Conditioned spellings in Danish

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Introduction

The inconsistency problem

Most people will agree that the major hurdle in learning to spell is to understand
how the alphabetic principle works. Once a child is able to isolate minimal
segments of speech and to associate them with phonologically appropriate
letters, the most important step towards becoming a competent speller has been
taken. But there are other hurdles waiting.

This is so because of the well-known fact that mappings from sounds to
letters are some times inconsistent. Therefore, the level of isolated sound
segments cannot be the sole source of information used in spelling, if one wishes
to spell conventionally. This inconsistency problem is especially large in some
orthographies like English and Danish. In these orthographies, it is a very
common phenomenon that one and the same sound is represented by different
letters in different words (Becker-Christensen 1988; Carney 1994). In this
article, I present data on the ability of Danish students (aged 10 to 17) to cope
with this problem by using certain other sources of information.

Conditional spelling rules

Perhaps the most obvious solution to the inconsistency problem is to let one's
choice of spellings be conditioned not just by the particular sounds to be spelled,
but also by the particular words in which they occur. In English, the sound [f] is
f in *if*, *ff* in *puff*, *ph* in *philosophy*, *Ph* in *Phoebe*, *gh* in *enough*, a.s.o. But this is
clearly an 'expensive' solution because one has to memorize spellings word by
word by word.

Interestingly, there are also cases where spellings can be identified by
reference to more general conditions. In this article, I focus on two such more
general conditions: grammar and phonological context.

An important grammatical condition is whether a word to be spelled is a
name or not. If it is, you use a capital for the first letter, otherwise you do not.

Another example is the spelling of a word final [t] in English. If the word to be spelled is a regular verb in the past tense, then the correct spelling is *-ed*, otherwise it is *-t* (Nunes et al. 1997). In this way inconsistencies at the segmental level (capital letter or not? word final *-t* or *-ed*?) are eliminated by conditional spelling rules which apply whenever a particular grammatical condition is met, and not just to individual lexical items. So knowledge of such rules is likely to be a great help for the speller. On the other hand, it is possible that the necessary grammatical information is less accessible to the speller than information about segmental structure and lexical identity.

The relevance of exploiting the phonological context can be illustrated by the spelling of word initial [k] in English. Before certain vowels this sound is represented by *k-* (e.g. *kit, keep, kite*), while before other vowels and before consonants it is usually represented by *c-* (e.g. *cat, coat, crap, clap*) (Marsh et al. 1980). Thus, awareness of the phonological context (in this case awareness of the following segment) may also be very useful to the speller.

The study

Below, I present data from a cross sectional study on Danish students' ability to use spellings conditioned by grammar or by phonological context. For each category of conditioned spellings a general measure is constructed. There are two main questions that I address.

The first is at what age the use of these spellings has become a matter of routine. The second is how the scores on the two measures relate to each other.

Method

Participants

There were four groups of participants, cf. table 1. All were recruited from the Copenhagen area. Tests were carried out between the end of March and the middle of May 2000. Only pupils with Danish as their first language are included in this report.

Table 1. Participants

	4th grade	6th grade	8th grade	high school
MEAN AGE	10:9	12:9	14:9	17:0
N	31	40	33	38

Materials and procedure

Nonword spelling tasks were used to assess the participants' ability to use each category of conditioned spellings. The nonwords were recorded on tape and played to the participants in their usual classroom.

Spellings conditioned by grammar

Nonwords involving a grammatical condition were presented in meaningful sentence contexts in order to make the grammatical status of the nonword unambiguous. Booklets with printed versions of these sentences were distributed. In these, the crucial parts of the nonwords were missing and had to be filled in by the participants. There was a total of 50 nonwords, 10 nonwords involving each of 5 specific grammatical conditions. The 5 specific conditions were:

1. Proper names. The first letter was missing. Phonologically acceptable spellings could either be lower or upper case letters, but only upper case letters were grammatically appropriate.

2. Definite nouns. The nominal stem (ending in a vowel) was printed, while the inflectional ending was missing. Phonologically acceptable spellings could be *-n* or *-en*, but only the *-en* spelling was grammatically appropriate.

