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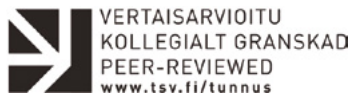
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## **Intelligibility and the gravity of segmental deviations in L1 Finnish speakers' L2 English**

The goal of English pronunciation teaching has shifted from native-likeness to intelligibility. Especially in EFL contexts, pushing learners to sound like L1 speakers is difficult to justify, whereas becoming intelligible is an easily justifiable, practical learning goal. However, EFL teachers often emphasize the sounds that are typically challenging for their learners, even though all sounds are not equally important for intelligibility. The present study is focussed on the extent to which segmental deviations can compromise intelligibility. Speech samples were elicited from teenaged L1 Finnish learners of English, demonstrating segmental deviations typical of the target group. To evaluate the gravity of segmental deviation, an intelligibility test was arranged with L1 English listeners. Results suggest that the sounds under investigation can be ranked into groups based on how crucial they are for intelligibility. The ranking can help EFL teachers to prioritize the critical sounds over those that are unlikely to compromise intelligibility.

**Keywords:** English, pronunciation, intelligibility

**Asiasanat:** englannin kieli, ääntäminen, ymmärrettävyys



## 1 Introduction

In English language teaching (ELT), the status of pronunciation has changed over time. As a brief historical overview, pronunciation teaching was valued at the time of post-war globalisation but later neglected due to the traditional pronunciation teaching methods not being compatible with the communicative language teaching (CLT) framework, which took rise from the 1970s (Celce-Murcia et al. 2010: 11; Derwing 2010). Second language (L2) pronunciation research was also marginalised (Derwing & Munro 2005) until a new wave of research-based pronunciation teaching began in the 1990s (Murphy & Baker 2015). Today, pronunciation is considered an important part of spoken communication, and it receives increased attention in L2 teaching. In Finland, the national core curriculum for basic education highlights pronunciation as central teaching content (Finnish National Agency for Education 2014). Also, L2 pronunciation research has developed significantly as a field, now offering international conference series and a dedicated international journal for disseminating research findings.

However, English pronunciation teaching is not what it used to be. The goal has shifted from native-likeness to intelligibility (i.e. being understood) and comprehensibility (i.e. ease of understanding): learners do not need to sound like first language (L1) speakers of English (see Levis 2005 on the Intelligibility vs. Nativeness Principles). Overall, L1 speaker norms have become less important especially in contexts such as the European countries where English is studied as a foreign language (EFL). In an EFL context, English is mainly studied for the purposes of international communication; communication that mostly takes place between L2 speakers (e.g. Brabcová & Skarnitzl 2018). For such communication, it would be difficult to justify native-likeness as a pronunciation learning goal.

The present study is focussed on intelligibility and segmentals (i.e. individual sounds). Unless pronunciation teaching is completely neglected, teachers hardly need encouragement to teach segmentals. On the contrary, pronunciation teaching is often focussed on individual sounds instead of prosody, at least in EFL contexts (e.g. Tergujeff 2013; Buss 2016; Jerotijević Tišma 2016; Yağiz 2018). However, teachers might find it self-evident to focus on the sounds that are particularly challenging for their students, without considering whether the sounds are crucial for intelligibility or not. Nonetheless, all sounds are not equally important for intelligibility (Brown 1988; Jenkins 2000). Consequently, it would be beneficial to consider the typical challenges in relation to intelligibility and to direct teaching to the crucial speech features.

The aim of the present study is to shed light on the gravity of segmental deviations typical of L1 Finnish speakers' English. Previous research (e.g. Lintunen 2004) has mapped the typical deviations, but only little is known about how listeners perceive them. Hence, this exploratory study looks at how the typical deviations affect

intelligibility. Moreover, it tests intelligibility using speech samples elicited from teenaged language learners, which is rare in previous research. The choice of teenaged speakers supports the author's long-term pursuit to develop English pronunciation teaching in Finnish schools. The study seeks to answer the following research questions:

1. To what extent can segmental deviations typical of L1 Finnish speakers' L2 English compromise intelligibility?
2. Which of the typical segmental deviations should be prioritized in teaching?

To address the research questions, an intelligibility test was arranged, using speech samples from L1 Finnish teenagers and age-matching L1 English listeners. In the test, the listeners heard simple sentences produced by the speakers, including segmental deviations in contexts where a misunderstanding may take place (e.g. *Take that pole/bowl*). The listeners indicated what they heard; the responses were used to calculate an intelligibility rate for each sentence. The results of the study will help to set priorities for teaching English segmentals not only to the target group but all learners facing similar pronunciation challenges. Prioritizing sounds that are crucial for intelligibility will make room for the teaching of other aspects important for intelligibility, making EFL teaching more effective and refraining from the unnecessary attempt of eliminating foreign accent.

