Dutch orthography:
a near-optimal phonological transcription?

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0. Introduction

There are two different views on the nature of the correspondence between sound and spelling. On the one hand, Saussure warned us that spelling may have its flaws: ‘Writing, though unrelated to its inner system, is used continually to represent language. We cannot simply disregard it. We must be acquainted with its usefulness, shortcomings, and dangers’ (Saussure 1959:23). Chomsky on the other hand, assumes that ‘conventional English orthography in its essentials appears to be a near-optimal system for representing the spoken language’ (Chomsky 1970:4). This statement is motivated by the fact that both spelling and underlying sound representations abstract from predictable variation. A similar claim has been made for Dutch by Wester (1987).

It is important to establish which view is correct; not only for the sake of insight into the spelling system, but also because spelling tends to influence our perception of sounds. One consequence of this influence is the existence of so-called spelling pronunciations (for instance, Dutch [se-van-tax] (‘seventy’) is often pronounced with a [z] because of the spelling zeventig). Furthermore, differences between spelling and pronunciation caused by writing conventions may be misinterpreted as the effect of a sound rule. For instance, the difference between [s] and <t> in words like actie ([ak-si], ‘action’), has led phonologists to postulate a sound rule that changes /t/ to [s]. Van Zonneveld (1983:36), however, shows that this rule is the result of an incorrect interpretation of the convention to write /s/ as <t>.

Most linguists abandoned Chomsky’s view on English orthography, because it implies that historical sound changes like the Great Vowel Shift must be duplicated in the phonological competence of speakers (cf. Derwing 1992:194). It is unlikely that speakers are able to learn such intricate rule sets and abstract representations, especially as spelling is not available when children learn to speak. However, the pronunciation of Dutch has hardly changed since spelling was first formalised in 1804, so Wester’s claim for Dutch may still be right.

The facts in (1) show that Dutch orthography abstracts from the effect of sound rules like nasal assimilation, final devoicing and glide insertion:
This situation is schematically represented in (2): a difference between the pronunciation ([A]) and the spelling (<B>) is the effect of a sound rule that modified the underlying representation (/B/), while the spelling is the same as that underlying representation:

However, there are also cases in which differences between the pronunciation and spelling of Dutch words are caused by speech-to-text-conversion rules (writing conventions). An example is the spelling of schwa. This sound is written as <e>, just like the sound /e/. The fact that these sounds have the same spelling suggests that one of them may be derived from the other. In fact there is a vowel reduction rule in Dutch that changes /e/ to schwa. For instance, /persoon/ becomes [pərson] (persoon, 'person'). However, not all schwas are reduced vowels. The schwa in [ovən] (oven, 'stove') is an example of an underlying schwa. In this case, the difference between pronunciation and spelling is not the effect of a sound rule, but of a writing convention. There simply are not enough letters to uniquely represent all sounds, so /ə/ and /e/ have the same spelling <e>. This situation is represented in (3):

Situation (3) holds for many vowel representations: lack of letters has also led to one spelling for long and short vowels: hamer ([hamɔr], 'hammer'), jammer ([jamɔr], 'a pity'). As the context usually shows which sound is meant, one may still claim that spelling is an almost ideal representation of the underlying representation in these cases. However, in this article we will discuss a type of words whose spelling is more problematic for Wester's assumption.

The relevant data set consists of loan words with a [z] following a long vowel or sonorant consonant that is written as an <s>:
The question is whether this difference is caused by a sound rule as in (2) or by a speech-to-text conversion rule as in (3). Wester (1987) proposed to analyze the words as in (2). In that case the spelling of the words in (4) would be the optimal representation of the lexical representation. We will argue that this analysis must be rejected in favour of the second option.

1. Accounting for sound-spelling differences by means of a sound rule

The first way to account for the difference between the pronunciation and spelling of words like *mensa*, is to assume that spelling represents the underlying pronunciation. The derivation of spelling then becomes trivial, but we must find a way to explain the difference between underlying representation and surface pronunciation. Such an analysis has been proposed by Wester (1987). Wester observed that a long vowel, or a vowel followed by a sonorant consonant, is always followed by a [z] and never by an [s]:

\[
\begin{array}{l}
\text{[menza]} / *[mensa] \\
\text{[owaza]} / *[owasd]
\end{array}
\]

According to Wester this can be accounted for by postulating an underlying /s/, which becomes voiced in the contexts just mentioned.\(^1\)