Example[1]: The definite noun *leen* 'the scythe' ends in *-en*, as do all definite nouns in the common gender. In a casual style of pronunciation (as the one employed in presenting the items), the word is homophonous with the uninflected noun *len* 'entailed estate' ending in *-n*.

3. Verbs in the present tense. The verbal stem (ending in *-r*) was printed, while the inflectional ending was missing. Phonologically acceptable spellings could be *-e* or *-er*, but only the *-er* spelling was grammatically appropriate.

Example: The present tense form *kører* 'drives' ends in *-er*, as present tense verbs generally do. The word is homophonous with the infinitive form *køre* 'to drive' ending in *-e*.

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[1] The examples given are real Danish words.

4. Present participles. The verbal stem was printed, while the inflectional ending was missing. Phonologically acceptable spellings could be *-ene* or *-ende,* but only the *-ende* spelling was grammatically appropriate.

Example: The present participle *skålende* 'touching glasses' ends in *-ende* as do all present participles. The word is homophonous with the plural definite noun *skålene* 'the bowls' ending in *-ene.*

5. Perfect participles. The final letter was missing. Phonologically acceptable spellings could be *-d, -de,* or *-t,* but only the *-t* spelling was grammatically appropriate.

Example: The perfect participle *fremmet* 'promoted' ends in *-t,* as perfect participles generally do. The word is homophonous with the noun *fremmed* 'stranger', ending in *-d.*

Spellings conditioned by the phonological context
A list of 10 nonwords with spellings conditioned by the phonological context was dictated at the end of each experimental session. The words consisted of one to three syllables and had to be written in full. The 10 nonwords featured a total of 15 target spellings (some words containing more than one target). The target spellings may be divided into four groups:

1. Unaspirated stops after word initial [s] (5 items). Unaspirated stops can be represented in writing by alternative letters. E.g., [b] is usually represented by *b,* but after [s] only *p* is conventional.

Example: *spille* 'play' and *bille* 'beetle' both have [b] in the onset. The sequence [sb] is never spelled **sb-.*

2. Consonants after short vowels (2 items). In Danish, as in several other orthographies, consonants have to be doubled after short stressed vowels. Thus in *klasse* 'class' the *a* represents a short vowel, whereas the *a* in *klase* 'cluster' represents a long vowel. There are few exceptions to this rule.[2]

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[2] Nauclér (1980) studied the Swedish parallel of this spelling rule and found errors to be quite frequent in grades 4 and 6. (In grade 4 errors were committed by 71% of her subjects, and by grade 6 by 34%.) An interesting difference is the fact that the doubled consonants in Swedish correspond to phonetically long consonants. In Danish the corresponding consonants are

3. Consonants in other contexts (4 items).
The conditioned consonant spellings mentioned under 1. and 2. are used very frequently. Some slightly less common spellings were included, too. For example, the sound [ç] is always represented by *-g(e)* after a long vowel, as in the French loans *bagage, garage.* The domestic spelling *sj* is never used in this context.

4. Back vowels before certain consonants (4 items)
The lower back vowels can be spelled in several ways. For example, [ɔ] can be represented by *å, o* or *u.* Before [m] however, only *o* and *u* are conventional.

Examples: *dumme* 'stupid' and *bombe* 'bomb' have [ɔ] in the first syllable. The sequence [ɔm] is never spelled **åm.*

A particularly illustrative example of a nonword used is ['sbɔmə] with the target spelling *spumme.* This nonword featured no less than three target spellings: [b] is *p* after [s]; [ɔ] is *u* before [m]; and [m] is *mm* after a short stressed vowel.

Results

The total number of correct spellings in each task was used as a measure of the general ability to use each of the two categories of conditioned spellings. In figures 1 and 2, the proportion of spellings that were correct is compared to the proportion that was incorrect but phonologically acceptable, and the proportion that was either phonologically unacceptable or missing.

It is evident that there was no problem in producing phonologically acceptable spellings (90% or more were phonologically acceptable even in the youngest group). It is equally evident that there *was* a problem in producing the conditioned spellings.

On both measures, only the high schoolers approached ceiling. It should be noted in this connection that the high schoolers probably performed *above* the general level for 17-year olds. (Less than 50% of all Danish students go to high school after the 9th grade. And for poor spellers the percentage is probably much smaller.)

