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Length awareness predicts spelling skills in Finnish

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Abstract. The main type of phonemic analysis skill considered to affect spelling acquisition has been awareness of phoneme quality. However, it is also important to find out whether other measures of phoneme awareness might contribute to literacy acquisition. Thus, the influence of phoneme length and phoneme quality awareness on spelling in Finnish was compared. The Oddity task was used to assess phonemic awareness and spelling skills were investigated by a spelling-to-dictation task. The results showed that length awareness predicted spelling better than quality awareness did. Moreover, length awareness was more strongly related to spelling of long phonemes, which specifically require analysis of phoneme length, than to spelling of phoneme clusters not involving length analysis. Additionally, only length awareness predicted children's general spelling skills. These findings suggest that awareness of length, which is a phonemic attribute of the Finnish language, is connected to children's spelling skills more strongly than awareness of phoneme quality is.

Key words: Finnish, Length awareness, Phoneme awareness, Regular orthographies, Spelling acquisition

Introduction

Languages differ in the phonological characteristics that they use to distinguish between the meanings of words, i.e., the phonemes of languages are defined by different phonological attributes. In English, for example, differences in phoneme quality (e.g., between /n/, /m/ and /ŋ/) are the only way in which phonemes differ from each other. However, also phoneme quantity, based on the duration of phonemes in time, can differentiate between word meanings. This is the case in languages such as Finnish, Hungarian, Italian and Welsh, which are said to have contrastive length, so that phonemes, both consonants and vowels, are defined according to their quantity in addition to their quality. Thus, whether a particular phoneme is pronounced as short or long changes the meaning of the word.

Phoneme awareness is crucial for literacy acquisition, because alphabetic orthographies attempt to represent the phonemic structure of spoken words by letters. There has been a considerable amount of research

into children's phonological awareness and its connection to their literacy abilities. Bradley and Bryant (1983) in their longitudinal study were the first to show that children's sound categorisation ability at ages 4 and 5 predicted their spelling skills several years later, a finding replicated by for example Cataldo and Ellis (1990) and Caravolas, Hulme, and Snowling (2001). Moreover, this relationship is not unique to the English orthography, since it has been shown for example in Swedish (Lundberg, Olofsson, & Wall, 1980), in French (Sprenger-Charolles, Siegel, & Bechennec, 1998), in Chinese (Ho & Bryant, 1997) and in Finnish (Holopainen, Ahonen, & Lyytinen, 2001).

In contrast to the work on awareness of phoneme quality, the impact of phoneme length on literacy acquisition has hardly been studied. However, if we assume that awareness of phonemes is related to literacy acquisition because phonemes distinguish between word meanings and these differences are represented by the orthography, then we should also consider the role of phoneme length as well as of phoneme quality. Phoneme length probably does not affect children's literacy acquisition in orthographies such as English, where it does not play a phonemic role. However, it should be connected to literacy in languages in which it does have a semantic function.

The Finnish and Italian scripts use letter doubling to mark long phonemes, whereas in Welsh double dots and in Hungarian accents serve the same purpose. Consequently, children who are learning to spell different orthographies are faced with somewhat different challenges. They need to learn which aspects of speech sounds are represented by the orthography and how the letters are used to do this. Literacy researchers need to find out more about these learning processes to be able to formulate a comprehensive theory of literacy development.

We shall begin to investigate this process by looking at the importance of phoneme length awareness in Finnish. In the regular Finnish orthography, phoneme–grapheme correspondences are one-to-one, with the exception of the phoneme /ŋ/, which is spelled as *nk* (when short) or *ng* (when long). The Finnish language distinguishes between short and long consonants and vowels. The difference is explicitly represented by the orthography, since long phonemes are spelled with letter doublets and short phonemes with single letters. Table 1 shows examples of how length affects meaning.

Long phonemes seem to present some degree of difficulty for young spellers, since errors with long phonemes are the most common error type in young Finnish children's spellings (Lyytinen, Leinonen, Nikula, Aro, & Leiwo, 1995; Matilainen, 1985). The most typical error for beginning spellers is to leave out the second letter of a doublet, which

Table 1. Examples of how length affects meaning in Finnish (partly after Lehtonen, 1970).