## 2 Literature review

### 2.1 Focus on intelligibility

The shifting learning goal has been reflected in L2 pronunciation research. Munro and Derwing (1995) revealed that intelligibility, comprehensibility and accentedness (i.e. strength of foreign accent) are partly independent yet related concepts. The authors demonstrated that even highly accented speakers can be fully intelligible and relatively easy to understand. Inspired by this finding, a new line of research has emerged to further disentangle these concepts from one another, investigating which speech features are linked with intelligibility or comprehensibility, and which with accentedness (e.g. Hahn 2004; Field 2005; Trofimovich & Isaacs 2012; Saito et al. 2017). Such research can help to identify the most crucial aspects for becoming intelligible and comprehensible.

According to previous research, intelligibility and comprehensibility seem to be affected by numerous aspects – some of them related to pronunciation. For example, missing or misplaced word stress (Field 2005) and sentence stress (Hahn 2004) have been found factors that compromise intelligibility. Overall, there is more evidence of

speech prosody contributing to intelligibility and comprehensibility, but segmentals can also be crucial. Levis (2018: 61) points out that individual sounds need to be pronounced with accuracy that enables the listener to identify words correctly. In sum, English pronunciation teaching should consider important segmentals (e.g. Munro & Derwing 2006; Suzukida & Saito 2021) as well as prosodic features (e.g. Hahn 2004; Field 2005; Trofimovich & Isaacs 2012; Saito et al. 2017).

Focussing on features that contribute to intelligibility is important not only for efficiency but also for distinguishing pronunciation teaching from unnecessary 'accent reduction'. While accent reduction aims to eliminate foreign accent, contemporary pronunciation teaching aims at intelligibility and comprehensibility. Hence, learners may maintain their accent. This may be utterly important to learners who find their accent to be a part of their identity. Lee and Hsieh (2018) found that many Korean and Taiwanese students of English oppose teachers pushing them to sound like L1 speakers, and that they do not mind people laughing at their accent, because it is their "own English". Similar attitudes were discovered in Sung's (2014) interviews with L1 Cantonese speakers in Hong Kong: the majority of the interviewees indicated to prefer their local accent over trying to sound like L1 speakers. Additionally, interview studies have demonstrated that youth in Finland may want to be recognised as Finns based on their English accent (Tergujeff 2013) and feel that L1 speakers should accept that L2 speakers have their own unique ways of speaking English (Ilola 2018: 113).

## 2.2 Determining the gravity of segmental deviations

To determine the gravity of deviant pronunciation, Jenkins (2000: 158–160) proposed a *Lingua Franca Core* (LFC) for English as an international language (EIL) communication. The proposition is based on empirical research on recorded discussions between L2 speakers of English and pronunciation-induced communication breakdowns in them. Hence, it can be seen relevant for the target group of the present study. Jenkins suggests that consonants and consonant clusters are more important for intelligibility than vowel sounds but would allow most substitutions of interdentals, for example. In addition, Jenkins considers close approximations to consonants permissible, as long as they are not heard as a different consonant. In English, vowels are generally longer before lenis consonants such as /b, d, g, z/ than fortis consonants such as /p, t, k, s/ (see e.g. Jones 1950). The effect of fortis/lenis consonants on the preceding vowel duration is included in the LFC as a feature that is crucial for intelligibility. Aspirated /p, t, k/ are also included as a requirement for intelligible pronunciation. As for vowels, the LFC urges to maintain vowel length contrasts.

Another attempt to prioritize English segmentals from the viewpoint of intelligibility is the *Functional Load* theory (Brown 1988). Brown's theory comprises that each sound substitution has a defined functional load, which is based on the cumu-

lative frequency of the sound and the number of contrasts (minimal pairs) the substitution can form. For example, conflating /p–b/ is considered to have the highest functional load in Brown's ranking, whereas /f–θ/ conflation has the lowest functional load. Consequently, high functional load substitutions are more likely to cause misunderstanding and are thus more important for intelligibility than low functional load substitutions. The functional loads of sound substitutions typical of L1 Finnish speakers' English will be discussed in 2.3, along with how the gravity of these segmental deviations are presented in Jenkins' (2000: 158–160) LFC.