Although this analysis seems plausible, there is no compelling evidence which shows that *mensa* cannot have an underlying /z/. On the contrary, there are facts that point in the other direction. For instance, the past tense suffix [da] shows that stem final fricative is voiced in indigenous words like *vreesde* (‘feared’), otherwise the suffix would be pronounced as [ta]. Non-native verbs like *forensen* (‘to commute’) behave just like native words in this respect: it is *[forenzda]*, not *[forensta]*. A word like *forensisch* (‘forensic’) which is related (at least diachronically) to words like *forens* (de) probably also has an underlying /z/. As *mensa* has a similar sound structure, the fricative may be voiced in this word as well.

There are only a few words in which we can be sure that there must have been an underlying /s/ at some point. Examples are listed in (6):

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\(^1\) In fact, Wester’s rule is more general: it applies to /v/ as well, and also causes alternations like *lief- lieve* and *vrees-vrezen*. As shown in (Nunn 1992), the fricatives in *lief* and *vrees* are underlyingly voiced, so voicing is not needed there. Voicing within words does not affect f: the name *Alfons* is pronounced with [f], not with [v].
The examples in (6a) are acronyms. NASA, for instance, is the abbreviation of *National Aeronautics and Space Administration*. In (6b) the plural suffix -s has been reanalysed as part of the stem. The words in (6c) have inflected forms with a /z/ next to the original forms with an /s/. However, words like those in (6b) and (6c) are rare, and voicing is probably not the effect of a synchronic rule here. The facts in (6) thus do not form strong evidence for a voicing rule.

Support for a voicing rule may also be found in pairs such as (7):

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<tbody>
<tr>
<td>a</td>
<td>puls</td>
<td>pulseer</td>
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<tr>
<td></td>
<td>impul</td>
<td>impul</td>
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<tr>
<td></td>
<td>perve</td>
<td>perve</td>
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<td></td>
<td>intense</td>
<td>intens</td>
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<tr>
<td>b</td>
<td>solut</td>
<td>resol</td>
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<tr>
<td></td>
<td>server</td>
<td>reserver</td>
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<tr>
<td></td>
<td>signer</td>
<td>resigner</td>
</tr>
<tr>
<td>gloss</td>
<td>puls-pulsate’</td>
<td>‘impulses-impulsive’</td>
</tr>
</tbody>
</table>

However, we will see in (15) below that pairs of Romance words like those in (7) must not be considered synchronically related, so (7) does not constitute evidence for a synchronic voicing rule. Furthermore, there are similar pairs in which there is no voicing:

<p>| | | |</p>
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</thead>
<tbody>
<tr>
<td>a</td>
<td>balans</td>
<td>balanceren</td>
</tr>
<tr>
<td></td>
<td>cadans</td>
<td>cadanceren</td>
</tr>
<tr>
<td>b</td>
<td>sequent</td>
<td>consequent</td>
</tr>
<tr>
<td></td>
<td>signific</td>
<td>insignific</td>
</tr>
<tr>
<td></td>
<td>supposit</td>
<td>presupposit</td>
</tr>
<tr>
<td>gloss</td>
<td>‘scales’-‘to balance’</td>
<td>‘rhythm’-‘give rhythm to’</td>
</tr>
</tbody>
</table>

Therefore, the only real evidence for a voicing rule consists of the words in (6), and these words do not illustrate a general pattern (with the exception of the facts in (6a) to which we will return below). We can conclude that there is not much evidence for underlying /s/ and a voicing rule.

Another problem with Wester’s analysis is the fact that the asymmetry in (5) is not perfect. There are words with voiceless fricatives after long vowels or sonorant consonants. Some examples are given in (9):
Wester acknowledged this, and observed that these words are written with <c>: ‘Notice that ‘c’ behaves as ‘a kind of s’ that does not undergo voicing’ (Wester 1987:79).2 Wester therefore assumes that ‘c must be considered a plosive as far as orthography is concerned, and is converted to s or k after the application of the rule that voices fricatives’ (Wester 1987:76). This remark concerns the reading process. How can we explain the phonological behaviour of the words in (9)? In line with Wester’s analysis, we might assume that [s] is derived from the underlying plosive /k/ in these cases (‘-’ represents a sound rule, and ‘→’ a writing convention):

To account for surface fricatives in words like doceren, we need a spirantisation rule. The (extrinsic) ordering of this rule with respect to fricative voicing would then explain the difference in voicedness between doceren and doseren:

However, in most words [s] never alternates with [k], see (9) and similar words in (13):

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2 Wester proposes something similar for the spelling <sch> in logisch (and also in words like mensch before 1954): <sch> encodes an /s/ that cannot be devoiced.
In such cases, there is no reason to postulate an abstract phonological representation that differs from the surface pronunciation.