Finnish	English
t***a***k*a*	back
t***a***kk*a*	a fireplace
t***aa***kk*a*	a burden
t***a***k*aa*	from behind
t***a***kk*aa*	fireplace + partitive
t***aa***kk*aa*	burden + partitive
aat***e******l***inen	a nobleman
aatt***ee******ll***inen	idealistic

suggests that they can identify the phoneme as such but fail to mark its length. Moreover, Lyytinen et al. (1995) found that dyslexic adults are more likely than normal readers to pronounce short phonemes as long and vice-versa. Consequently, they suggest that processing of phoneme length is one of the markers of literacy problems in Finnish. The difficulties with long phonemes might be partly due to the fact that there is no absolute acoustic duration for a "long" or a "short" phoneme. Instead, whether a phoneme of a certain duration is perceived as long or short in a particular word depends on the duration of the surrounding phonemes and on the total duration of the whole word (Lehtonen, 1970). Thus, determining the length of a specific phoneme requires considering the preceding and following phonemes as well.

An issue that needs to be addressed is the relationship between length awareness and spelling. There are two possibilities. This relationship could be general, so that phoneme length awareness would be linked to children's overall ability to spell all kinds of clusters. Alternatively, length awareness could be particularly closely connected to long phoneme spelling, since these are the phonemic units that necessarily require the analysis of length. Correspondingly, phoneme quality awareness should be specifically connected to the spelling of mixed phoneme clusters, such as /st/ or /lt/, since these only require the analysis of phoneme quality. If the latter alternative were true, the relationship between phoneme awareness and spelling would be specific and the processing requirements on spelling would directly reflect the phoneme–grapheme relationships of the orthography.

To answer this question, it is necessary to assess children's awareness of phoneme length and their awareness of phoneme quality, and see how these affect spelling performance. For assessing phoneme awareness, we

used the well-known Oddity task, where children are required to tell which one of four words sounds different compared to the others. Our spelling test tested children's spelling of (1) phonemic units that require analysing length, i.e., long phonemes, and (2) units that only require analysing phoneme quality, i.e., phoneme clusters not containing long phonemes. Comparison of how the two kinds of phoneme awareness are related to spelling of different clusters will allow us to see how closely the attributes of spoken language and their representation in the orthography are connected in the course of Finnish children's spelling development.

Method

Participants

The participants were 71 children from years 1 to 3 in a primary school in Espoo, Finland. One first-year child had other than Finnish as his first language and the performance of another first-year child was too poor to be scored. Thus, their data were omitted. This left 20 children (7 boys, 13 girls) in year 1, mean age 7.7 years (range 7.0–8,1 years), 24 children (9 boys, 15 girls) in year 2, mean age 8.10 years (range 8.5–9.5 years) and 25 children (13 boys, 12 girls) in year 3, mean age 9.10 years (range 9.4–10.3 years). The children were tested in April.

Tasks and procedure

Dictation task. The Dictation task consisted of 48 pseudo-words. Pseudo-words were used because this way children's familiarity with the test words would not affect the results. As targets, we used consonant and vowel doublets and mixed clusters (*ss*/*ll*/*st*/*lt*/*aa*/*ee*/*ai*/*ei*). The pseudo-words were constructed from real words, in which enough phonemes were changed so that the original words could not be recognised. The words were long and both phonemically and morphologically complex, since earlier pilot studies with similar real word items had shown that due to the rapid development of spelling skills in Finnish, even first-year children are able to competently tackle such challenging spelling items. To avoid possible ceiling effects, we chose complex rather than simple words that only contain one target complexity. The items in the Dictation task are presented in Appendix 1.

The task was administered to groups of 10 children at a time. The first- and second-year children did the task in two parts, as it was too long for a single experimental session. There were two experimental lists

in which the words were in different randomised orders, and these were given to different groups to eliminate possible order effects. The third-year children only needed one session to do the task. Each experimental session started with the distribution of lined response sheets and the following instructions:

> "We will now do a dictation task like you have done before, but this time the words are 'fairy-tale words' that no-one has ever heard. It does not matter if you are not quite sure how these words are spelled, you should just try your best and spell them the way you think is correct. The words are quite long and hard, and therefore it is important that you listen very carefully. I will say each word twice, and then say it again if someone needs to hear it again."

Oddity task. The aim of the Oddity task was to compare children's awareness of phoneme length and phoneme quality directly within one phoneme awareness task. Children heard four words and had to pick out the one that had a different middle phoneme from the other three. There were two different conditions. In the Length condition, the words differed in the length of the middle phoneme, while in the Quality condition the difference was in phoneme quality, as in phoneme awareness tasks traditionally.

There were 16 trials altogether. In eight trials the target phoneme was a consonant and in the other eight trials the target phoneme was a vowel. The words within a trial did not share phonemes in any other positions of the word except the target position. All words were five letters, four phonemes long and consisted of two syllables. The experimental items are presented in Appendix 2.