Additional issues to consider in determining the gravity of segmental deviations include variation in L1 speakers and the position of the sound within a word. For example, L1 speakers of English often devoice /z/ in word-final positions (e.g. Haggart 1978; Smith 1997; Jansen 2004; Davidson 2015), but it does not lead to a mix-up with /s/. This is based on L1 speakers producing vowels significantly longer before /z/ than /s/ (e.g. Jones 1950). Also, the duration of the preceding vowel has been found a strong cue for identifying /z/ (Cole & Cooper 1976; Derr & Massaro 1980; Flege 1984; Flege & Hillenbrand 1986; Jansen 2004; Broersma 2010). Overall, word-final consonant sounds may not be as crucial for intelligibility than word-initial (Zielinski 2008).

### 2.3 Segmental deviations typical of the target group

Based on contrastive phonetics and other research, L1 Finnish learners of English face numerous challenges concerning pronunciation of segmentals. These include producing voicing contrasts in sibilants such as /s–z/ and in stop consonants /p–b, t–d, k–g/, pronunciation of /v/ and interdentals /θ, ð/, and the tense–lax opposition of vowels (e.g. Wiik 1965; Lintunen 2004). These challenges derive from the Finnish phoneme inventory, which only includes one sibilant /s/ and no interdentals. In addition, the Finnish language does not have voicing contrasts for stop consonants (only /p, t, k/ are in use, with exceptions such as loan words), /p, t, k/ are unaspirated, and there is no quality difference between short and long vowels. Further, the pronunciation of the letter <v> in Finnish is an approximant /u/, which transferred to English sounds closer to /w/ than /v/. For a comprehensive description of Finnish phonology, see Suomi et al. (2008). Little is known about how listeners perceive Finns' English, but according to Morris-Wilson (1999), pronouncing /v/ as /w/ is the severest of deviations.

Considering Jenkins' (2000) LFC and Brown's (1988) Functional Load theory, the challenges typical of L1 Finnish learners of English are mainly considered severe. Overall, the LFC emphasises consonants, and aspiration is required with /p, t, k/. In Finnish-accented English, lack of voicing contrast and aspiration can lead to conflated /p–b/, /t–d/ and /k–g/, which all bear a high functional load. Other high functional load confluations typical of the target group include /i–ɪ/, /w–v/ and /s–z/.

Out of these, the LFC does not include the quality difference between tense and lax vowels but pays attention to maintaining the length opposition. It also mentions consonants' effect on preceding vowel duration, which is relevant as for final /s, z/, for example. The only low functional load conflation typical of the target group is /θ-t/. However, the LFC is critical towards all approximations that can be heard as another phoneme, even though it states that most substitutions of interdental are permissible.

### 3 Methodology

#### 3.1 Participants

The speakers were nine teenagers who volunteered for the research. They were Year nine students in a Finnish-medium secondary school in Finland, aged 15 to 16. One of them was bilingual in Finnish and English, whereas the rest were L1 speakers of Finnish. The bilingual speaker was used in order to check the reliability of the intelligibility test, while the rest were used for the actual test sentences. All speakers were rewarded with a cinema voucher.

Fifty teenagers from the UK served as listeners. They were 16 to 19-year-old secondary school students, recruited through their school. All but three listeners spoke English as their only L1 and home language, and all spoke English as one of their home languages and attended English-medium education. All reported that they have normal hearing. None of the listeners had studied Finnish or had frequent contacts with people who speak Finnish. The listeners were not rewarded individually, but a selection of books by Finnish authors were offered to their school library (as English translations) as a thank-you gift for the students' participation.

Teenaged listeners were opted for so that they would match the speakers' age. After all, teenagers from Finland are likely to use English for communicating with other teenagers, for example in social media and online gaming, and if they travel or go abroad as exchange students. Some previous studies have reported minor problems using teenaged listeners in listener tests. Paananen-Porkka (2007) had to discard participants, because they failed to fill in the answer sheet correctly, and Norell (1991) found that teenagers left more blanks compared to adult listeners. Then again, Butler (2007) and Field (2005) did not report any problems related to teenaged listeners. In addition, the author had previously conducted a successful listener test with teenagers (see Tergujeff 2021). As the speakers of the present study come from an EFL context, recruiting L2 English listeners was originally considered. Such a research design was eventually abandoned based on the possibility of L2 speakers' language proficiency affecting their speech perception (Beinhoff 2014).