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short. Another difference is the fact that the Danish rule applies to intervocalic consonants only.
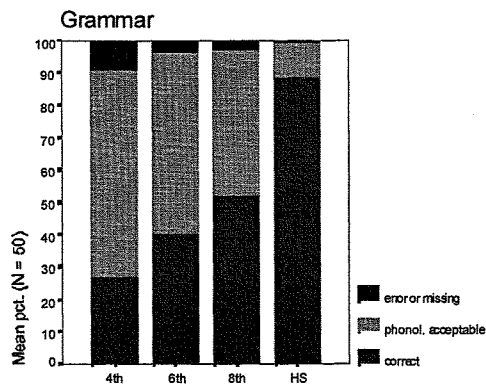
Grammar

Figure 1. The use of grammar conditioned spellings at the four grade levels
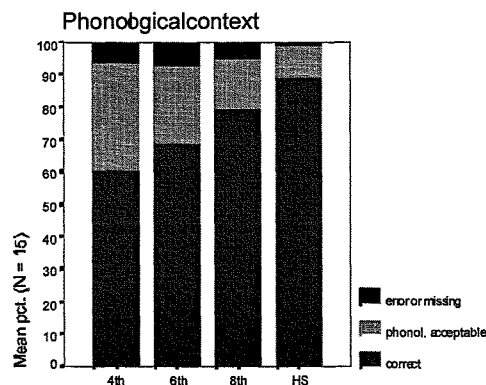
Phonobgicalcontext

Figure 2. The use of spellings conditioned by the phonological context at the four grade levels

Thus, it appears that the ability to use conditioned spellings takes a long time to develop. This was true both for spellings conditioned by grammar and for spellings conditioned by phonological context.

One may ask, now, to what extent these two spelling abilities go together? Judging by these measures the relation between the two is not very strong. In the youngest and the oldest groups (4th grade and high school) correlations (Spearman's rho) were as low as .02 and .06 respectively. In the middle groups (6th and 8th grade) correlations were .32 and .45 respectively ($p < 0.05$).

In figure 3 individual scores from the middle groups (both 6th and 8th-graders) are shown in a scatterplot. The scores here are the number of correct spellings relative to the total number of phonologically acceptable spellings.
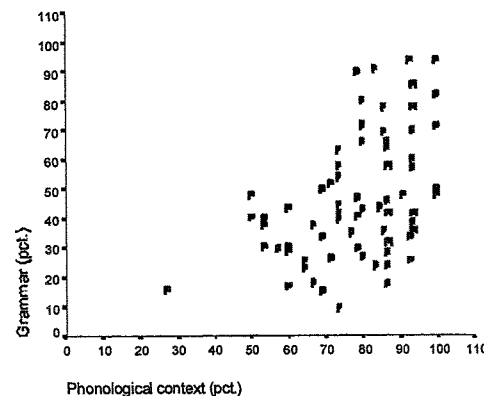

Figure 3. The use of the two sorts of spellings plotted against each other. Scores are correct spellings as percentages of all phonologically acceptable spellings.

Missing and phonologically unacceptable spellings have been disregarded because they do not reflect a specific problem in using conditional spellings. Rather, they reflect other problems (problems in using the phonemic principle, mishearings, failure to pay attention, etc.) As it can be seen, the distributions are fairly normal: The group results are not just due to a few pupils lagging behind their peers.

Discussion

Are conditional spelling rules hard to learn?

The fact that the general level of performance approached ceiling only in the high school group was actually somewhat surprising. It was obvious in advance that conditioned spellings are not among the first spellings to be mastered by children learning to spell. But it is remarkable that even in the 8th grade the use of these spellings has still not yet become a matter of routine. There is nothing new, of course, in the observation that even mature spellers commit occasional errors. But the focus here is not on the occurrence of errors *per se*. Rather, it is on the general ability in spellers to meet specific demands posed by the writing system.

One may wonder whether conditional spelling rules are cognitively very challenging? It may be, e.g., that children find it difficult to identify particular inflectional morphemes. Indeed, for British children grammatical and morphosyntactic awareness has been found to be a predictor of the ability to use grammar conditioned spellings (Nunes et al. 1997, Bryant et al. 2000). A difficulty could also be the need to access information at several linguistic levels while spelling.