The task was done with the help of picture cards. Three practice trials preceded the 16 experimental trials. In the practice trials, the difference between words was based on phoneme quality, and all the words were four letters, four phonemes long, differing in all but the target phoneme. Practice items of this type prepared children for the cognitive demands of the task without contrasting the length and quality items and thus teaching the children prior to doing the experimental items.

At the start of the experimental session, the child received the following instructions:

> "We will now look at some pictures together. I am going to show you four pictures at a time and say a word from each picture. Three of these words sound the same in the middle, but one sounds different. You should tell me which one is the different-sounding word."

The child then saw four pictures, each of which was named. The pictures were there to help the child to remember the words and the words were also repeated if the child asked the experimenter to do so. The experimenter asked which one was the different word, and the child responded either by pointing to the picture or by saying the word. Feedback was given for the practice trials, but not for the experimental trials. The Length and Quality trials were intermixed, so children did not know beforehand whether to base their judgement on phoneme length or quality.

The picture cards were placed in stacks on the table, the four cards of each trial in one stack. The experimenter picked a stack at random at each trial, and the cards in each stack were shuffled between the testing of each child, so that words of the trials were presented in different random orders. In addition, the cards of a trial were laid out in different configurations, so that children could not just keep choosing a card in a particular position on the table.

Results

Dictation task

Our aim was to investigate the relationship between length awareness and spelling, and the Dictation task provided three scores for this: (1) Doublet spelling (requiring length analysis), (2) Mixed cluster spelling and (3) General spelling. These spelling scores were calculated by counting the number of errors that children made in spelling (1) long phoneme targets (Doublet Spelling), (2) mixed phoneme cluster targets (Mixed cluster spelling) and (3) the total number of errors in all the experimental words (General spelling). In calculating the General spelling score, we counted all the errors within different words separately, so that the total number of errors often exceeded the number of experimental items (e.g., children could make one error of omission and one of a wrong letter when spelling a single word). Scores for the spellings doublet and mixed cluster are presented as percentages, while General spelling is just the number of errors in the task. These scores are presented in Table 2.

The error percentages demonstrate that children in all age groups made fewer errors with mixed clusters than with doublet ones. This was verified by a repeated-measures ANOVA, where the between-subjects factor was year (1st/2nd/3rd) and the within-subjects factor was Cluster type. The analysis revealed the significant main effect of Cluster type ($F(1,66) = 32.773$, $p < 0.001$), which did not interact with year.

Table 2. The means of error percentages for the spelling measures from the pseudo-word dictation task and the oddity task (standard deviations in parentheses).

	Year 1	Year 2	Year 3
Doublet spelling	22 (24)	14 (11)	5 (10)
Mixed cluster spelling	18 (16)	7 (8)	1 (3)
General spelling score[a]	46.80 (34.20)	33.33 (24.04)	10.04 (12.75)
Length Oddity	51 (23)	50 (26)	23 (27)
Quality Oddity	52 (20)	52 (18)	34 (21)

[a]This is not a percentage score, but a total number of errors in the task.

There was a surprisingly small difference between the vowel doublet and mixed cluster items, which is particularly obvious for the first-year data. This might emerge because word endings such as *-ain*, *-ein* are very low frequency, while *-aan* and *-een* are much more common.[1] This would pull the vowel doublet error score down and the vowel mixed error score up, producing a smaller difference between the two and thus confounding the results. To inspect this possibility, we ran a repeated-measures ANOVA, where the between-subjects factor was Year (1st/2nd/3rd) and the within-subjects factors were Phoneme (Consonant/Vowel) and Cluster type (Doublet/Mixed). The analysis revealed significant main effects of Phoneme ($F(1,66) = 60.832$, $p < .001$) and Cluster ($F(1,66) = 13.569$, $p < 0.001$), which indicated that consonants were more difficult to spell than vowels overall and doublets caused more errors than mixed clusters. There was also a significant Phoneme by Cluster interaction ($F(1,66) = 10.319$, $p < 0.002$), but no further interaction with Year.

T-tests with Bonferroni corrections revealed that while consonant doublets caused significantly more errors than mixed consonant clusters ($t(68) = 4.321$, $p < 0.001$), this was not the case for vowels ($t(68) = 1.216$, $p < 0.228$). This suggests that children did not find vowel doublets harder to spell than mixed vowel clusters. One reason for this could indeed be the different frequency properties of the vowel items. However, an alternative explanation would be that since vowels are easier in general, as demonstrated by the significant Phoneme main effect, the difference between the vowel items no longer emerges since children are just competent in spelling these clusters in general. The difference between the vowel and consonant items will be discussed again when we consider the relationship between children's spelling and their length awareness.