### 3.2 Materials and speech data collection

Speech materials were designed by the author to reflect pronunciation challenges typical of the speaker group and contexts where misunderstandings are possible based on deviant sound production. The selected challenges included sound substitutions regarding /z, ɪ, v, θ, ð/, unaspirated fortis stops /p, t/ and devoiced lenis stops /d, g/. The materials are described in Table 1.

TABLE 1. Description of materials

Pronunciation challenge	Test sentences	Can be mistaken for
Pronouncing /z/ as /s/ or /ts/	Zip it. I don't like lies.	Sip it/Chip it. I don't like lice.
Pronouncing /ɪ/ as /i/	Don't slip now. Look at those tins.	Don't sleep now. Look at those teens.
Unaspirated fortis stops	Take that pole. Don't tie now.	Take that bowl. Don't die now.
Devoicing lenis stops	This is gold. Dry it.	This is cold. Try it.
Pronouncing /v/ as /w/	He has a lot of vines. I made a vow.	He has a lot of wines. I made a wow.
Pronouncing /θ, ð/ as /t/ or /th/	It's his faith. He said "then".	It's his fate. He said "ten".

The speakers were contacted through their school and informed about the research, following GDPR regulations. The recruited volunteers and their guardians signed a written consent on the use of the speech samples. The samples were recorded at the participants' school by a research assistant. The recordings were made in a silent room, using a Røde NT-USB microphone and a laptop. Each speaker was recorded individually as they read aloud the test sentences, which were shown to them on a computer screen one at a time.

The present study is not focussed on L1 Finnish speakers' English pronunciation in general but the intelligibility of the typical features. Therefore, each of the nine speakers were recorded for the test sentences, but only one representative example was selected for the intelligibility test, based on whose pronunciation best represented the typical pronunciation challenge (clear sound substitution, unaspirated fortis stop, devoiced lenis stop; see Table 1). Thus, each sentence occurred in the test only once, with the exception of *Zip it* and *I don't like lies*. These were included from two speakers, as the study placed special emphasis on the effects of context for the gravity of deviation regarding the pronunciation of /z/. In total, the materials

consisted of fourteen test sentences and three sentences produced by the bilingual speaker (*Don't tie now, I made a vow, It's his faith*). All nine speakers were featured in the sentences, most of them producing 2–3 sentences. The bilingual speaker's sentences reached an intelligibility rate of 100%, which speaks for the reliability of the test.

### 3.3 Intelligibility test

The intelligibility test was arranged at the listeners' school in the UK, led by the author. The listeners took part in the test in three groups. This enabled presenting the test sentences in three different orders to avoid possible effects of fatigue towards the end of the test, and novelty in the beginning. In other words, the test sentences were organised in a way that the same sentences did not always appear among the first or last sentences. To further minimise the effects of item order, the participants got to train with two practice items before the actual test. This way they knew what to expect as for the speech samples and how to use the answer sheet.

The test took place in a regular classroom, using loudspeakers. The participants were told that they would hear students from Finland speaking English, and that the researcher aimed to find out if the speakers are understood correctly. The participants gave pen-and-paper answers, ticking the answer options they heard (see Figure 1 demonstrating the answer sheet).

	What did you hear?	How sure are you? 1=completely sure, 4=very hesitant				
1.	<input type="checkbox"/> Don't <b>sleep</b> now. <input type="checkbox"/> Don't <b>slip</b> now.	1	2	3	4	<input type="checkbox"/> I don't know what I heard.
2.	<input type="checkbox"/> Take that <b>pole</b> . <input type="checkbox"/> Take that <b>bowl</b> .	1	2	3	4	<input type="checkbox"/> I don't know what I heard.

FIGURE 1. Excerpt from the answer sheet.

It was also possible to opt for "I don't know what I heard" to prevent the participants from guessing. In addition, the listeners were asked to evaluate how certain they were about their answer, using a four-point scale (1 = completely sure, 4 = very hesitant). Using a multiple-choice method instead of the listeners writing down what they heard eliminated the need for interpreting the participants' handwriting. In addition, it was considered unlikely that the listeners would perceive the test sentences as something other than the given choices. No problems occurred in the intelligibility test. Teenaged listeners performed the test independently without peeking at each other's responses and with full concentration. They remained silent and did not disturb others in any way. All in all, the procedure was smooth.