Hopefully, future research will give us a better understanding of the cognitive demands posed by our writing system in these areas. Such an insight might inspire new and perhaps more effective instructional practices (a factor not controlled in this study).

The relative difficulty of the two spelling tasks

Turning to the relation between the two categories of conditioned spellings, the grammar task was clearly harder than the phonological context task in all groups except the oldest (cf. figures 1 and 2). Yet, this does not imply that grammar conditioned spellings as such are more difficult to learn.

First, we did not attempt to match the two categories of target spellings for *frequency*. It may - or may not - be the case that initial capitals in names (and the other grammar conditioned spellings) were less familiar simply because they occur less often than doubled consonants (and the other spellings conditioned by phonological context).

Second, there may be a difference in *the functional need* for the two categories of spellings. Is it less important for successful communication, for

instance, to distinguish names from non-names (by capitalising the first letter of the word) than it is to distinguish short from long vowels (by doubling the following consonants)?

I leave these questions open. However, there were some good reasons to expect spellings conditioned by phonological context to be learned more easily. Just like ordinary context-free sound-to-letter spelling rules, they are based on phonological information. In this way they are a natural next step, once the basics of turning sounds into letters are mastered.

Moreover, the identification of these spellings may be backed if a feedback spelling strategy is adopted. For instance, the spelling **sbume* for the nonword ['sbɔmə] violates phonological context-conditions in two ways: **sb* should be *sp* and the *m* should be doubled (cf. above). But these errors may be detected if the word is read back. Visually, occurrences of word initial *sb-* are highly exceptional. Phonologically, the vowel *u* cannot have a short pronunciation if the undoubled following consonant is taken into consideration. By contrast, identification of grammar conditioned spellings cannot be backed in this way. A failure to capitalize the first letter of a name neither reveals itself through visual or phonological feedback.

Correlations between the tasks

The final topic to be discussed are the correlations between performances in the two tasks. As reported, the correlation coefficients were close to zero in the youngest and the oldest groups. Thus, there does not seem to be any necessary connection between the two spelling skills. This is not surprising as the phonological and grammatical conditions are not really of the same kind.

On the other hand correlations *were* significant in the middle groups.

Possibly, the similarities between the two categories of spellings are relevant at least at some stages in spelling acquisition: Both categories involve inconsistencies at the segmental level and both can be described as regularities at a higher level. Thus acquisition of conditioned spellings in general may be better in those spellers who are most aware of the inconsistency problem, and most capable of identifying and reproducing regularities.

It should also be remembered that grammar conditioned spellings are based on both grammar *and* phonology. They are still representations of particular phonological structures.

Yet another similarity lies in the fact that conditioned spellings of both types

usually involve the representation of particular sounds by unusual graphemes. As phonology is certainly the most important linguistic level in spelling, one might hypothesize that spellers will use unusual graphemes conditioned by grammar only when they have already become accustomed to using unusual graphemes conditioned by phonology. Thus the prior acquisition of skill in using spellings conditioned by phonological context could be a necessary, if not sufficient condition for the acquisition of skill in using grammar-conditioned spellings.

From these results one would predict a "half correlation" between the measures of the two skills – which is not too far from what was found in the middle group. One would also predict that some participants would get high scores on phonological context and low scores on grammar, but not vice versa. This means that in a scatterplot there could be many observations in the lower right corner, but none in the opposite half towards the upper left corner. Thus, observations would form a triangular shape. Again, this is not *that* far from what we found (cf. figure 3), but only in the middle group.

All in all, the outcome of this tentative comparison is rather inconclusive.

Summary

The study reported here demonstrates that the use of a selection of conditioned spellings in Danish increases gradually up through the teenage years. Below the high school level, the use of these spellings has not become a matter of routine for everybody.

The study focussed on two categories of conditioned spellings, spellings conditioned by grammar, and spellings conditioned by phonological context. In spite of similarities between the two categories, performances were only weakly related.

Hopefully, future research will tell us more about *why* conditioned spellings are such a hurdle in spelling acquisition.

Acknowledgements

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