The means of the General spelling scores varied considerably between the year groups, although a one-way ANOVA revealed that

there was no significant difference between the scores of the first- and second-year children, while third-year children's error scores were significantly lower than those of the second-year children (Tukey HSD; $p < 0.005$).

Oddity task

We scored the task by counting the number of children's errors in the Length and Quality conditions and calculating the error percentages separately for the two conditions. The means of these error percentages are presented in Table 2. The overall reliability of the task was 0.736 (Cronbach's α).

Since the Oddity task was a multiple-choice task with four alternative responses, children could have achieved 25% correct performance by chance alone. Therefore, we checked whether children's scores were significantly different from chance at all times by testing the mean percent of times that the children made the correct response in the different conditions by using one-sample *t*-tests against the 0.25 chance value. The analyses showed that the oddity scores for all conditions were significantly better than chance (i.e., the error scores were significantly below chance level; $p < 0.001$).

The scores of the first- and second-year children were indistinguishable from each other, while the third-year children did considerably better than the younger children. Children did not seem to find judgements based on length more difficult than judgements based on quality, since scores in the two conditions did not differ considerably and the small difference in the third-year children's data actually indicated that the length condition was slightly easier than the quality condition.

We examined the scores by a repeated-measures ANOVA, with Year (1st/2nd/3rd) as the between-subjects variable and Condition (Length/Quality) as the within-subjects variable. There was a significant main effect of Year ($F(2,66) = 12.231$, $p < 0.001$). Tukey's post-hoc tests ($p < .001$) confirmed that the overall scores of the first- and second-year children did not significantly differ from each other, but that third-year children scored significantly better than either of the younger year groups. The lack of a significant Condition main or interaction effects indicates that children in all year groups found phonemic analysis based on length and quality equally demanding.

Length and quality awareness as predictors of spelling

The aim of the following analyses was to find out whether length and quality awareness would predict spelling in different ways. To do this, we first computed correlation coefficients between children's scores in the two conditions of the Oddity task and the three spelling scores (Doublet, Mixed cluster and General spelling). These are presented in Table 3.

The Length score correlated with all the spelling measures more highly than the Quality score did. This systematic difference was interesting, because the mean scores in the Length and Quality conditions were not significantly different for any of the year groups.

We then ran a series of fixed-order hierarchical multiple regression analyses. Age was the first predictor, and the Length and Quality scores were entered one after another in different orders. The outcome measures were Doublet, Mixed cluster and General spelling, each in turn. The analyses are presented in Table 4.

The results revealed, firstly, that length awareness predicted a significant portion of variance in the spelling scores when it was entered as the second step after Age. In this case length awareness predicted a considerably larger portion of variance in doublet spelling than in spelling of mixed clusters (10.6% vs. 6.8%). This indicates a specific relationship between length awareness and spelling of long phonemes, the phonological segments that necessarily require the consideration of length in order to be spelled correctly.

Secondly, the Length score predicted a significant portion of variance in spelling even when it was entered into the regression equation after the Quality score. Thus, length awareness predicts an independent portion of variance in spelling ability. However, in this analysis length awareness is

Table 3. The correlation coefficients between children's phoneme awareness scores and their spelling scores (Pearson's *r*, Two-tailed).

	Length	Quality	Spelling	Doublets	Mixed
Length	–	0.455***	0.498***	0.450***	0.469***
Quality	–	–	0.345**	0.409***	0.333**
Spelling	–	–	–	0.911***	0.852***
Doublets	–	–	–	–	0.801***
Mixed	–	–	–	–	–

**$p < 0.01$.
***$p < 0.001$.

Table 4. Phoneme length and quality awareness as predictors of the spelling measures.