### 3.4 Analyses

The results were analysed as relative frequencies of correctly identified test sentences, forming an intelligibility rate (%). Certainty evaluations were examined as mean scores per test sentence. Special attention was paid to vowel duration as the main cue for the identification of word-final /z/ and an added feature distinguishing tense and lax vowels. Hence, the relevant test items were measured for vowel duration as a proportion of total word duration to identify test sentences demonstrating duration differences. This was done with help of computer programme Praat (Boersma & Weenink 2021). As a result, the intelligibility test included two versions of *I don't like lies*: one with a shorter diphthong in *lies* and another with a longer (33% vs. 54% of word duration). Unfortunately, the speech materials did not allow as clear a difference regarding vowel duration in test words focussing on the tense–lax opposition. However, a moderate difference in vowel duration was detected between *tins* (18%) and *slip* (21%), and these were contrasted in light of intelligibility.

## 4 Results

The intelligibility test yielded varied results. The most difficult items to identify correctly were deviant interdentalals and /v/, whereas the word-final /z/ was often perceived correctly, despite devoicing. The intelligibility rate was as low as 1% and 5% for the two difficult items, respectively, whereas 60% of the participants identified the devoiced word-final sibilant as /z/. The overall results are presented in Figure 2.

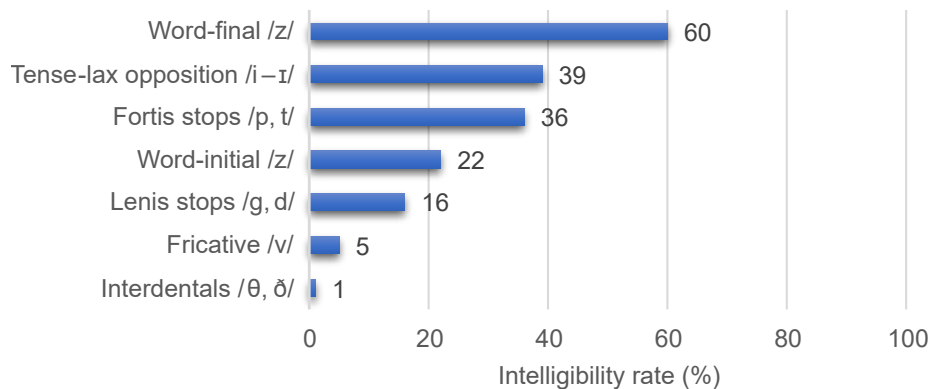


FIGURE 2. Overall intelligibility rates (%) of words featuring segmental deviation.

Word-initial /z/ was tested with two different substitutions: /ts/ and /s/ – both typical of the target group. Whereas the overall intelligibility rate was 22%, there was a clear difference between the two substitutions. Substituting /z/ with /s/ resulted in 42% of correct identifications, whereas only 2% of the participants perceived it correctly, when substituted with /ts/ (Figure 3). Hence, it seems that substituting word-initial /z/ with /ts/ is potentially more severe than substituting with /s/. As for the certainty evaluations, the /ts/ substitution made the listeners quite certain of what they heard: mean value was 1.36 on the four-point scale (1 = completely sure). Thus, the listeners were sure that they heard *chip* instead of the intended *zip*. The mean value for the /s/ substitution was 2.04, suggesting more hesitation.

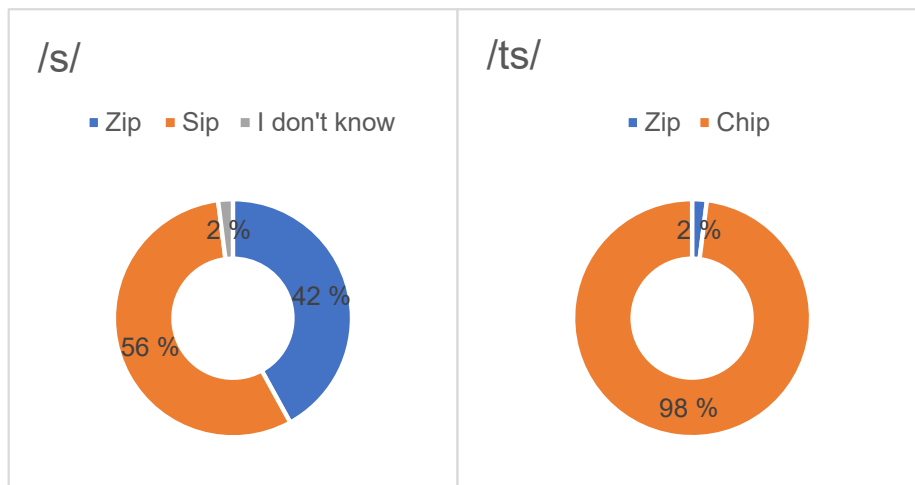


FIGURE 3. Perception of *zip* pronounced with /s/ and with /ts/.

