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Overruled!: Implicit cues rather than an orthographic rule determine Dutch children's vowel spelling

Elise de Bree[a,*], Jan Geelhoed[b], Madelon van den Boer[a]

[a] University of Amsterdam, Research Institute of Child Development and Education, PO Box 15780, 1001 NG, Amsterdam, The Netherlands
[b] Vrije Universiteit Amsterdam, PI Research, De Bascule, Rijksstraatweg 145, 1115 AP, Duivendrecht, The Netherlands

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ABSTRACT

This study addressed the question why vowel spelling acquisition is relatively difficult for young Dutch spellers. A spelling rule guides vowel spelling, but implicit cues could also play a role. We evaluated the role of phonology, morphology, and orthography. Grade 1 (N = 113) and 2 (N = 59) children were presented with dictations of real and pseudowords differing in the degree of consistency and familiarity. Correct scores of consistent vowel spelling in Grade 1 and 2 students were near ceiling, whereas those for inconsistent vowels were low, even in Grade 2 children, who have had explicit instruction of the spelling rule. Correct scores were affected by phonological and morphological consistency, and orthographic familiarity. Effects of these implicit cues were even more pronounced in Grade 2. Findings indicate that vowel length spelling is difficult to acquire because the explicit spelling rule is overruled by various sources of implicit information.

1. Introduction

Part of becoming literate is being able to spell. Spelling ability influences both the writing process and the perception of written texts by others (Graham, Harris, & Hebert, 2011). It has furthermore been proposed to influence reading ability, the other essential aspect of literacy (Ehri, 2000; Graham & Hebert, 2011). Spelling ability is thus of great importance for academic success. Although attention to acquisition of spelling is increasing, surprisingly few studies have focused on spelling compared to reading.

Spelling is complex and error prone. How it can best be taught has been an important discussion in the literature. One debate has been whether spelling should be *taught*, that is, whether spelling should be learnt through directly and systematically teaching children the spelling rules, or whether it should be *caught*, that is, whether it should be acquired incidentally, and indirectly. A recent meta-analysis of Graham and Santangelo (2014) found support for better spelling acquisition when spelling was taught rather than caught, pointing towards the importance of instruction in spelling acquisition.

A related (and partly overlapping) debate has been how spelling is learnt. Broadly speaking, a division can be made between models and interpretations of a phase-or-stage-like development (Ehri, 1992; Nunes, Bryant, & Bindman, 1997), which assume that increasingly more knowledge is used in spelling and that this knowledge leads to abrupt changes in spelling. On the other hand are models that assume that different linguistic and orthographic cues play a role from early development onwards (Deacon, Conrad, & Pacton, 2008; Treiman & Kessler, 2014). The currently dominant interpretation is that multiple implicit cues contribute to spelling outcomes as well as instruction (Treiman & Kessler, 2014). However, not much is known about the influence of these different sources of information on spelling outcomes. In this study, we compare vowel spelling in Dutch Grade 1 and 2 children, referring to the phases before and after instruction of the vowel spelling rule. We assess the influence of different sources of implicit cues.

Vowel spelling is dependent on different elements. For instance, vowel duration can influence spelling: errors can occur if the phonetic distinction of long and short vowels is not clear-cut (e.g. Lehtonen & Bryant, 2005; Nag, Treiman, & Snowling, 2010). Related, Landerl (2003) found that in contrast to good spellers, German poor spellers showed poorer vowel categorization. Furthermore, vowel spelling is easier if it is more predictable, when there is a straightforward phonology-orthography conversion, than when it is less predictable, when there is no 1:1 mapping between phonology and orthography, as in English (Wimmer & Landerl, 1997). Young English spellers have been found to initially rely on phonological information and only later shift to considering orthographic information in vowel spelling (Treiman & Kessler, 2006; Varnhagen, Boechloer, & Steffler, 1999). Varnhagen et al. (1999), for instance, found that children initially spell the vowel /ɑ/ with 'o', even when this is incorrect (correct: *sock*, incorrect: *swap*).

