Abstract

Morphological awareness is a relatively new aspect of the research on dyslexia. This paper provides a succinct review of the scant literature on how morphological awareness relates to the reading and spelling abilities of young dyslexics. One of the four research studies that have investigated the effects of morphological awareness training on the reading and spelling skills of dyslexic students, Elbro and Arnbak (2000), is presented in some detail. Their results suggest that morphological awareness training has an impact on the reading and spelling abilities of young dyslexic students.
THE EFFECTS OF MORPHOLOGICAL AWARENESS TRAINING ON THE READING AND SPELLING PERFORMANCE OF YOUNG DYSLEXICS

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1. Introduction

Dyslexia, which accounts for 80 to 90% of all learning disabilities, is more common than most people think (Canadian Dyslexia Association (CDA), 2014). According to that same document, approximately 23% of the population of Canada suffers from some form of dyslexia. These unexpectedly high numbers have prompted the question as to what can be done to help dyslexics – especially dyslexic children in their school years – improve their reading and spelling abilities. These skills, which are prominently impaired by dyslexia, play an important role in children’s acquisition of literacy (Arnbak and Elbro, 2000; Siegel, 2008) and, by extension other areas of knowledge that depend heavily on being literate.

Research has long been focussed on phonological awareness deficits as a possible cause for dyslexics’ impairments in reading and spelling (Arnbak and Elbro, 2000; Carlisle, 1984; Casalis et al., 2004; Joanisse et al., 2000; Siegel, 2008). However, morphological awareness is a relatively new aspect of the research on dyslexia, though its role in dyslexics’ acquisition of reading and spelling has been discussed in a growing number of studies (Arnbak and Elbro, 2000; Casalis et al., 2004; Elbro and Arnbak, 1996; Siegel, 2008). If morphological awareness is indeed related to dyslexics’ reading and spelling achievements, it follows that morphological awareness training should have a positive effect on young dyslexics’ reading and spelling skills. This paper’s aim is to provide a succinct review of the literature on how morphological awareness relates to the reading and spelling abilities of young dyslexics. One of the four research studies that investigated the effects of morphological awareness training on the reading and spelling skills of dyslexic students, Elbro and Arnbak (2000), is presented in more detail.

In the second section of this paper, terms of importance, including dyslexia, phonological awareness and morphological awareness, are explained. In the third section, findings from previous research on morphological awareness and spelling and reading achievements in young dyslexics are discussed, with a focus on the study by Arnbak and Elbro (2000). Our conclusion follows in section 4.

2. Explanation of terms

In this section, several key terms relevant to the topic of this paper are explained, including dyslexia, phonological awareness and morphological awareness. Dyslexia is generally defined as a specific language impairment that affects the reading, writing and spelling skills of individuals, despite normal intelligence, conventional teaching and adequate socio-cultural opportunities (CDA, 2014; CDC, 2014). Dyslexia is believed to be genetically inherited (CDA, 2014; CDC, 2014) and people suffering from this specific language impairment usually experience difficulties in performing word recognition tasks, organization and memorization tasks, spelling tasks, word and non-word reading tasks and reading comprehension tasks (Bourassa et al., 2006; CDC, 2014; Joanisse et al., 2000).

Research suggests a strong association between dyslexia and poor phonological abilities in children (Snowling and Stackhouse, 2006; Stanovich, 1988), which explains why phonological awareness has long been at the centre of research on dyslexia. Phonological awareness is understood as the conscious

\[1\] Difficulties in reading non-words (i.e., words that do not exist but that respect the language’s sound structure possibilities) indicate that dyslexics are unusually poor at decoding the unfamiliar words they encounter in their reading. This is obviously a particularly serious problem for beginning readers.
knowledge of the correspondence between the sound and spelling of words (Joanisse et al., 2000). Part of phonological awareness is the ability to segment words into phonemes (Joanisse et al., 2000). For instance, phonological awareness makes it possible for speakers of English to comprehend that a word such as *bat* is made up of three separate sounds, /b/, /æ/ and /t/. Phonological awareness is usually measured using tasks involving the manipulation of phonemes in words and non-words (Joanisse et al., 2000). For example, as part of a phonological awareness task, participants could be asked to repeat a word or a non-word presented orally to them while omitting the first sound. Upon hearing the word *bat*, for example, the participants would be expected to produce *at*.

However, explaining dyslexia solely in terms of phonological awareness is problematic. It presupposes that all languages exhibit a good correspondence between sound and spelling. This is not necessarily true of languages such as English that have a more complex orthographical system. Examples of the non-correspondence between sound and spelling in some English words are presented in (1).