Outcome measure	Spelling of doublets				Spelling of mixed clusters				General spelling			
	ΔR^2	*B*	S.E. *B*	beta	ΔR^2	*B*	S.E. *B*	beta	ΔR^2	*B*	S.E. *B*	beta
1. Age	0.140**	−0.745	0.489	−0.180	0.322***	−1.30	0.321	−0.440	0.212***	−8.519	3.345	−0.290
2. Length	0.106**	0.490	0.217	0.279	0.068**	0.336	0.143	0.268	0.115***	4.269	1.484	0.342
3. Quality	0.035	0.506	0.286	0.214	0.002	0.082	0.188	0.049	0.005	1.369	1.961	0.082
1. Age	0.140**	−0.745	0.489	−0.180	0.322***	−1.30	0.321	−0.440	0.212***	−8.519	3.345	−0.290
2. Quality	0.084**	0.506	0.286	0.214	0.018	0.082	0.188	0.049	0.035	1.369	1.961	0.082
3. Length	0.057*	0.490	0.217	0.279	0.052*	0.336	0.143	0.268	0.085**	4.269	1.484	0.342

*$p < 0.05$.
**$p < 0.01$.
***$p < 0.001$.

no longer a stronger predictor of doublet spelling than of mixed cluster spelling (5.7% vs. 5.2%), mainly because the Quality score entered before the Length score predicted hardly any variance in mixed cluster spelling. In general, phoneme quality awareness was a surprisingly poor predictor of spelling ability. It only predicted a significant amount of variance when entered as the second step, and even then it only predicted doublet spelling, not mixed cluster spelling at all. We will consider these results in more detail in "General Discussion" section.

Given the possibility of the frequency confound with the vowel items that was mentioned in conjunction with the Dictation task analysis, we also ran the above regression analyses with only the *consonant* doublet and mixed cluster scores as dependent measures. This still left 12 items in both the doublet and mixed conditions of the Dictation task. The results of these analyses closely paralleled those presented above. Therefore, it appears that the frequency confound was not the reason for the lack of specific relationship between length awareness and doublet spelling when length awareness was entered into the equation after quality awareness.

When General spelling was the outcome measure, the results were clear-cut. The Length score predicted a significant portion of variance in spelling whether it was entered before or after the Quality score, while the Quality score was not a significant predictor. Thus, the results demonstrate that although length awareness predicts all spelling measures, quality awareness only predicts doublet spelling, and only if it is entered into the regression equation before length awareness.

General discussion

The aim of this experiment was to investigate whether children's awareness of phoneme length predicts their spelling development in Finnish, a language that distinguishes between phonemes of different length and represents long phonemes in the orthography by letter doublets. If this connection were specific, children's length awareness should primarily predict their spelling of long phonemes, which necessitate the analysis of length. In contrast, phoneme quality awareness should mainly predict the spelling of mixed clusters, which only require the analysis of phoneme quality.

The results did not support the specificity view unequivocally. Instead, length awareness predicted all of our three spelling measures, while quality awareness only predicted doublet spelling. In addition, we discovered that analysis of phoneme length and quality was equally difficult in the oral Oddity task.

The first implication of the results concerns the nature of phonemic awareness. We found that although children were equally skilled in the Length and Quality conditions of the Oddity task, only their Length scores were significantly connected to their spelling performance. This suggests that length awareness is not just another index of general phonemic awareness, but instead a skill that is to some degree independent from phoneme quality awareness. Thus, phoneme awareness may not be a homogeneous concept, but encompasses different phoneme analysis skills although the processes involved in these are likely to overlap.

The results fit in with the idea that at least one factor determining the phonological attributes that are crucial for literacy development is whether they are phonemic or not. Both phoneme length and quality have a semantic function in Finnish and are represented by the Finnish orthography. Further studies will be needed to determine whether different attributes of phonemes are important in literacy acquisition depending on their representation in the spoken language and/or the orthography in question. A possible candidate for this would be tone in languages such as Mandarin Chinese and Thai.

Since the specificity view was not unequivocally supported by the data, we still have to answer two questions. Firstly, why did awareness of phoneme quality only predict doublet spelling and not mixed cluster spelling, and secondly, why did the specific relationship between length awareness and doublet spelling disappear after we controlled quality awareness in the regression analysis?

An important reason for the poor predictive power of quality awareness might be the time of testing. The 21 phoneme–grapheme correspondences of Finnish are one-to-one and the way in which a particular phoneme is spelled does not depend on the phonemic context. In addition, as many as 30% of children entering school usually have some literacy knowledge. Therefore, by the end of the first school year phoneme quality awareness is likely to have less influence on children's performance, since they have progressed beyond the initial phase of learning and their phoneme–letter conversion skills are likely to have become largely automatic.