* Corresponding author.
E-mail addresses: e.h.debree@uva.nl (E. de Bree), jwgeelhoed@gmail.com (J. Geelhoed), m.vandenboer@uva.nl (M. van den Boer).

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They gradually also incorporate orthographic knowledge, by spelling the /ɑ/ words with the 'a' when needed. In addition, acquisition of orthographic conventions is necessary for acquiring the vowel spellings, because vowel spellings are also influenced by the surrounding word-or-syllable context (e.g. Landerl, 2003) and, vice versa, can influence the spelling of the surrounding consonants (e.g., Deacon, Leblanc, & Sabourin, 2011). Finally, vowel spelling can be influenced by morphological consistency: children spell morphemes better when the underived (base) word does not demand a change in the inflection. Deacon et al. (2011) found that children spelled both words with long (*skater*) and short vowels (*knitter*) with one consonant (correct *skater* and incorrect **kniter*). The children thus relied on this consistency even when the orthographic convention of doubling the consonant when preceded by a short vowel pointed them to the correct spelling (*knitter*).

In the present study, the focus was on Dutch vowel spelling of long vowels. Long vowels can be spelled two ways, either with two graphemes (vowel /a:/ in *maan* (moon)) or with one (vowel /a:/ in *water* (water) or *manen* (moons)). The former spelling pattern relies on consistent phoneme to grapheme conversion. The spelling of a long vowel with one grapheme is dependent on an orthographic rule of vowel degemination. This rule demands the conversion of a phonological representation (from /a:/ to 'a') on the basis of a spelling rule. It is generally taught as the letter-thief rule, as one of the letters for the vowel is 'stolen' when the vowel occurs at the end of an open syllable. This is the case both for mono-morphemic words, such as *water*, and words that are inflected and have a monomorphemic counterpart (*manen*).

The spelling convention applies only to vowels A/E/O/U, not for those with diphthongs, such as *buik-buiken* (bellies) and not for words with closed syllables (e.g. *taart-taarten*, cakes). In Grade 1, children are taught transparent spellings (*tas* 'bag', *maan*). In the second half of Grade 2, they are taught the vowel degemination rule (*manen*, *water*). The rule is not fully acquired at least until Grade 4 (Landerl & Reitsma, 2005). Errors made are often writing two graphemes for the long vowel, i.e, **waater* (Landerl & Reitsma, 2005). Studies have looked into improving spelling instruction to increase vowel spelling, but to our knowledge, there are no studies investigating the joint role of phonological, morphological and orthographic cues potentially contributing to vowel spelling. Prior to explicit instruction of this rule, these cues might already affect spelling and might continue to do so even when the rule has been taught explicitly. This is what we aimed to investigate.

Two interventions to promote learning of this Dutch spelling pattern have been reported. They focused on learning through explicit or implicit instruction. Hilte and Reitsma (2011) taught second grade children the rule of vowel length spelling before they were taught this rule in the school curriculum They compared a control group (education-as-usual) and four intervention groups, divided into rule (present or absent) and number of items during intervention. The intervention groups outperformed the control group, indicating that both implicit and explicit instruction were beneficial. The intervention consisting of an expanded set of training items with presentation of the spelling rule was most supportive in learning, although accuracy was still not near ceiling. At first glance, these findings suggest that it is the explicit instruction that aided learning most. However, implicit exposure and analogy to a larger set of targets could also have contributed to this higher outcome, as number and frequency of exemplars presented during intervention affected learning. Because of this ambiguity and because this study collapsed findings on vowel spelling in open and closed syllables further investigation into the role of implicit and explicit cues in vowel spelling is needed.