Furthermore, note that (11ii) is not a general rule but a morpholexical rule. Some exceptions are listed in (14):

We may only posit (11ii) as a synchronic rule if Romance words like _provoceer-_provocatie were derived from each other or from a common base in the Dutch language (and not historically). This is not likely as we cannot predict the pronunciation of such ‘derived’ forms (cf. Booij and Van Santen 1995:45). As shown in (15a), apart from rule (11ii) other irregular changes may or may not occur. Even if the formal relation is clear, the semantic relation may be obscure as in (15b).

Therefore, rule (11ii) is at the most a historical rule. Speakers of Dutch still use it as a ‘via-rule’, but not to relate pre-existing pairs (cf. Booij 1995:79). Consequently, we may not posit an underlying /k/ for [s], so the fact that voicing does not apply in words like _provoceren_ remains problematic. Furthermore, there is hardly any evidence for an abstract /s/ and voicing.

We saw that there are some phonological problems associated to Wester’s analysis. The only advantage of the assumption of abstract /s/ and /k/ is the fact that we may easily derive the spelling from the lexical representation. This is suspicious, because the spelling was part of the motivation of the postulation of these abstract sounds in the first place. Furthermore, even predicting spelling does not work out well. If Wester’s analysis were correct, we would predict that /s/ is always written as <s>. However, this is not the case. Next to words written with an <s> in (16a), there are also words with a similar phonological representation that are written with a <z> in (16b). In (16c) we see that some
words that have an underlying /zl/ are written with an <s>, instead of the expected <z> as in (16d).

(16) a meson id censuur ‘censorship’
    b horizon id. azuur ‘azure’
    c diffuse ‘diffuse’ forensen ‘commuters’
    d precieze ‘exact’ accijnzen ‘taxes’

In some words of type (16a), <z> is the result of a spelling change in the Dutch language. For instance, faze has been an allowed spelling variant of fase (‘fase’) since 1954 (like nearly all allowed variants, it is abolished in the spelling dictionary of 1995). However, in Wester’s analysis /s/ and /z/ are separate sounds which are written differently, and there is no reason why these two spellings should converge. To account for the facts in (16b), we would have to assume an additional writing convention which changes an /s/ to a <z>. Alternatively, we could assume that the underlying representation has changed. Furthermore, we also need a complementary writing convention which changes a /zl/ to an <s> in words like forensen. The fact that we need these two opposite rules, suggests that something wrong with the analysis. In any case there does not seem to be much regularity: both /s/ and /zl/ may be written as <s> and <z>.

It would be an advantage to use <c> to represent sibilants that do not undergo voicing if all voiceless sibilants were written this way. However, as shown in (17a), this is not the case. Furthermore, if <c> were to represent exceptions to voicing, the <c> seems redundant in (17b). <s> would also suffice in these contexts where voicing is impossible anyway. Finally, in (17c) we see that even when there is [k]/[s]-alternation, the [k] is not always written as <c>.

(17) a consideratie, carrousel regisseur, mousseren ‘consideration’, ‘carousel’
    b succes, abcess ‘success’, ‘abscess’
    c fabrikant-fabriceer rubriek-rubriceer ‘manufacturer’-‘manufacture’
        ‘section’-‘rubricate’

The facts in (17) show that there is no one-to-one relation between /k/ and <c>, so <c> cannot be the unique representation of a voiceless sibilant. Wester introduced abstract /k/ and /s/ to account for sound-spelling relations, but these abstract segments cause more problems than they can solve. It turns out that sound-to-spelling correspondences are quite complicated after all. We can conclude that option A is not ideal; it has both phonological and orthographical problems.
2. Accounting for sound-spelling differences by means of a writing convention

The second way to account for the difference between the pronunciation and spelling of words like *mensa* is to assume that the surface pronunciation corresponds to the underlying representation. That is, words such as *mensa* have an underlying /zl/. In that case, the derivation of the surface pronunciation (e.g. [fo:renzda]) and [forenzis]) is straightforward: nothing changes. Furthermore, we do not need an abstract /k/ to distinguish *doceren* from *doseren*; /s/ and /zl/ suffice to derive the surface pronunciation variants:

(18)

<table>
<thead>
<tr>
<th>pronunciation</th>
<th>underlying representation</th>
<th>spelling</th>
<th>example</th>
</tr>
</thead>
<tbody>
<tr>
<td>[z]</td>
<td>← /zl/</td>
<td>→ &lt;z&gt;</td>
<td>azuur</td>
</tr>
<tr>
<td>[z]</td>
<td>← /zl/</td>
<td>→ &lt;s&gt;</td>
<td>mensa</td>
</tr>
<tr>
<td>[s]</td>
<td>← /s/</td>
<td>→ &lt;s&gt;</td>
<td>consideratie</td>
</tr>
<tr>
<td>[s]</td>
<td>← /s/</td>
<td>→ &lt;c&gt;</td>
<td>doceren</td>
</tr>
</tbody>
</table>

Of course, this analysis removes all phonological problems of Wester’s analysis. However, now we must account for the fact that we write an <s> instead of a <z> in *forensen, mensa, diffuse* etc. The explanation is easily found. We are dealing with an etymological spelling here, a relict of Latin spelling that did not use a <z> (except in Greek loans like *zefer* ‘zephyr’). However, in some cases we do write a <z>. This is not problematic, as an etymological spelling may have been replaced by a regular spelling, and the regular spelling of /zl/ in native words is <z>, e.g. *zaal* (‘hall’), *deze* (‘this’).

The spelling is not always adapted: we write *precieze* with a <z> but *precisie* (‘precision’) with an <s>. This alternation, however, is quite regular: <z> occurs at the end of a word and before a native suffix. In the other contexts we write <s>. The formulation ‘at the end of words and before native suffix’ suggests that words composed with non-Germanic suffixes like -ie do not constitute suffixes in their own right: *precisie* is considered monomorphematic just like *precies*. This assumption is supported by the fact that the morphological principle (the requirement that morphemes always have the same spelling) apparently does not prohibit the different spelling of [i] in *precies* and *precisie*. This follows if both words are considered separate morphemes to which the morphological principle does not apply. Therefore the term ‘morpheme’ will be used to refer to native morphemes only in the remainder of this article.

The spelling of sounds like /i/ and /e/ is also adapted morpheme finally:
The spelling of /z/ works in the same way, for instance in *Friezin-frisisme*. Of course, there are some words in which the spelling has not been adapted yet. The words of this type from the Celex-database are exhaustively listed in (20a). There are also words in which adaptation has already taken place before a non-native suffix or within the word. Some examples are given in (20b):

(20) a abstruse (id.), diffuse (id.), infusen (‘infusion’), excuses (‘apologies’), diocesen (‘dioceses’), tendensen (‘tendencies’), forensen (‘commuters’), diverse (id.).

b markizaat (‘marquisate’), studentikoziteit (‘jauntiness’), pauzeer (‘to stop’); poëzie (‘poetry’), pauze (‘intermission’), etc.

The analysis proposed here correctly predicts that there are no words in which adaptation has taken place before native morphemes but not before Romance suffixes (e.g. *markiesin-markizaat, *diffuse-difuzie*).

If we assume that words like mensa have underlying /z/, and that the spelling <s> is the effect of an etymological writing convention, the correspondence between sounds and spelling is more transparent than it was in Wester’s analysis: the etymological spelling <s> is being adapted by replacement with regular <z>, starting at the end of morphemes. A rule like ‘write /z/ as <s>’ is no longer necessary to account for (20a). <c> is considered an etymological spelling. The fact that <c> may represent both /k/ and /s/ is due to a historical rule that changed /k/ to [s] before front vowels. Spelling abstracts from this rule even though the effect is lexicalised. The rules for the spelling of /s/ and /z/ in non-native words are given in (21) and (22), respectively:

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3 It is not clear why the words in (20a) are exceptional; perhaps they used to be pronounced with an [s] like balansen, but this is no longer the case.
Write /z/ after long vowels or sonorant consonants
   i as <z> at the end of morphemes (precieze', precisie)
   ii as <s> elsewhere (precies)

Exceptions:
   i: diffuse etc. (cf. (20a))
   ii: acacia; coulisse, florissant; markizaat, poëzie, -zoen (seizoen)
       and -zijn (rozijn) etc.\(^5\)

(i) Write /s/ after long vowels or sonorant consonants
   i as <c> before front vowels (docent)
   ii as <s> elsewhere (persoon)

Exceptions:
   i: carrousel, consideratie etc.; regisseur, mousseren etc.; discipel,
      ensceneren etc.\(^6\)
   ii: reçu, façade etc.; palissade etc.