Another issue to consider is the extent to which different types of phoneme awareness are required in Finnish. Not even the third-year children were at ceiling in the Oddity task, although they were making very few errors with the spelling task. This in itself already seems to suggest that children's phoneme awareness performance does not strictly parallel their spelling performance, if general success levels are considered. Consequently, it appears that children can use a rule in spelling that they are not aware of and thus do not take full advantage of when

solving the Oddity task. The results thus appear to present an example of literacy skills preceding the emergence of a metaphonemic skill, in this case phoneme length awareness. It is possible that learning to spell such a transparent orthography as Finnish simply does not require as advanced phoneme quality awareness as is necessary for learning to spell phonologically and/or orthographically more complex languages, such as English. This would explain the poor predictive efficiency of phoneme quality awareness.

In contrast, spelling long phonemes involves two types of difficulty. Firstly, determining phoneme length depends on the phonemic context, i.e., on the duration of the whole word and the duration of the surrounding phonemes. Secondly, long phonemes demand children to overcome the 'one sound, one letter' assumption, which works with the Finnish orthography otherwise, and to realise that length is a phonemic attribute that is relevant in spelling. Thus, length awareness could be considered to be an index of a more advanced understanding of the orthography than quality awareness is, and likely to be involved in spelling for a longer period of time.

However, the fact that length awareness was related to the spelling of both long phonemes and mixed clusters when we controlled for the quality awareness scores suggests that the measures of length and quality awareness also predict a shared portion of variance. Consequently, the independent portion of variance that length awareness predicts over and above quality awareness is an index of the type of phonemic awareness that is important in learning to spell Finnish in general, irrespective of the type of phonemes involved. It is possible that children who are good at interpreting length of phonemes are those children who have a good understanding of the way in which the Finnish orthography works in general, both in representing phoneme quality and phoneme length.

The results highlight the importance of considering the phonemic properties specific to the language and the way in which the orthography represents these properties. To broaden our understanding of the importance of different phonemic attributes in literacy development we should also investigate orthographies that represent length in a different way from Finnish. In addition, we should look at other phonemic attributes, such as tone, in orthographies that do (e.g., Thai) or do not (e.g., Mandarin Chinese) represent these. Other important issues include the study of children who have problems with literacy development, as well as the relationship between length awareness and reading development. Only this type of cross-linguistic work will allow us to formulate a comprehensive theory of early literacy acquisition.

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Appendix 1. The experimental items of the dictation task (target clusters are in bold capitals).

	Consonants		Vowels	
Doublet	maari**SS**aksi	maaksiri**SS**a	niipp**AA**mista	tamisiipp**AA**n
	kaire**SS**ona	renaiko**SS**a	toikk**AA**misen	semoitikk**AA**n
	riimo**SS**utta	muuttori**SS**a	kail**AA**mista	kaimasil**AA**n
	sorma**LL**itta	sorttima**LL**a	toip**EE**kkisen	pekkitois**EE**n
	laame**LL**iksi	meiksula**LL**a	punt**EE**llisen	pullisent**EE**n
	korppai**LL**ista	porkkaisti**LL**a	karst**EE**llina	sallikatr**EE**n
Mixed	luuta**ST**oksi	tiluukse**ST**a	lenk**AI**suksi	seluskij**AI**n
	konno**ST**aina	nakoinno**ST**a	nort**AI**suutta	rosuuttaj**AI**n
	kellai**ST**ona	noillake**ST**a	mirkk**AI**luna	kulmiraj**AI**n
	mupa**LT**aneen	munneepa**LT**a	kank**EI**suutta	katakuust**EI**n
	maina**LT**ajan	mannaija**LT**a	tann**EI**suutta	sattanuut**EI**n
	kore**LT**oivan	ronkoiva**LT**a	muur**EI**ksena	muusekar**EI**n

Appendix 2. The experimental items of the oddity task (targets are in bold capitals).

Condition	Words sharing the target phoneme	The odd word out
Length	lIIma kIIre pIIlo	tIkku
	lUUta tUUli pUUro	nUkke
	mAtto pAssi rAppu	vAAte
	pUlla tUssi lUkko	kUUme
	kiSSa laSSo poSSu	kuuSi
	tyTTö kaTTo roTTa	LiiTu
	rääSy muuSi kaaSu	veSSa
	huuTo pääTy riiTa	leTTu
Quality	lIIna pIImä vIIru	mAAli
	mUUri kUUla rUUsu	lÄÄke
	lAkki kAnnu pAllo	tIppa
	nOppa lOkki tOssu	kEllo
	veLLi hiLLo naLLe	tuKKa
	kaKKu tiKKa meKKo	poMMi
	paaLu huuLi viiLa	kääRö
	saaRi kuuRa myyRä	tiiNu

Notes

1. We would like to thank one of our reviewers for pointing this out.

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