Kemper, Verhoeven, and Bosman (2012) conducted a short-term intervention study in first grade on vowel length spelling with an explicit, implicit and control condition (education-as-usual). Both implicit and explicit instruction were more effective than the control condition in children with average-to-above-average spelling abilities. In the explicit condition, there was transfer to untrained words, but not to pseudowords. In the implicit condition, there was no transfer. Kemper et al. (2012) take these findings to mean that explicit instruction rendered knowledge that was of higher quality than implicit instruction. Furthermore, they interpret their findings to align with a stage-based approach of spelling; rules are learned in stages and generalization to abstract knowledge about spelling and correct use of these rules takes time and effort.

The findings of both Hilte and Reitsma (2011) and Kemper et al. (2012) indicate that, although phonologically inconsistent vowel length spelling can be learnt, spelling scores remain relatively low. In the present study, we aim to assess which cues might cause the difficulty in spelling this pattern. As the aim of the two intervention studies was to assess whether spelling could be improved, the number of trained items was quite low (5 phonologically inconsistent targets in Hilte and Reitsma, and 8 in Kemper et al., 2012) as was the variety of the targets. For instance, there were no targets that are phonologically consistent. Such targets would provide a baseline of vowel spelling. It is important to confirm that children are able to spell vowels correctly when phonology and orthography are consistent, as this precludes other difficulties, such as difficulties in perception of vowel duration. As we outline the potential contribution of different sources of information contributing to vowel length spelling below, the case for an analysis into these different cues is made.

Vowel distinction could influence spelling of the long vowel. In Dutch, the distinction between short and long vowels is based on duration as well as spectral composition. Children are able to classify /A/ as in man and /a:/ as in *maan* (Gerrits, 2001). Furthermore, five-year-olds have generally acquired the phonemes /A/ and /a:/ (Beers, 1995). Spelling of consistent long vowels has not been found to be problematic in Grade 2-to-4-children (Landerl & Reitsma, 2005). Although difficulties are not anticipated in vowel duration, spelling of both consistent short and long vowels needs to be assessed before assessing inconsistent long vowel spelling.

Morphological consistency can also contribute to vowel spelling. Phonologically inconsistent long vowel spelling occurs in monomorphemic (uninflected) targets, such as *water* but also in inflected words, such as *manen* ('moons') or *koken* ('to cook'). Based on findings that show a preference for morpheme consistency (Deacon et al., 2011), it can be anticipated that young spellers might make more errors in targets that have an uninflected counterpart. They might aim to be consistent in their (phonology and) morphology (*maan*-**m<u>aa</u>nen*) rather than use the correct orthographical rule. This pattern has indeed been reported by Landerl and Reitsma (2005). They tested Grade 2 to 4 children's ability to spell and identify plural words and pseudowords. Both spelling and identification of the correct spelling was difficult. Morphological and phonological consistency influenced the outcomes more than the orthographic rule. This finding is reflected in a study by Verhoeven, Schreuder, and Baayen (2006), who found that Grade 3 and 4 children as well as adults were slower and less accurate in lexical decision when the target was a word that undergoes vowel change due to pluralisation (i.e., *manen*) than when there were no changes or other changes. Although this provides important information on the role of morphological consistency in long vowel spelling, a comparison of vowel spelling between monomorphemic (*water*) and inflected targets (*manen*) was not made. This is relevant for assessing the influence of a morphological pattern.

Furthermore, knowledge of the meaning of the word might aid spelling. Studies have reported weak to moderate relationships between vocabulary knowledge and spelling for beginning spellers (Kim, 2010; Sénéchal & LeFevre, 2002). This could mean that the vowel in a word such as *water* ('water'), a word familiar in meaning and phonology to children might be easier to spell than *krater* ('crater'), which is less frequent and therefore less likely to be familiar to children. It would also imply that pseudowords, which lack meaning, are more difficult to spell than words that are familiar.

Finally, orthographic exposure could affect vowel spelling. Previous exposure to the orthographic form of the word as a whole might