Further, duration of the preceding vowel (diphthong in this case) should be taken into consideration concerning word-final /z/, as it is a strong cue for listeners (e.g. Broersma 2010). The test sentence *I don't like lies* was purposefully included twice, with one speaker producing the /aɪ/ in *lies* significantly longer than the other, whilst both substituted the /z/ with /s/. The intelligibility rates diverged accordingly. For the version with a longer preceding diphthong, the intelligibility rate was 98%, whereas only 22% of the participants identified it correctly from the version with a shorter diphthong (Figure 4). Looking at the certainty evaluations, the shorter diphthong caused slightly more hesitation on average (2.10) than the longer one (1.62).

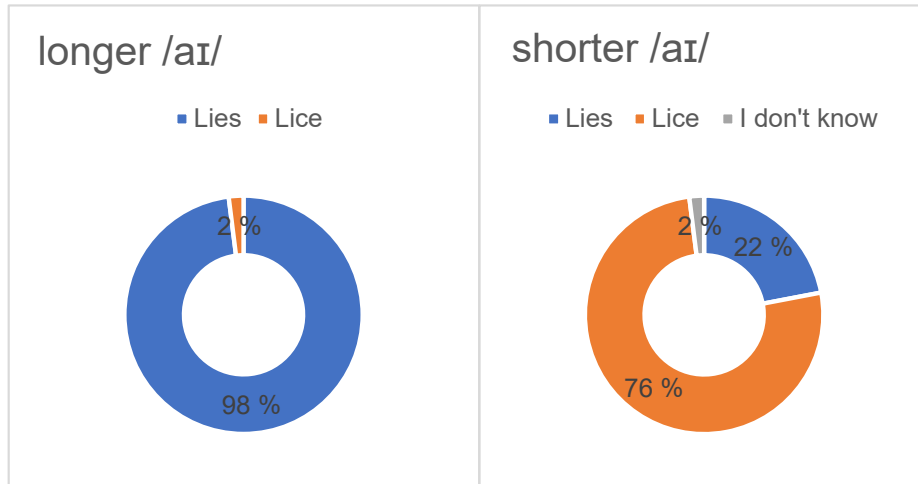


FIGURE 4. Perception of *lies* pronounced with longer /aɪ/ and shorter /aɪ/.

Finally, the lack of tense–lax opposition was also investigated regarding vowel duration. The difference in the intelligibility rate was clear and in favour of the shorter vowel, which suggests that substituting /ɪ/ with /i/ does not have as severe consequences for intelligibility if the vowel is kept short. The word with a shorter vowel was perceived correctly by 54% of the participants, whereas the longer vowel yielded an intelligibility rate of 24% (Figure 5).

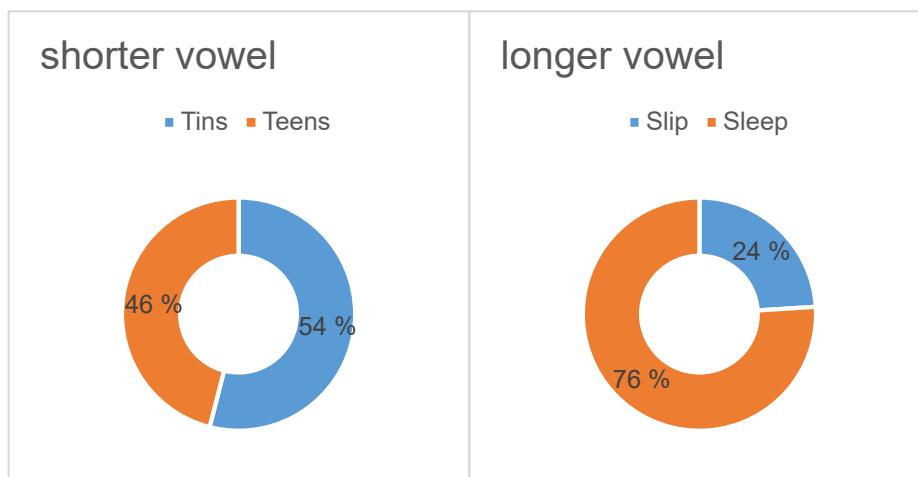


FIGURE 5. Perception of *tins* pronounced with shorter /i/ and of *slip* pronounced with longer /i/.