(1) Examples showing the non-correspondence between sound and spelling in English

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<table>
<thead>
<tr>
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<tr>
<td>a. heal /hɪəl/</td>
<td>healthy /ˈhɛlθi/</td>
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</tr>
<tr>
<td>b. sane /sən/</td>
<td>sanity /ˈsænəti/</td>
<td></td>
</tr>
<tr>
<td>c. breathe /bɹiθ/</td>
<td>breath /bɹɛθ/</td>
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</table>

All three of these examples show that the same letter or letter combination can be pronounced in different ways. However, the lack of exact correspondence between sound and spelling in these examples is not arbitrary. In many cases, such as those in (1), the similar spelling captures the fact that these word pairs are morphologically related. Many of the spelling “irregularities” found in English can be explained through morphological relatedness (Bourassa et al., 2006). Though it is not always the case that morphologically related words are similarly spelled (e.g. *profound* – *profundity*), English is better viewed as having morphophonemic spelling system than a purely phonemic one (Chomsky and Halle, 1968). This suggests that morphological awareness also plays some role in learning the written system of English.

Morphological awareness refers to the conscious knowledge of the word formation patterns in a language (Casalis et al., 2004; Elbro and Arnbak, 1996). This knowledge is based on the morphemes, the smallest linguistic units of meaning, (Casalis et al., 2004; Elbro and Arnbak, 1996), including prefixes and both derivational and inflectional suffixes. That is to say, morphological awareness allows the speaker-reader to see that a morphologically complex word consists of meaning components. Examples of both inflectional morphology and derivational in English are provided in (2a) and (2b), respectively.

(2) Examples of inflectional and derivational morphemes in English

a. Inflectional morphemes

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<table>
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<tr>
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<tbody>
<tr>
<td>3rd person singular <em>-s</em></td>
<td>sells = sell + s</td>
</tr>
<tr>
<td>progressive <em>-ing</em></td>
<td>selling = sell + ing</td>
</tr>
<tr>
<td>regular past tense <em>-ed</em></td>
<td>watered = water + ed</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>runs = run + s</td>
<td>jumps = jump + s</td>
</tr>
<tr>
<td>running = run + ing</td>
<td>jumping = jump + ing</td>
</tr>
<tr>
<td>walked = walk + ed</td>
<td>sorted = sort + ed</td>
</tr>
</tbody>
</table>
b. Derivational morphemes

-ness  
goodness = good + ness  
softness = soft + ness  
madness = mad + ness

-ly  
kindly = kind + ly  
strongly = strong + ly  
rapidly = rapid + ly

-able  
doable = do + able  
driveable = drive + able  
manageable = manage + able

Morphological awareness allows the reader-speaker to realize that *cats*, for instance, is comprised of two “meaning chunks”, *cat* and the plural marker –s. It further allows that reader-speaker to see the meaning consistency in regular plurals, such as in *dogs, desks, dolls, etc.*

Inflected forms are more common than derived forms and more consistent in their semantics; they play an important role in grammar and they are generally learned earlier (Carlisle, 1984). In English, derived forms are later acquired and considered harder, partly because of their more complex semantics and partly because derivational suffixes often trigger complex and seemingly arbitrary phonological changes, including stress shifts, vowel quality changes, truncations, etc. (Carlisle, 1984). Examples of English derivational morphology causing sound changes are presented in (3).

(3) Examples of derivational morphemes triggering phonological changes in English

-ity  
sanity /sænəti/  
<  sane /sɛn/ + ity

-ic  
sarcastic /sɑrˈkæstɪk/  
<  sarcasm /ˈsɑrkæzəm/ + ic

-ify  
solidify /ˈsɒlɪdəfai/  
<  solid /ˈsɒlɪd/ + ify

-ous  
gracious /ˈɡreʃəs/  
<  grace /ɡres/ + -ous

Researchers agree that phonological awareness alone cannot account for dyslexics’ difficulties in reading and spelling (Carlisle, 1984; Casalis et al., 2004; Siegel, 2008). It seems obvious that seeing the simple words inside the derived forms would help in the acquisition of reading. Indeed, research is converging to show that morphological awareness plays an important role in the acquisition of reading and spelling abilities by young dyslexics (Carlisle, 1984; Casalis et al., 2004; Siegel, 2008). We can thus assume that young dyslexics could make significant gains in reading and spelling if they received specific morphological awareness training.