We may conclude that the second way of accounting for the difference between
spelling and pronunciation of words like mensa is to be preferred: there is no
need for abstract representations with /s/ and /k/ which never surface, or for
different underlying representations for words that have a similar pronunciation
like precisie-precieze and censuur-azuur. Furthermore it offers more insight into
the spelling system. Therefore we must reject Wester’s proposal in favour of the
analysis proposed here.

The new view on sound-spelling relations also offers an alternative, non-
phonological explanation for facts like NASA. Wester assumed that the surface [z]
is caused by the voicing rule. However, words like NASA originate as follows:
the initial graphemes of the (most important) words become phonemes, and these
phonemes form a new word (cf. Reker and Streekstra 1988). Therefore, in order
to pronounce an acronym, we have to apply speech-to-text conversion rules. The
rule that is relevant here is the complement of rule (21ii):

(23) Read <s> as /z/ between vowel letters (and as /s/ elsewhere)

\(^4\) The spelling precipies is the effect of a spelling rule, which is motivated by fact that <v> and <z>
may not appear at the end of a syllable.

\(^5\) -oen and -ijn are adapted versions of the French affixes -on and -in(e) or -aine, so it is not
surprising to find that the spelling of /z/ is also adapted before these sequences. Other words with
-oen are also written according to native rules: kampioen (champion), miljoen (million), fatoen
(faison), with the exception of citroen.

\(^6\) Most of the exceptions to (21) and (22) are rare. Even the most frequent types, i.e. /z/ written as
<s> and /s/ written as <s>, only occur in about ten and fifteen percent of the words,
respectively (counts based on the Celex-database).
It is rule (23) which accounts for the pronunciation with a [z] in words like NASA. This rule may also be responsible for the ‘voicing’ in words of which the pronunciation is not known. For instance, a Spanish name like Alfonso may be pronounced with a [z] instead of [s] for this reason.

Deriving the spelling of /s/ and /z/ seems straightforward with rules (21) and (22): words with /z/ are written with <s> or <z>; words with /s/ with <s> or <c>. However, there are some complications. On the one hand there is a tendency (illustrated in (11)) to reinterpret voiceless sibilants as voiced after long vowels and sonorants. There are even speakers who pronounce <c> as [z] in words like procent and december. On the other hand many speakers of Dutch no longer realise or recognise a difference between /s/ and /z/, notably at the beginning of words. For these speakers there is only one sound, /s/, which can be written as <s>, <z> or <c>. Mistakes like *spercieboon instead of sperzieboon (‘haricot vert’) for [sper-zi-bon] may be explained as a hypercorrect spelling of speakers who no longer perceive voicing distinctions. As the pronunciation of /s/ and /z/ is so unclear, it is important to distinguish between sound rules and writing conventions.

3. Conclusion

In the case of words which are written with an <s> but pronounced with a [z], spelling is not the visual form of the abstract phonological representation. Positing abstract underlying representations is unmotivated and causes more problems than it can solve. Instead, we can conclude that there is no difference between underlying representation and surface pronunciation, and the deviating spelling is caused by a writing convention:

\[
\begin{align*}
\text{(24) & phonology} & \text{//z/ } & \rightarrow [z] \\
& & \downarrow & \\
& \text{spelling} & <s>
\end{align*}
\]

Thus, contrary to current belief, words like mensa have an underlying /z/. In some cases, writing conventions such as (21ii) duplicate the effect of a historical rule, although there have been no sound changes after the Dutch spelling was formalised. This is because at the time the spelling was fixed, the spelling of loan words abstracted from the effect of rules that were no longer productive, like the change from /k/ to [s] in words like provokeer. These findings show that we may not automatically assume that spelling corresponds to abstract pronunciation whenever there are spelling-sound differences. Abstract lexical representations should not be posited on the basis of spelling or the existence of related Romance words exclusively. If we do so, we would miss the correct generalisation about sound-spelling correspondences and make incorrect predictions about future
changes in spelling and phonology. Another implication is that phonologists should be careful not to confuse writing conventions with phonological rules. We should take Saussure's warning to heart.

References