The listeners were quite sure about their answers regarding the longer vowel (1.76), whereas the shorter vowel caused more hesitation (2.26). The difference in intelligibility is noteworthy, considering that the difference in vowel duration was only moderate. Yet, nearly half of the listeners misunderstood even the word with a shorter vowel, which means that the results are not conclusive (see 5.3 for discussion).

## 5 Discussion

### 5.1 Intelligibility of typical segmental deviations

The high functional load confluents /p–b/, /t–d/ and /k–g/ (Brown 1988) can realise in L1 Finnish learners' English mainly because of two challenges: lack of aspiration in /p, t, k/ and lack of voicing in /b, d, g/. In the present study, both these challenges caused misunderstandings to the extent that they can be considered crucial for intelligibility. This is in line with Jenkins' (2000) LFC, which emphasises consonants and requires aspirated /p, t, k/. Another high functional load substitution that caused plenty of misunderstandings was pronouncing /v/ as /w/. In fact, this segmental deviation caused a misunderstanding to such a great extent in the present study that /v/ seems to deserve a clear priority in pronunciation teaching. This finding supports the results obtained by Morris-Wilson (1999), who concludes that L1 Finnish speakers' pronunciation of English /v/ is badly tolerated by English-speaking listeners.

Jenkins (2000) considers maintaining the length opposition between tense and lax vowels important for intelligibility, whereas Brown (1988) also finds the quality opposition critical: /i–ɪ/ conflation is listed as having a high functional load. The present study suggests that an /ɪ/ pronounced as /i/ does not necessarily cause misunderstandings, if the /i/ is produced as short. However, misunderstandings did take place, and this finding is not conclusive. Nevertheless, the results support Jenkins' (2000) view of the importance of length oppositions. Vowel duration seemed prevalent also in the recognition of word-final /z/ in the present study: devoicing seldom led to misunderstanding if the preceding vowel was long enough. As pointed out by Zielinski (2008), deviation in word-initial consonants can be more detrimental to intelligibility than in word-final. This was the case of /z/ in the present study, which demonstrated that deviation in a word-initial position had lower intelligibility rates compared to deviation in a word-final position.

The /θ–t/ conflation is the only low functional load challenge (Brown 1988) addressed in the present study, and Jenkins (2000) is overall permissive regarding substitutions of interdental. Yet, words with deviation in interdental resulted in a minimal intelligibility rate in the present investigation. Hence, it seems that Jenkins' (2000) general cautiousness towards consonant substitutions is in place.

## 5.2 Implications for teaching

Considering the results of the present study and previous propositions on the gravity of segmental deviations, the importance of individual sounds investigated in the present study can be organised into three groups, which rank the priority of sound accuracy in relation to intelligibility as follows. The ranking can function as a guideline when teaching English segmentals in Finnish schools.

1. **Pronunciation of /v/ deserves clear priority.** Substituting /v/ with /w/ resulted in an extremely low intelligibility rate in the present study. In addition, it is considered to bear high functional load (Brown 1988) and to be crucial for intelligibility according to Jenkins' (2000) LFC.
2. **Voicing contrast of stop consonants, word-initial /z/ and interdental /θ, ð/ deserve attention in teaching.** Devoicing lenis stops and lack of aspiration with fortis stops obscured voicing contrasts and resulted in frequent misunderstandings in the present study. Voicing contrasts in stops are classified as high functional load confluents by Brown (1988) and included in Jenkins' (2000) LFC, which also makes a special note about the importance of aspiration. Substituting word-initial /z/ with /s/ and especially with /ts/ was also prone to cause misunderstanding in the present study; Brown (1988) supports the avoidance of mixing up /z/ and /s/ (and LFC with any consonant sound). Concerning interdentals /θ, ð/, the present study would give grounds for the highest priority in teaching, but as /θ-t/ has a low functional load (Brown 1988) and Jenkins (2000) is permissive of substitutions regarding interdentals, it is considered more appropriate to place interdentals into this category. Consequently, some attention to interdentals can be recommended, yet keeping in mind that contexts in which deviation can cause a misunderstanding are rare.
3. **Tense-lax opposition of vowels and word-final /z/ can be left to less attention in teaching.** Substituting /ɪ/ with /i/ may not be very crucial for intelligibility, if the vowel is produced as short. Similarly, devoicing /z/ in a final position does not compromise intelligibility severely, if the preceding vowel sound is long enough. Instead of accurate sound quality, teachers could emphasise the length opposition between tense and lax vowels and the impact of the preceding vowel duration to the perception of /z/ vs. /s/. These recommendations are in line with Jenkins (2000) and what is known about the devoicing of final /z/ in L1 speakers of English (e.g. Jones 1950) and the role of the preceding vowel duration in the perception of fortis/lenis consonants (Cole & Cooper 1976; Derr & Massaro 1980; Flege 1984; Flege & Hillenbrand 1986; Jansen 2004; Broersma 2010).