3. Effects of morphological awareness training on young dyslexics’ reading and spelling abilities

Morphological awareness training presents advantages over traditional and phonological awareness instruction for both dyslexic and non-dyslexic students. Because the notion of morphological awareness is broader than the notion of phonological awareness, Fowler and Liberman (1995) suggest that sensitivity to morphemes is easier to acquire. Morphemes, because they carry semantic information, are more salient (Casalis et al., 2004). The segmentation of words into morphemes is also, at times, a more natural cut on language compared to word segmentation based on phonemes (Fowler and Liberman, 1995). For instance, it is easier to comprehend *cats* as *cat* +s than as /k-æ-t-s/.

Morphological awareness can also facilitate word decoding for both dyslexic and non-dyslexic students. It can help in segmenting words into smaller meaningful units of speech that can be recognized more easily and rapidly (Siegel, 2008). For instance, if students can identify the word *heal* in *health, healthy, unhealthy* or *healthcare*, they are likely to discern some meaning in these words even if they are
unsure of the exact definitions or the pronunciations. Indeed, research suggests that morphological awareness improves reading comprehension, as it provides important indicators of the meaning of words through identification of the morphemes (Casalis et al., 2004; Elbro and Arnbak, 1996; Siegel, 2008).

Dyslexic and non-dyslexic students can also benefit from morphological awareness in spelling. Knowledge of the morphological structure of words can provide valuable clues to the beginning and ending of a particular word, and thus emphasize the regularity in the spelling of some prefixes and suffixes (Siegel, 2008). For example, in words like *goodness*, *madness* and *closeness*, the derivational suffix *-ness* simply attaches to the word base, and it is always spelled the same (Siegel, 2008). In short, in spite of irregularity, there is considerable regularity in the English spelling system, and much of that regularity is tied to morphology.

3.1 The effects of morphological awareness training

While research clearly shows the contribution of morphological awareness to young dyslexics’ reading and spelling abilities, few studies have explicitly explored the effects of morphological awareness training on the reading and spelling achievements of young dyslexics. Elbro and Arnbak (1996) and Arnbak and Elbro (2000) were among the first to design a morphological awareness training study. Here we present and discuss the methodology and results of the more recent of the research studies, Arnbak and Elbro (2000).

Arnbak and Elbro (2000) compared an experimental group of 33 young dyslexic students aged between 10 and 12 years old to an age-matched control group of 27 non-dyslexic students. The participants were subdivided into (an unspecified number of) smaller groups. The researchers’ morphological awareness training program, which was administered to the dyslexic group, consisted of short morphological awareness training sessions that were carried out three times a week over a period of twelve weeks. These training sessions were conducted by different teachers who had all received 12 hours of morphological training prior to their participation in the study. The training program created by Arnbak and Elbro (2000) was based on oral instruction (not written instruction) and on the semantic meaning associated with morphemes.

The program consisted of three phases, each of which dealt with a particular aspect of morphology. As shown in Table (1), which also describes in broad terms the tasks performed by the dyslexic group during the sessions, the focus of the first phase was on semantically transparent root morphemes, mostly endocentric compounds (Arnbak and Elbro, 2000). The second phase of the morphological awareness training program dealt with affixes, including prefixes and both derivational and inflectional suffixes. The third phase was concerned with the inflection of nouns and verbs.

At the end of the training program, the dyslexic and the non-dyslexic groups were tested according to several measures of morphological awareness, as well as for reading and spelling abilities. Morphological awareness was assessed using morpheme subtraction, morphological analysis, compounding and derivation and inflection tests. Reading ability was measured by tests of passage comprehension, word decoding, non-word reading and the reading of words with different morphological structures. Finally, spelling ability was tested through a spelling task that included the words used in one of the reading tests.

The dyslexic students made significant gains in reading ability according to their results on the passage comprehension test. Arnbak and Elbro (2000) reported that over the twelve-week period the dyslexic students who received morphological awareness training made modest but significant gains in morphological awareness, reading and spelling abilities compared to the non-dyslexic control group. According to the results from Arnbak and Elbro (2000), which are consistent with the literature on the impact of morphological awareness on dyslexic children’s reading and spelling, morphological awareness training seems to have the most effect on the spelling abilities of dyslexic students. The dyslexic group improved significantly in the spelling of compounds taken from the list of words used in the word-reading
test. This group also outperformed the non-dyslexic group in the spelling of derived and inflected words taken from the list of words used in the word-reading test, though the results were not significant. The spelling gains are noteworthy, given that the morphological awareness training was provided orally.

