexic group receiving no explicit instruction also improved their spelling performance, albeit to a lesser extent than the intervention group, contradicts earlier findings by Nijakowska (2010). In her study, only the non-dyslexic control group showed significant development of spelling skills, whereas the performance of the dyslexic control group did not improve. This difference might be due to the fact that Dutch and English are very typologically similar and share a lot of cognates. Polish students with dyslexia (Nijakowska, 2010) might be even more dependent on the explicit spelling instruction in EFL due to a larger distance between L1 and L2. Another possible source of advantage of Dutch learners of English is that children in the Netherlands usually have a lot of extra-curricular exposure to English (Unsworth et al., 2015). It is also possible that we observed increasing performance in both groups because we used the same test of orthographic knowledge three times. Nijakowska (2010) used the same test items on the pre-test and the immediate post-test, but a different set of items was used on the delayed post-test. Importantly, however, if learning in our study occurred due to task effects, it occurred in both groups and the steeper growth in the intervention group cannot be explained by task effects.

Taken together, the results suggest that students with dyslexia learning EFL in countries with a lot of out-of-school exposure to English and speaking a typologically similar L1 are able to acquire L2 English spelling implicitly. However, their learning gains significantly increase if learners are provided with explicit contrastive spelling instruction. Hence, we recommend explicit contrastive teaching approaches for supporting EFL learning by students with dyslexia.

### **Limitations and avenues for future research**

A limitation of this research is that, for practical reasons, we only used one test of orthographic knowledge. Even though this test has an excellent internal consistency (see Methodology) and has been shown to be a good predictor of performance in free writing tasks (Schoonen et al., 2003), a superior design would have included an additional measure of orthographic knowledge, such as spelling in sentence writing or a free writing task. An advantage of our test over a free writing task is that all students were given exactly the same items, whereas in free writing tasks it is possible to avoid more complex words. However, using additional measures of spelling knowledge and use would have provided a deeper understanding of the learning trajectories. Future research along these lines will also benefit from including

a test of reading proficiency. For example, in Nijakowska's (2010) study, the performance of the spelling intervention group improved on both spelling and reading, whereas the control group of learners with dyslexia showed no improvement on either of the tests. It is possible that our explicit spelling intervention has also contributed to steeper development of the reading skills in the intervention group.

Developmental dyslexia involves a wide range of language profiles. In addition to the core deficits in phonological awareness, alphabetic mapping and phonological decoding, some learners also have co-occurring difficulties with oral language skills, including listening comprehension, vocabulary and grammar (Catts et al., 2003; Hulme et al., 2015; Nash et al., 2013; Snowling & Melby-Lervåg, 2016; Van Viersen et al., 2018). Unfortunately, we do not have information on the level of oral skills or word decoding abilities of our participants. Even though it is hardly feasible to differentiate between different types of dyslexia in providing extra support regarding English spelling, it would be theoretically interesting to investigate whether there are certain types of dyslexic learners that are most amenable to such explicit contrastive interventions.

Relatedly, based on prior research, we assumed a procedural learning deficit and intact declarative learning mechanisms in our participants without actually measuring their procedural and declarative learning ability, which is a limitation. Even though there is a growing body of research showing that dyslexia may be associated with a procedural learning disadvantage, evidence remains controversial (Van Witteloostuijn et al., 2019; West et al., 2019). Furthermore, even if procedural learning disadvantages are found, there is still a lot of variability in the performance of individuals with dyslexia on procedural learning tasks (Nicolson et al., 2010). A promising avenue for future research would be to relate the performance and the development of the students participating in an explicit intervention to measures of L1 development, as well as procedural and declarative memory. It is plausible to assume that learners with lower procedural learning abilities will have more difficulty in the implicit EFL classroom, and that students with enhanced declarative learning ability will benefit more from learning explicit rules. Relatedly, this study did not involve a control group of students without dyslexia. If students with dyslexia have a procedural learning disadvantage, it is likely that the positive effect of explicit cross-linguistic teaching should be stronger for students with dyslexia than for learners with typical language development.

In this study, we only looked at spelling performance in the L2. Future research could also control for the previous orthographic knowledge in the L1. Some students had received extra support in Dutch spelling as part of their treatment for dyslexia in primary school. Other students had not received extra support because they were diagnosed later or they did not have access to these classes for other reasons. The extra support might have influenced the students' ability to use their knowledge of L1 spelling rules and to learn L2 patterns. Furthermore, the effects of the intervention on L1 spelling abilities can be an interesting point for future research. The systematic comparison between L1 and L2 might have enhanced the students' orthographic knowledge in L1 Dutch as well. Future studies could trace the development of both languages to establish whether students improve their spelling abilities in both languages with these interventions.

This research involved secondary-school students. However, children around the globe are increasingly exposed to foreign languages, usually English, in primary school. It has been shown that explicit instruction may be as effective with younger children as it is with older

children and adults (Lichtman, 2016). Therefore, primary-school pupils with dyslexia are also likely to benefit from explicit teaching of L2 spelling rules. Future research could target younger learners and investigate the effects of explicit spelling instruction in primary-school-aged EFL learners.

Finally, follow-up interventions could also pay closer attention to the order in which the rules are treated. For example, it is plausible to assume that interventions would be particularly successful if they start with highly transparent rules making sound-grapheme correspondences more accessible to the learners and with predictable phonological principles such as the effect of the silent *e*, followed by morphological rules and finally by loan-words and influences from other languages.

## Conclusion

The findings from this intervention study have shown that relatively short interventions offered to large groups of students with dyslexia can effectively improve their L2 spelling skills in a regular classroom setting. These results are promising because they suggest that even small-scale interventions, which can be easily implemented in the standard curriculum or in extra support lessons, have the potential to help vulnerable language learners achieve better results in foreign language learning.

## Note

1. We use the term *grade* to refer to a year of education and *class* where a group of students shares the same classroom.

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