## 5.3 Limitations and future directions

The present study has its limitations. Firstly, the study does not provide knowledge concerning intelligibility in communication, as the study was limited to sentences that appeared out of context. It should be kept in mind that context helps the listener to understand the speaker's message, and the pronunciation of individual sounds may become less crucial for intelligibility. Then again, the present study of-

fers new knowledge concerning the gravity of a selection of sounds *in relation to each other*. Based on the results, teachers can set priorities according to the above ranking, which reflects the likelihood of misunderstanding caused by segmental deviation. Even though conducting intelligibility research in authentic speech situations is challenging, future research could look into the possibilities of considering the effects of context.

Secondly, the present study is based on a small sample of representative examples, and the position of segmental deviation within a word was not considered systematically. For example, word-medial positions were not included in the test sentences. Thirdly, we cannot completely disregard the possibility of listener background influencing the results. In addition, word frequency may have had an effect: some of the minimal pairs consisted of unequally frequent words. The word *lies*, for example, is much more frequent hence more familiar to the listeners than *lice*. Consequently, the listeners may have more easily heard the word as *lies*.

Regarding /ɪ/ being substituted with /i/, it was not possible to include test items demonstrating a clear difference in vowel duration. However, even a moderate difference seemed to affect intelligibility: while a slightly longer /i/ (instead of /ɪ/) in *slip* resulted in only 24% of the listeners correctly identifying the word, a moderately shorter /i/ in *tins* made the word intelligible to 54% of the listeners. The finding suggests that vowel quantity is more influential than vowel quality, but it should be acknowledged that even the shorter /i/ led to frequent misunderstandings in the present study. This could be interpreted so that for many listeners the vowel in *tins* was not short enough to be identified as /ɪ/. Hence, the results regarding the /i-ɪ/ opposition are not conclusive but need to be verified in future research. Suggested future studies could focus on the typical vowel duration of L2 speakers' /i/ when used to substitute /ɪ/ and on determining how short the /i/ should be to be perceived as /ɪ/.

Finally, L1 English listeners were opted for in order to avoid the possible effects of L2 listeners' proficiency in English (cf. Beinhoff 2014). However, L2 listeners would have been more relevant, as EFL learners are likely to communicate with other L2 speakers, rather than L1 speakers of English (Brabcová & Skarnitzl 2018). Hence, the next steps in exploring the intelligibility of L1 Finnish speakers' L2 English could include intelligibility tests such as the present one (or other ways of data collection) with L2 speakers of English as listeners.

## 6 Conclusion

This study aimed to shed light on the gravity of segmental deviations typical of L1 Finnish speakers' L2 English. An intelligibility test was conducted to investigate to what extent the selected deviations affect intelligibility, and which individual

sounds could be prioritized in teaching. The results revealed that most of the deviations typical of the target group may lower intelligibility to a great extent. Based on the present study, the pronunciation of /v/ deserves priority, followed by contrasts in stop consonants /p, t, k/ vs. /b, d, g/ and the pronunciation of word-initial /z/. Further, interdentalals also deserve attention in teaching, even though their functional load suggests they cause misunderstandings more seldom than the above-mentioned challenges. Finally, less attention can be paid to teaching the tense–lax opposition of vowels and the pronunciation of word-final /z/, because these as such were found less crucial for intelligibility. Paying attention to vowel duration contrasts can be recommended instead.

The present study can serve as an inspiration for teachers to consider the gravity of segmental deviations typical of their specific learner group. Instead of taking it as given to emphasize the typically challenging sounds, it is recommended to consider how severe the deviations are for intelligibility. Overall, individual sounds have been found less crucial for intelligibility and comprehensibility compared to prosodic features. Hence, it is important to direct the training to the crucial sounds and to save time and energy for the teaching of prosody. At best, contemporary pronunciation teaching helps learners to develop their intelligibility by being systematic, using varied teaching techniques and emphasizing features that contribute to intelligibility and comprehensibility, whereas there is no need to require learners to sound like L1 speakers.

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