Table (1): Structure of Arnbak and Elbro’s (2000) morphological awareness training program

<table>
<thead>
<tr>
<th>Focus</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>• Morphological segmentation of compounds</td>
</tr>
<tr>
<td>Root</td>
<td>• Analysis of the semantic relation between the roots</td>
</tr>
<tr>
<td>morphemes</td>
<td>• Production of both existing and novel compounds</td>
</tr>
<tr>
<td>Phase 2</td>
<td>• Morphological segmentation of words into affixes and roots</td>
</tr>
<tr>
<td>Affixes</td>
<td>• Analysis of the semantic relationship between affixes and roots</td>
</tr>
<tr>
<td></td>
<td>• Production of new word forms by changing or adding different affixes to the root</td>
</tr>
<tr>
<td>Phase 3</td>
<td>• Analysis of the meaning of the inflection</td>
</tr>
<tr>
<td>Inflections</td>
<td>• Segmentation of words into root and inflection</td>
</tr>
</tbody>
</table>

Perhaps not surprisingly, the performance of the dyslexic group was significantly better than the performance of the non-dyslexic control group on two of the four measures of morphological awareness, the morphological analogy and the compound formation test. They performed better, though not significantly so, than the control group on the real word-decoding test. According to the other measures of reading ability, that is the non-word reading test and the decoding of morphologically simple and complex words test, the dyslexic group did not make more progress in reading than did the non-dyslexic group.

The results from Arnbak and Elbro’s (2000) study suggest that morphological awareness training has an impact on the reading and spelling abilities of young dyslexic students. The researchers were able to obtain these results from small groups studied over a short period of time. Because gains in spelling ability were higher than gains in reading ability, it is possible that morphological awareness training did help dyslexic students in the segmentation of complex words into smaller units that they knew how to spell (Arnbak and Elbro, 2000). Furthermore, because morphological awareness training for spelling included written tasks, it can be argued that the combination of oral and written instruction yielded more benefits for the young dyslexics than did the oral instruction alone (Arnbak and Elbro, 2000; Bourassa et al., 2006). More research on the impact of morphological awareness training on reading and spelling skills is certainly needed to verify Arnbak and Elbro’s (2000) results, but their results are promising.

Though as other contributions to this volume clearly indicate, morphological awareness training offers all students an advantage, not just those suffering from dyslexia, a caution that emerges from the Arnbak and Elbro (2000) study is that morphological awareness training should be administered to dyslexic students in small groups or even individually. Not all the subgroups of dyslexics in the study benefited equally (recall that the dyslexic experimental group was subdivided into smaller groups taught by different teachers). In their study, Arnbak and Elbro (2000) found a negative correlation between group size and some measures of morphological awareness, reading and spelling abilities, suggesting that gains from the morphological awareness training were larger for smaller groups.
An instructive caution that emerges from a shortcoming of the Arnbak and Elbro (2000) study concerns the morphological knowledge of the specialized teachers who took part in the study and who, in fact conducted the morphological awareness training sessions. Even though the participating teachers received a 12-hour morphology course prior to their participation in the study, their own previous knowledge about morphology seems to have had an impact on their ability to actively support the young dyslexics’ acquisition of morphological knowledge. The inconsistency in the results of different subgroups of dyslexics suggests that the teachers’ own training and knowledge might have influenced the quality of the morphological awareness training passed on to the dyslexic students (Arnbak and Elbro, 2000). The researchers did not supervise the teachers during the training sessions, so neither the researchers nor the readers can be certain that they all used the same type of instruction or that they provided the dyslexic students with the same morphological awareness content (Arnbak and Elbro, 2000; Elbro and Arnbak, 1996). From a research perspective this introduces a serious lack of control. To ensure that all participants receive comparable training, future studies should test the teachers and ensure complete consistency in the implementation of the training program. From the reader’s perspective, the results of this study caution us that teachers themselves need more than a passing knowledge of morphology if they are to help their students, dyslexic or non-dyslexic.

Yet another instructive caution relates to the fact that the morphological awareness training program was administered to the dyslexic students by means of oral instruction. Findings from previous research suggest that a certain amount of orthographic knowledge is needed in order to acquire morphological awareness and thus become sensitive to the morphological structure of words (Carlisle, 1984; Fowler and Liberman, 1995). Future research on morphological awareness training should therefore focus on making dyslexics aware of the morphological structure of the language in both spoken and written form (Bourassa et al, 2006; Carlisle, 1984; Egan and Pring, 2004; Elbro and Arnबak, 1996).

4. Conclusion

The aim of this paper was to provide a succinct review of the literature on the effect of morphological awareness on reading and spelling achievements in young dyslexics. It also reviewed and discussed a seminal piece of research by Arnbak and Elbro (2000) on the effects of morphological awareness training on dyslexics’ gains in reading and spelling. Results from this study show that morphological awareness training can help at least some dyslexic students improve their reading and spelling abilities, suggesting that morphological awareness training should be included in remediation training for dyslexics, as a complement to phonological awareness training or traditional remediation instruction.

References


